



New South Wales Import Export Container Mapping Study

Report

**Prepared for:
Sea Freight Council of NSW**

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1 Executive Summary

A recent Sydney Ports Corporation (SPC) forecast predicted that total container volumes through Sydney will increase from the current 1.1 million TEUs per annum to 2.5 – 3.0 million TEUs per annum by 2025. Along with this increase in freight volumes it is predicted that empty container movements will also increase significantly as will the proportion of 40' container movements. Such significant increases will place increasing pressure on container management processes and infrastructure in New South Wales (NSW).

Against this backdrop, the Sea Freight Council of NSW commissioned this study in an effort to investigate container management processes associated with the ports of NSW. The primary goal of this study is to provide qualitative and quantitative information that will assist industry and government with the following:

- Defining major, international container movements in NSW;
- Identifying key factors that contribute to the movement of containers;
- Outlining areas for improvements to the container management process; and
- Providing a strong database to underpin future projects.

Given the scope of information targeted for the study, two data collection methods were adopted; 40 face-to-face *Qualitative Interviews* were held with stakeholders and a *Quantitative Survey* was sent to 190 stakeholders.

Unlike Origin-Destination studies, which seek to quantify where containers are packed (ultimate origin) and unpacked (ultimate destination), this study focused on container movement patterns. The survey captured 62% of 2001/02 import container trade in NSW and 95% of export container trade. Survey data was used to map 78% of total land based primary container movements (TEU) and 50% of total land based secondary container movements (TEU).

Analysis of container movements captured showed that Sydney's industrial suburbs of Bankstown, Parramatta, Fairfield, Blacktown and Campbelltown account for a significant proportion of import and export related container flows, with 70% of full import and 34% of full export container movements concentrated in these suburbs.

Analysis of container management processes indicated that while containers follow relatively straightforward physical pathways, the management of the overall land based container movement task is more complex, compounded by factors including seasonality and the lack of overall coordination in the container movement process.

Stakeholders identified a number of issues currently affecting land based container movements to and from the ports of NSW, which, if not addressed, will see current inefficiencies become more prominent as container numbers increase and the balance between imports/exports and 20/40' containers changes over time. Opportunities to improve efficiency include:

- Information management;
- Vehicle Booking Systems;
- Empty container management;
- Container staging;
- Seasonality – capital investment
- Use of rail transport;
- Hours of business; and
- Increasing land values.

The study concludes that there is limited scope for individual industry participants to coordinate the container management process. This highlights the importance of industry collaboration in relation to achieving the efficiencies required to meet the increasing pressures on the container management task in the future.

2 Introduction

2.1 Context

Whilst NSW containerised freight volumes are reasonably understood from historical data, trade statistics and forecasts, there has been little research performed on the entire container management process.

Previous research primarily identified the origin and ultimate destination of international container movements. However, this research has concentrated on the individual links in the ports' supply chains.

Jays Corporate Services Pty Ltd was engaged to undertake a comprehensive investigation into container management processes associated with the ports of NSW.

2.2 Objectives

The overall purpose of this study was to provide qualitative and quantitative information that will assist industry and government with the following:

- Defining major, international container movements in NSW;
- Identifying key factors that contribute to the movement of containers in NSW;
- Identifying opportunities to improve the container management process in NSW;
- Adding to the knowledge base of previous NSW research; and
- Providing a strong knowledge base to underpin future projects.

2.3 Information Targeted

This report summarises the qualitative and quantitative information collated during an investigation into container management processes associated with the ports of NSW.

The specific information targeted in this investigation included a data set of land based international container movements suitable to calculate the total annual NSW container movement task.

To provide a consistent base, 2001/02 information was sought from participants, except where the particular year was unrepresentative of normal trading conditions (eg agriculture was severely drought affected in 2001/02). In these cases participants were requested to supply information regarding a 'normal' year.

Unlike Origin-Destination studies, which seek to quantify where containers are packed (ultimate origin) and unpacked (ultimate destination), this study focused on significant container movement patterns and summarised results into two major container movement patterns:

1. Primary moves - defined as international container movements to or from a NSW marine terminal; or
2. Secondary moves - defined as international container movements that do not include a NSW marine terminal eg modal changes, empty returns to container parks.

2.4 Terms and Definitions

<i>Container</i>	International shipping container, commonly 8' wide, 8' high and either 20' or 40' long
<i>Destuff</i>	Unload goods from containers
<i>Empty Container Park</i>	Operation storing, cleaning and repairing empty containers
<i>Exporter</i>	Operation exporting goods and loading containers
<i>FEU</i>	Forty foot equivalent unit = 2 x TEU
<i>Importer</i>	Operation importing goods and unloading containers
<i>Intermodal Terminal</i>	Operation transferring containers between road and rail
<i>SPC</i>	Sydney Ports Corporation
<i>Stack run</i>	Block Movement of containers – usually empty
<i>Staging</i>	Breaking a container journey between origin and destination
<i>Marine Terminal</i>	Operation loading and unloading ships
<i>Stuff</i>	Load goods into containers
<i>TEU</i>	Twenty foot equivalent unit – used to describe trade volumes
<i>Timeslot</i>	Allocated window for deliveries/dispatches
<i>VBS</i>	Vehicle Booking System used by Port Botany Stevedores

2.5 Acknowledgements

This study was undertaken in collaboration with the New South Wales Government transport and economic development agencies, Shipping Australia, Toll Logistics, P&O Ports, Pacific National and the Sydney, Newcastle and Port Kembla Port Corporations.

In particular, the project team would like to thank those who provided information for this report, as without their time and patience this report would not have been possible. Their names have only been excluded to ensure confidentiality.

2.6 Disclaimer

The methodology used in this report was developed specifically for this particular project, taking into account the time frame and ultimate aim of the document. The methodology has not been rigorously tested and we have been unable to independently verify the accuracy of information provided by respondents.

3 Methodology

Given the scope of the study, two data collection methods were adopted:

Qualitative Interview: face-to-face interviews were held with 40 stakeholders involved in the land based container task in NSW. The interviews aimed to clarify container data trends and summarise issues industry believed were impeding container management efficiencies; and

Quantitative Survey: a survey was sent to 190 industry stakeholders involved in the land based container task in NSW. The survey aimed to provide data on all land container movements relating to NSW ports, including local, regional and interstate movements.

The primary data compilation methods included:

- Respondents electronically collating information in spreadsheet format; and
- Respondents manually collating information with data entry by the project consultant.

3.1 Data Capture Rates

The study's qualitative and quantitative analyses were based on a broad industry sample, identified via consultant, Sea Freight Council and stakeholder databases. The study's quantitative and qualitative survey participation results are shown in Table 1:

Table 1: Survey Response Levels

Stakeholders	Organisations Interviewed	Organisations Surveyed	Qualitative Information Provided	Quantitative Data Provided	Response Rate
Shipping Lines	5	17	1	4	29%
Stevedores	2	2		2	100%
Forwarders	1	15	1	8	60%
Importers	8	36	3	14	47%
Exporters	7	67	2	43	67%
Empty parks	7	8	4	1	63%
Intermodals	6	21		15	71%
Road	1	19	1	10	58%
Rail	2	5		5	100%
Leasing	1				na
TOTALS	40	190	12	102	60%

Overall, 114 (60%) of the 190 organisations contacted responded to requests for information.

It is important to note that survey participation was voluntary. As such, participants were followed up throughout the data collection stage by the project consultant, and either the Sea Freight Council Project Manager or the relevant project stakeholder. This continued until it was felt that the investment of further resources would be unlikely to produce a favourable result. The criteria for a successful response appear to relate to the firm's capacity to source relevant information and their interest in improving the overall situation for the industry.

3.2 Primary Container Moves

The sample base was designed to maximise the magnitude of container movement data capture. As such, organisations identified as handling the largest number of containers within each link of the container supply chain were approached to take part in the study. A risk associated with this approach is the duplication of container movements. For example, transport operator and exporter records may describe the same container movements. However, a review of all data by container type at journey level identified and eliminated duplicate records.

Data sets by container type and trade direction were then compared to NSW Port Corporations' 2001/02 container trade statistics to confirm the final number of unique records shown in Table 2.

Table 2: Data Collection Comparison

Container Type	Container Trade Data Captured in this Study	NSW Port Corporation Trade Data 2001/2	Portion Captured in this Study
IMPORT			
Dry Full 20'	125,775	224,818	56%
Dry Empty 20'	5,819	13,630	42%
Reefer Full 20'	3,537	15,916	22%
Reefer Empty 20'	3,221	3,221	100%
Dry Full 40'	102,878	128,526	80%
Dry Empty 40'	2,155	2,155	100%
Reefer Full 40'	76	4,889	2%
Reefer Empty 40'	523	523	100%
SUB TOTAL	243,984	393,678	62%
EXPORT			
Dry Full 20'	157,665	166,430	95%
Dry Empty 20'	55,828	55,826	100%
Reefer Full 20'	16,328	16,668	98%
Reefer Empty 20'	nil	2,975	nil
Dry Full 40'	61,070	63,859	96%
Dry Empty 40'	55,884	55,884	100%
Reefer Full 40'	2,269	3,267	69%
Reefer Empty 40'	nil	1,056	nil
SUB TOTAL	349,044	365,965	95%
TOTAL	593,028	759,643	78%

Source: NSW Port Corporations' 2001/02 container trade statistics

Note: Figures are shown in containers not TEUS

The survey collected data on 243,984 import containers and 349,044 export containers, representing approximately 62% of 2001/02 import container trade and 95% of 2001/02 export container trade in NSW. With the exception of refrigerated import containers, all other container types were well represented with more than 40% of trade captured.

3.3 Secondary Container Moves

The capture of primary container movements was relatively straightforward given the availability of NSW Port Corporations' 2001/02 container trade statistics. However, secondary container movements proved relatively difficult to capture, as respondents were generally unaware of movements outside their direct control.

As such, secondary container movements were quantified using estimates provided by industry stakeholders.

Most respondents interviewed indicated between 30% and 70% of containers had an extra transport leg included in their journey. As such a large percentage of containers move from wharf to destuffing and return to a container park, it is expected that container movements per 100 containers should approximate:

- 100 pick up/deliver to wharf,
- 50 (between 30 and 70) extra transport legs; plus
- 80 to/from empty container park.

This equates to 230 moves per 100 containers. Separate anecdotal analysis for each link in the chain was also undertaken with the results confirming this approximation.

After deducting the primary move this suggested that each container averages approximately 1.3 secondary moves¹.

Therefore, for the 624,373 full import/export containers recorded by NSW Port Corporations in 2001/02, it is estimated total land based secondary container movements should have been approximately 811,685. Since 404,590 secondary container movements were identified, the capture rate was 50% of total land based secondary container movements. This information void provides a working example of the challenges facing the industry regarding container management practices.

It is estimated that a significant number of the secondary moves not captured during the survey were interim road moves. This may be partly attributed to the study sample base under-representing small container road transport operators, a significant number of which carry containers via interim locations

It is important to observe the significance of the secondary data limitation in two key areas. Firstly, limitations may have impacted on land based container movement patterns. For example, comparisons with earlier studies undertaken by SPC indicate possible under representation of container movements in the Botany area. Secondly, data limitations may have impacted on the study's road/rail modal share, as missing moves were predominantly road based interim container movements.

3.3 Confidentiality

The data provided in this report has been aggregated to ensure respondents' commercial information remains confidential. Steps taken include:

- Referring to Local Government Areas within the Sydney Basin (as defined by the NSW Department of Local Government);
- Referring to NSW regional areas outside the Sydney Basin (as defined by the NSW Department of Local Government);
- Combining refrigerated and dry container movements to protect those businesses operating in the less active market;
- Combining road and rail movements to protect rail terminal activity levels; and
- Reporting trade by either percentage or by ranges of containers, rather than actual TEUs.

¹ The Victorian Origin-Destination Study estimated the number of container moves to be in the range of 2.4 – 4, with greater than three moves being most likely. However, the different commercial environments operating in each state may account for differences in the estimate.

4 Findings

Survey data was used to map 78% of total land based primary container movements (TEU) and 50% of total land based secondary container movements (TEU).

4.1 Container Movement Patterns

The following Chapter outlines land-based container movements associated with the Ports of NSW, summarising the results of the data collection detailed under Appendices A-G.²

Sydney's industrial suburbs of Bankstown, Parramatta, Fairfield, Blacktown and Campbelltown account for a significant proportion of import and export related container flows, with 70% of full import and 34% of full export container movements concentrated in these suburbs.

4.1.1 Full Import Container Movement Patterns

The top 10 destinations for full imports (TEU) were all in the Sydney Metropolitan Area and accounted for 90% of inbound trade:

1. Bankstown	25%
2. Fairfield	15%
3. Parramatta	12%
4. Blacktown	11%
5. Botany Bay	8%
6. Campbelltown	7%
7. Holroyd	5%
8. Auburn	3%
9. Willoughby	2%
10. Leichhardt	2%

The Bankstown area led import destination flow with 25% of inbound container trade. The top 2 locations account for 40% of import container movements, while the top 5 locations account for more than two thirds of import container flows. (Refer to Appendices A and E for additional information)

4.1.2 Full Export Container Movement Patterns

The top 10 origins for full export containers (TEU) accounted for 83% of outbound trade. In contrast to full imports, a significant proportion (43%) of full exports originated outside the Sydney Metropolitan Area:

1. Bankstown	13%
2. Parramatta	11%
3. Central West	10%
4. Hunter	9%
5. North Western	8%
6. Brisbane	8%
7. Northern	8%
8. Botany Bay	6%
9. Fairfield	5%
10. Campbelltown	5%

Compared with imports, export container concentration was more evenly distributed across locations. The top 2 locations account for 24% of export containers, while the top 5 locations account for more than 50% of exports. (Refer to Appendices B, D and F for additional information)

² It is important to note that study's sample base was designed to maximise the magnitude of container movements. As such, this sample technique may impact on the statistical validity of extrapolating report information.

4.1.3 Empty Container Movement Patterns

The top 12 empty container journeys (TEU) accounted for 63% of total empty container movements³, with intra-area moves around Botany Bay locations accounting for more than one fifth (22%) of movements:

1. Botany Bay – Port	19%
2. Botany Bay – North Western	7%
3. Botany Bay – Central West	6%
4. Botany Bay – Hunter	5%
5. Botany Bay – Murrumbidgee	4%
6. Marrickville – Port	4%
7. Botany Bay – Botany Bay	3%
8. Blacktown – Parramatta	3%
9. Parramatta – Port	3%
10. Bankstown – Botany Bay	3%
11. Fairfield – Botany Bay	3%
12. Blacktown – Botany Bay	3%

The data showed that the predominant journey type for empty containers is within metropolitan Sydney with 58% of empty movements originating from the Botany Bay area and 47% of movements destined for the Botany Bay area. This is not unexpected as the Botany Bay area encompasses the Port of Botany and a significant number of intermodal terminals and empty container parks. (Refer to Appendices C and G for additional information)

4.2 Rail and Road Movements

While a range of approaches could be undertaken to analyse road rail market share for container transport, the approach used in this study was influenced by confidentiality issues, and therefore represents the proportion of container journeys undertaken by each transport mode as a percentage of overall container journeys.

A significantly higher proportion of survey information was obtained for rail moves compared to road, thereby affecting calculated road rail market share figures. It is also important to note that the inclusion of rail movements from outside NSW and “normal year” estimates by the agricultural and rail sectors may have further affected rail usage figures.

³Empty Container Imports

Discussion with industry representatives concluded that refrigerated containers imported empty had their first movement in the Botany Bay area, most often for cleaning and pretripping. Therefore, the database includes refrigerated containers as moving initially to Botany Bay.

Empty Container Exports

One significant area where data availability was limited included the movement of empty containers from empty container parks to stevedore terminals. (These container movements are often a stack run from empty container park(s) to the stevedore terminal to “top up” ship capacity prior to sailing.)

However, an estimate was based on the following:

1. Container throughput per day (for empty container parks) was provided by SPC;
2. Days per week opened were used with (1) to calculate annual throughput;
3. Annual throughput was divided by capacity to provide inventory turns;
4. Inventory turns were calculated for sites where limited data was available;
5. Inventory turns were multiplied by capacity to find annual TEU turnover;
6. Splits between 20' and 40' containers were made using SPC data;
7. 80% of export empties were assigned to “near-Botany parks”;
8. 20% of export empties were assigned to “other parks”; and
9. SPC empty exports from parks were calculated on the basis of park throughput.

4.2.1 Rail Movements

Survey data showed that:

- Rail transport accounted for 25-27% of the overall movement of containers to and from the marine container terminals (as reported by stevedores);
- Railed imports accounted for 49% of the total collected import movements in NSW. This was consistent across container types and included imports from ports outside NSW;
- Railed exports accounted for 53% of the total collected export movements in NSW. This included a number of containers exported from Queensland through Botany to the US West Coast using the Sea Train Service (there is no direct shipping service from Brisbane to the US West Coast). However, recent industry feedback suggests some shipping lines are now exporting containers from Brisbane to Auckland for transshipment to the US West Coast; and
- Rail accounted for nearly two thirds of exported full 40' containers, supporting rail's weight and efficiency advantage over long distances, as a large proportion of 40' containers carry heavy agricultural/extractive product from rural centres.

In addition to cost benefits, consignees, including exporters, importers and freight forwarders, identified the following reasons for using rail transport:

- Reduces lead time;
- Convenience;
- Overcomes weight restrictions for 40' containers; and
- Reduces environmental impacts.

4.2.2 Road Movements

Survey data showed that:

- Road transport accounted for 73-75% of the overall movement of containers to and from the marine container terminals (as reported by stevedores);
- Roaded imports accounted for 51% of the total collected import movements in NSW; and
- Roaded exports accounted for 47% of the total collected export movements in NSW.

Consignees, including exporters, importers and freight forwarders, identified the following reasons for using road transport:

- Advantages over short distances;
- Flexibility;
- Reliability;
- Direct access to marine terminals; and
- Western Sydney rail terminal shortages.

It is important to note that, in a number of cases, existing capital investment precluded anything other than the current transport mode – this applied to both road and rail usage.

4.2 Container Management Process

The following Chapter outlines the container management process associated with the Ports of NSW, summarising findings from qualitative and quantitative survey information.

This study defines the container management process as comprising those tasks involved in delivering import containers from ships alongside NSW marine terminals to the point of de-stuffing and container return, while the export container process involves tasks associated with the pick up of the empty container and its path to the ship.

An observation of this project is that while the physical path of containers is a relatively straightforward, logical process, the management of the overall land based container movement task is more complex, compounded by factors including seasonality and the lack of overall coordination in the container management process.

4.2.1 Container Supply Chains

While respondents described a range of container supply chains, analysis showed that, from a consignee perspective, there are four major container supply chain categories:

The two most commonly cited **export container supply chains** are:

1. **Rural** - the container (generally 20' containers, due to weight restrictions either within NSW or the destination country) takes the following steps after being sourced from an empty container park:
 - Road transport to intermodal rail terminal (the bulk of rural exports are railed);
 - Packing at intermodal rail terminal **or** rail transport to rural destination;
 - Packing at rural siding **or** road transport to packing facility and return to rail terminal; and
 - Rail transport to the port.
2. **Metropolitan** – the container takes the following steps after being sourced from an empty container park:
 - Road transport to packing facility (tends to be either within the port precinct or in the outer suburbs of Sydney);
 - Packing; and
 - Road transport to the port (few metropolitan exports are delivered to the port by rail).

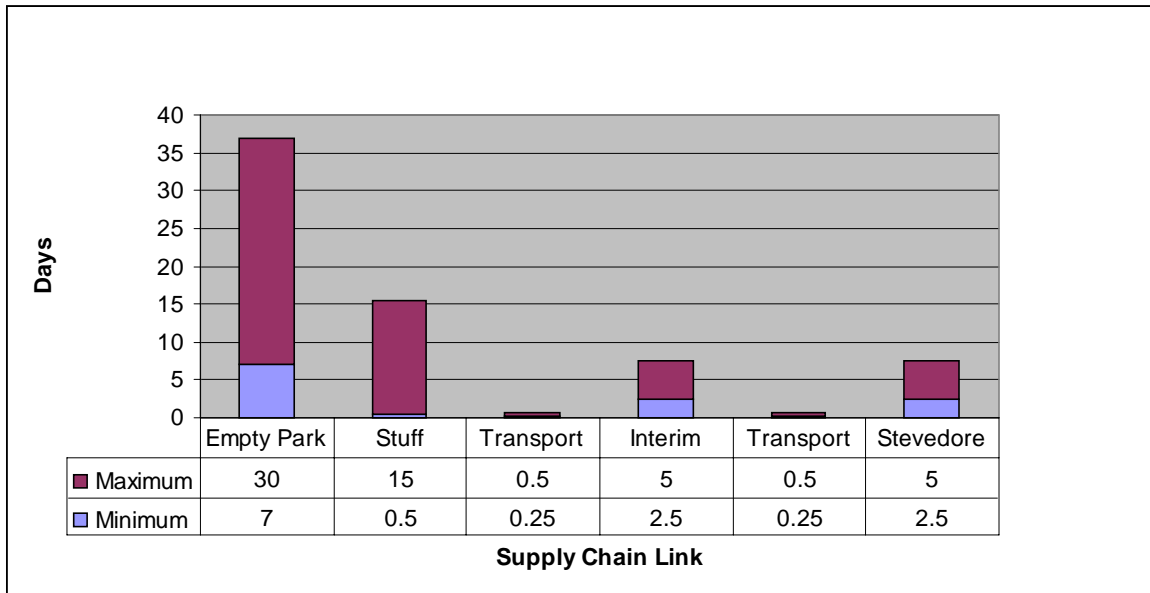
The two most commonly cited **import container supply chains** (import containers are predominately delivered to the Sydney metropolitan area) are:

3. **Within 20 kilometres of the port** – the container takes for the following steps:
 - Road transport to unpacking facility (in some cases this is within the port precinct);
 - Unpacking; and
 - Return of empty container by road transport to a near-port empty container park.
4. **Between 20 and 50 kilometres of the port** – the container takes the following steps:
 - Road transport to unpacking facility (generally urgent freight or where the unpacking location is not near a rail terminal, eg northern beaches) **or** rail transport to a suburban intermodal rail terminal where unpacking occurs **or** on-delivered by road transport to the unpacking facility;
 - Unpacking; and
 - Return of empty container by road transport to an empty container park in western Sydney or near-port empty container park, depending on shipping line instructions.

4.2.2 Container Dwell Times

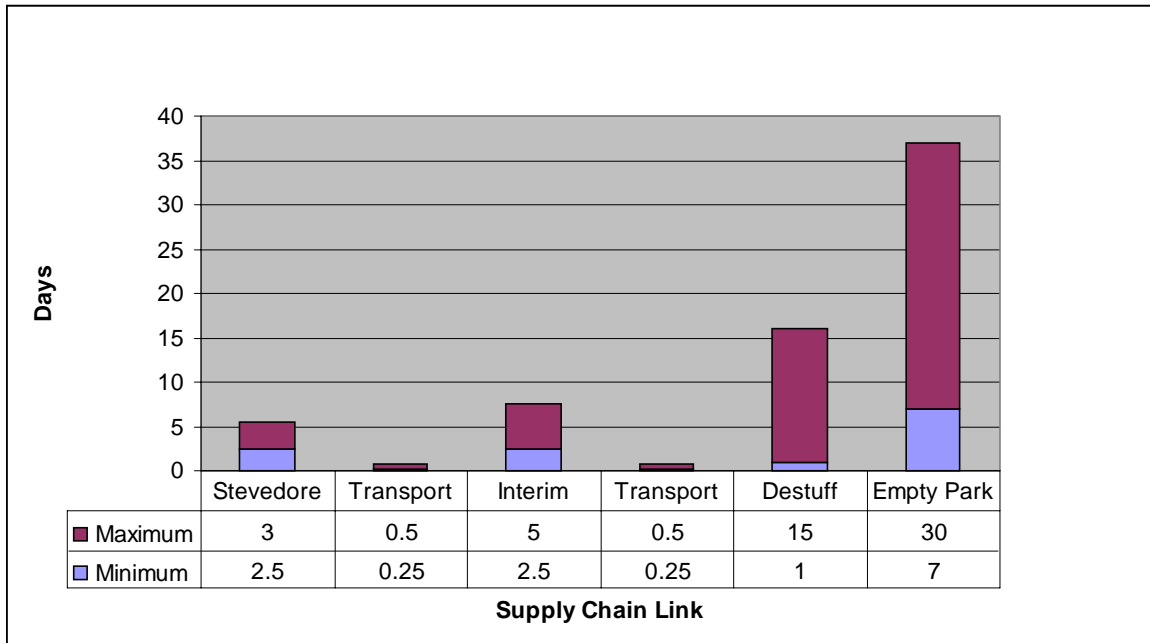
Details of average dwell times for the container export supply chain are shown in Figure 1:

Figure 1 Average Dwell Times – Export Containers



Details of average dwell times for the import container supply chain are shown in Figure 2:

Figure 2 Average Dwell Times – Import Containers



4.2.3 Container Supply Chain Costs

Table 3 outlines indicative consignee freight costs for the major container supply chains described under section 4.2.1:

Table 3: Typical Container Supply Chain Costs

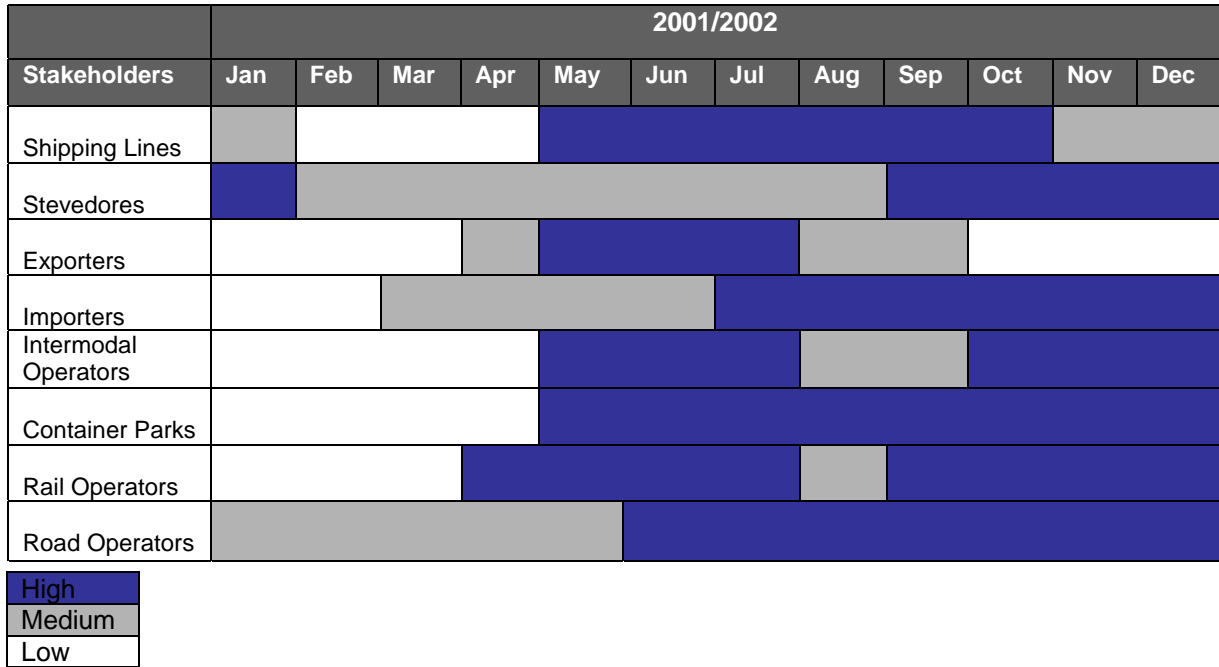
Exporter Controlled Container Activity	Rural Export (Regional)	Metro Export (Outer Metro)
Transport Empty to Exporter	\$400	\$350
Lift from Transport (Truck)	\$10	\$10
Load Cargo to Container	na	na
Lift to Transport	\$10	\$10
Transport to Container Terminal	\$400	\$350
Other Export Container Chain Costs (Dependent on Circumstances)		
Empty Storage	\$1	per day
Load from Container Storage Park	\$10	per lift
Container Terminal Handling (Local)	\$173	per container
Port Cargo Charges (Local Port Corp. Schedule)	\$60	per container
Sea Freight (Type of Unit, Shipping Company and Destination Specific)	\$580	per TEU, Singapore
Bunker Surcharge (if applicable)	\$31	per TEU, Singapore
Peak Season Surcharge (if applicable)	na	
Container Terminal Handling Charge (Overseas Destination)	\$167	per TEU, Singapore
Transport to Import Destination (if FIS Terms)	na	
Importer Controlled Container Activity	Metropolitan (<20Kms)	Metropolitan (<50Kms)
Transport From Container Terminal	\$150	\$450
Lift from Transport (Truck)	\$10	\$10
Unload Cargo from Container	na	na
Lift to Transport	\$10	\$10
Transport Empty to Container Park	\$150	\$450
Other Import Container Chain Costs (Dependent on Circumstances)		
Transport from Import Origin (FIS Terms)	na	
Container Terminal Handling (Overseas Departure Port)	\$167	per TEU, Singapore
Sea Freight (Type of Unit, Shipping Company and Destination Specific)	\$700	per TEU, Singapore
Bunker Surcharge (if applicable)	\$31	per TEU, Singapore
Peak Season Surcharge (if applicable)	na	
Port Cargo Charges (Local Port Corp. Schedule)	\$45	per TEU, Singapore
Container Terminal Handling Charge (Local)	\$173	per TEU, Singapore
Transport to Import Destination (FIS Terms)	na	

Source: study quantitative and qualitative survey information

4.2.4 Seasonality

Seasonal factors impact significantly on the container supply chain. Figure 3 provides a general indication of annual container activity levels across industry stakeholders in the container task in NSW:

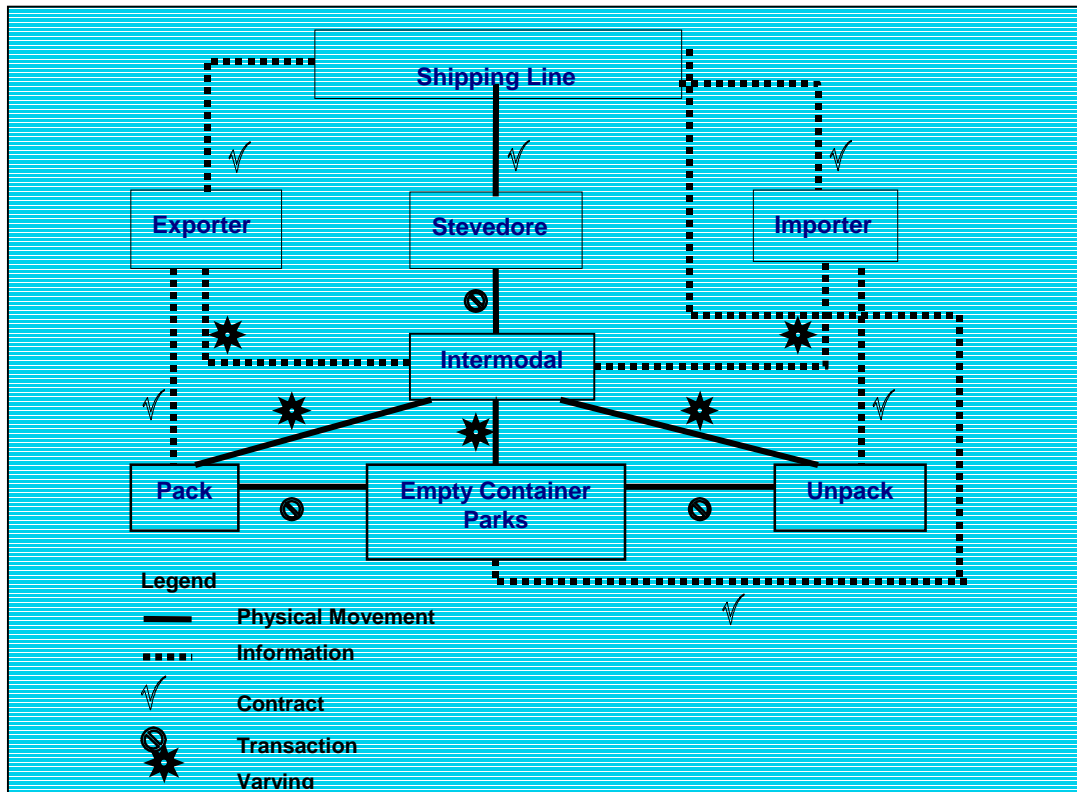
Figure 3: Seasonal Container Activity



4.2.5 Industry Structure

Figure 4 highlights key transport and information tasks associated with the container supply chain:

Figure 4: Industry Structure



Diverse container origin destination points combined with limited co-ordination among various industry stakeholders, promote a number of sub optimal arrangements in the container supply chain:

- While shipping lines (container controllers through either ownership or leasing arrangements) have contractual relationships with the stevedore, importer/exporter and container park, they tend to have limited relationships with container handlers along the land based chain;
- Road, and to a lesser extent rail, transport operators often have only transactional relationships for single container movements, particularly at the low cost end of the market where transport is treated as a commodity (the major exception here is rail and to some extent exports where shipping lines book land transit on behalf of customers);
- Empty container parks are generally unaware of the origin or destination of containers released to or returned from shipping company customers; and
- Marine terminal operators, stevedores, did not need to understand the origin or destination of containers leaving or entering their premises.

The fragmented nature of the communication flows associated with the container task, combined with the relatively high proportion (50%) of unaccounted secondary container movements, indicate opportunities for collaborative container tracking systems. In particular, qualitative interviews suggest that the congestion associated with seasonal peak periods is likely to continue without such an improvement to the container supply chain.

5 Opportunities to Improve Efficiency

The following Chapter summarises qualitative and quantitative survey information into a set of key issues, to be considered by various stakeholders:

5.1 Information Management

Section 4.2.5 of this report demonstrated that no one organisation (except possibly those vertically integrated) had complete information on container movements. Given this situation, it should come as no surprise that the current chain is disjointed and not able to take advantage of all the efficiencies that may be available through structural change. However, there is no link that needs full chain information to provide the current service, ie:

- Shipping companies don't need to know where their containers are – just that they are returned before time allowed has elapsed;
- Transport companies only need to know their movements as they are ordered;
- Empty container parks only need to receive, store and load containers;
- Importers only need to destuff their containers and return them to a container park within the time limit; and
- Exporters are able to book sea freight at the last moment (at low cost treating sea freight as a commodity), as NSW imports exceed exports.

To achieve the necessary level of information exchange to significantly increase chain efficiency would require a degree of cooperation that was not evident as part of this project. On this basis, there would appear to be limited opportunity, other than among those organisations vertically integrating, to manage overall operations and extract the efficiencies available.

5.2 Vehicle Booking Systems

Survey feedback most commonly identified Vehicle Booking Systems as an issue, with respondents quoting the following related issues:

- High VBS joining fees;
- Limitations on booking periods;
- Inconsistent service, including bias toward stevedore-owned transport companies; and
- Inconsistent performance measurement, including excessive penalties.

5.3 Empty Container Management

Shipping lines determine the return location for import containers once they are destuffed. This decision is complicated for the lines as they are often unsure of the containers next destination, which could be in Australia or overseas. The difficulty of coordinating empty container movements is highlighted in Table 4:

Table 4: Container Return Decision Matrix

De Hire	Exported Empty		Exported Full		
	Importer	Shipping line	Importer	Shipping line	Exporter
Near port	Pays (extra) to return container to park if from west	Pays premium storage rates prior to ship loading	Pays (extra) to return container to park if from west	Pays premium storage rates prior to ship loading	Incurs higher transport costs in collecting empty
Western Sydney	Saves by shortening distance to transport to de-hire	Lower storage costs offset by higher cost of transport to wharf	Saves by shortening distance to transport to de-hire	Lower storage costs and more attractive to exporter	Saves on transport costs

Shipping lines will seek to minimise costs by requiring de-hire at a point close to the wharf unless they have a known customer elsewhere. The issue then is to predict which empty containers will be packed for export if the freight rate is attractive enough. There is a further argument that there can be better value to the lines in exporting containers empty to reload overseas at better freight rates and increased revenue.

Some shipping lines felt there was an opportunity to better forecast needs, rather than adopting what was anecdotally described by respondents during industry interviews as a “just-in-case” approach.

Forecasting container demand is as much the consignees’ responsibility as the shipping lines. However, freight rate trends have engendered last-minute container ordering by exporters, based on the lowest shipping rate, which works against collaborative demand prediction and optimising efficiency.

During the data collection phase of the project at least one shipping line had begun directing empty containers from importers to maritime terminals instead of to empty container parks. This avoids the extra transport charge between the empty container park and the wharf, reducing shipping line costs and increasing overall efficiency of the container supply chain. However, there may be implications for road operators that traditionally move empty containers to the wharf as stack runs.

The fragmented nature of empty container stock management, combined with the high number of surveyed empty box relocations, suggests opportunities for collaborative demand prediction

5.4 Container Staging

Staging is where a full container (usually an import) is delivered to anywhere other than its destuffing location. There are also situations where empty containers are staged. Staging adds cost to the supply chain and is the other major determinant of container movement decisions (with the exception of direct delivery). Qualitative information indicated a number of reasons for staging:

- Terminal delays – for example, road transporters delayed at marine terminals miss following delivery windows at distribution centres (by being either late or after business hours). To continue using the vehicle, the road operator may need to unload containers at an interim location;
- Modal change – for example, rail/road exchanges other than at the marine terminal or consignee location;
- Shorter opening hours at container parks and importer/exporter warehouses – for example, marine terminals permit road transporters to pick up containers 24 hours per day while local government regulations restrict operating hours at some container receipt facilities. To continue using the vehicle, the road operator may need to unload containers at an interim location;
- Disparities between consignee ordering cycles and storage capacities – for example, seasonality or where a small importer may have more containers discharged from a ship than container unloading facilities; and
- Empty container consolidation – for example, empty containers may not necessarily have the same pick up or delivery location (different shipping lines use different container parks) resulting in road transporters consolidating at interim locations.

5.5 Seasonality – Capital Investment

Transporters indicated that the delays at wharves and container parks were worst during the period September to December when the imported products for retail sale were more prevalent. During winter no problems were identified, indicating the delays are in some part related to activity.

Compounding this could be competitive pressures for market share that can cause over supply and place unnecessary pressure on the supply chain. This presents an issue for the operators in that a commercial decision on the size of operations is normally based on average use, attempting to minimise excess idle equipment during low seasons. The combination of seasonal over supply and minimalist capital investment were identified as contributors to supply chain issues.

5.6 Use of Rail Transport

SPC reports that rail volumes have increased every year from 79,000 TEU in 1995 to 255,000 TEU in 2003, despite the drought affecting rural exports.

In general, respondents viewed rail transport as an efficient and viable alternative to road even within the Sydney metropolitan area, eg railing a container to Ingleburn was anecdotally 55% of the road cost, providing destuffing occurs at the rail head. Rail is also able to handle greater weights and has environmental benefits. The major issues raised were:

- Operational inefficiency;
- High transport costs when combined with road;
- Inadequate infrastructure; and
- Poor infrastructure maintenance.

In particular the Federal and NSW Government's need to support rail as an alternate transport option was identified by many respondees, eg the closure of the Menangle Rail Bridge in March 2003 and placing the alternate routes under maintenance forced rail traffic to road (The Australian – 26 July 2003).

5.7 Hours of Business

The disparities in operating hours across key elements of the container supply chain were regularly raised as reasons behind sub-optimal container handling practices.

Survey feedback identified that the following key issues were constraining further development:

- Financial imperatives – in general, container park operators believed the majority of importers and exporters worked similar hours to container parks. As such, operators concluded increasing their hours of operation would only serve to increase costs without increasing revenues;
- Local government restrictions – local government regulations determine warehouse opening hours. As such, further industry developments rely heavily on local government support; and
- Shipping line office opening hours – late release of container advice was identified by transporters and container park operators as a contributing factor.

5.8 Increasing Land Values

In general, container park operators reported ongoing pressures on margins. In particular, the impact of the increasing value of Sydney land, particularly close to the port area, is causing rent and rates to increase beyond the ability of current leasees' revenue.

Table 5 highlights this issue, comparing the estimated investment return of one acre of land in two hypothetical empty container parks located in the mid west and the outer west suburbs of Sydney:

Table 5: Container Park Location Returns

	Mid Western Sydney (20Kms from Botany)	Outer Western Sydney
	Details	
Land Value	\$1,500,000	\$200,000
Interest rate	7%	7%
TEU's per acre (max)	500	500
Revenue per TEU	\$1.00 per day	\$0.60 per day
Rates (est)	\$80,000 pa	\$60,000 pa
Other costs	\$20,000 pa	\$20,000 pa
Business Case		
Total Revenue (max)	182,500	109,500
Less expenses:		
Interest	105,000	14,000
Rates	80,000	60,000
Other	20,000	20,000
Total Costs	205,000	94,000
Net profit/(loss)	(22,500)	15,500
Return on asset	-1.5%	7.75%

Source: study quantitative and qualitative survey information

This indicates the return on inner Sydney land is negative and supports the view put by a few operators that the business value for storage of empty containers is in the land.

Qualitative interviews suggest that once the current mid west container park owners divest their properties, it is unlikely that similar businesses will continue. The closure of RACE Container Park at Auburn in late 2003 supports this view. This geographic gap will place increasing pressure on the container supply chain, as container parks will concentrate operations in either the Botany area or the outer west suburbs.

6 Conclusion

This study has identified a number of key issues that will impact on the container management process in the future:

- Container trade will increase. However there is significant variation among stakeholder growth forecasts, with respondents predicting increases between 5% and 20% per annum for the next 3-5 years:

– Shipping Lines	5-12%
– Exporters	6-10%
– Importers	5-10%
– Freight Forwarders	9-10%
– Intermodal Operators	10-15%
– Empty Container Parks	5-10% (although many are regularly at capacity)
– Rail Operators	Not determined due to the impact of the drought
– Road Operators	10-20%

SPC reported annual increase in container trade of 15% for 2002/03 to 1,160,747 TEU supports these views. Respondents also indicated there is every reason to expect this level of increase will continue after the fifth year. At 10% pa, this would see 1.6 million containers pa coming through the NSW port system in 5 years. In comparison, research undertaken by the SPC and the Bureau of Transport and Regional Economics, indicates a most likely long term growth of between 5-7% pa.
- Industry opinion is that Port Jackson will continue to see its container trade decline in favour of other ports over time. This was confirmed by a number of late 2003 announcements regarding the future of cargo trade in Port Jackson.
- Rail terminals will continue to develop in Sydney's outer suburbs. Developments at Ingleburn and recent interest in St Marys are evidence of the demand for these options.
- Increasing Sydney land prices will continue to place pressure on the container supply chain. As such, new empty container parks are unlikely to open within 20 kilometres of Port Botany as land prices preclude commercial viability at current revenue rates.
- Imports (related to retail consumption/population) will continue to outstrip exports (mainly agricultural/extractive and related to climate and world economics), with the associated container imbalance continuing to place pressure on the container supply chain.
- Importers, seeking to minimise costs, will increase the use of 40' containers, largely unsuitable for NSW exports, placing further pressure on empty container management.

Stakeholders identified a number of issues currently affecting container movements to and from the ports of NSW, which, if not addressed, will see inefficiencies become more prominent as container numbers increase and the balance between imports/exports and 20/40' containers changes over time. Opportunities to improve efficiency include:

- Information management;
- Vehicle Booking Systems;
- Empty container management;
- Container staging;
- Seasonality – capital investment
- Use of rail transport;
- Hours of business; and
- Increasing land values.

The study concludes that, there is limited scope for individual industry participants to coordinate the container management process. This highlights the importance of industry collaboration in relation to achieving the efficiencies required to meet the increasing pressures on the container management task in the future.

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8 Appendices

Appendix A - Full Import Container Movements (TEU's)

Primary Move (from Ports)		Secondary Move		
To	Proportion	From	To	Proportion
Bankstown	25.21%	Bankstown	Blacktown	22.04%
			Central Coast	0.44%
			Campbelltown	0.22%
Parramatta	12.26%	Parramatta	Blacktown	21.39%
			Holroyd	4.43%
			Camden	10.78%
			Campbelltown	2.73%
			Liverpool	0.74%
			Parramatta	0.55%
			Auburn	0.15%
Fairfield	14.78%			
Blacktown	11.19%	Botany Bay	Bankstown	1.59%
Botany Bay	7.90%		Auburn	0.97%
			Willoughby	0.89%
			Penrith	0.58%
			Campbelltown	0.30%
			Fairfield	0.27%
			Marrickville	0.20%
			Blacktown	0.19%
			Holroyd	0.13%
			Ryde	0.08%
Campbelltown	7.77%	Campbelltown	Liverpool	0.53%
Holroyd	5.49%	Holroyd	Fairfield	2.95%
			Holroyd	2.78%
			Northern	1.00%
			Parramatta	14.12%
Auburn	3.23%			
Willoughby	1.80%	Leichhardt	Fairfield	3.76%
Leichhardt	1.70%	Marrickville	Marrickville	0.96%
Marrickville	1.48%		South Sydney	0.60%
			Fairfield	0.53%
			Blacktown	0.40%
			Parramatta	0.40%
			Liverpool	0.22%
			Sutherland	0.18%
			Hornsby	0.10%
			Central Coast	0.08%
			Bankstown	0.07%
			Campbelltown	0.07%
Central West	1.27%	Central West	Central West	0.22%
			Murrumbidgee	1.48%
Liverpool	1.25%	Liverpool	Liverpool	0.35%
South Sydney	0.74%			
Hurstville	0.71%			
Ryde	0.63%			
Hornsby	0.60%			
Illawarra	0.37%			
North Sydney	0.35%			
Manly	0.21%			
Rockdale	0.19%			
Canterbury	0.16%			
Ashfield	0.16%			
Camden	0.13%			
Sydney City	0.10%			
Penrith	0.09%			
Hunter	0.08%			
Baulkham Hills	0.08%			
Blue Mountains	0.04%			
Sutherland	0.03%			
Gosford	0.01%			
	100.00%			100.00%

Appendix B

Full Export Container Movements (TEU's)

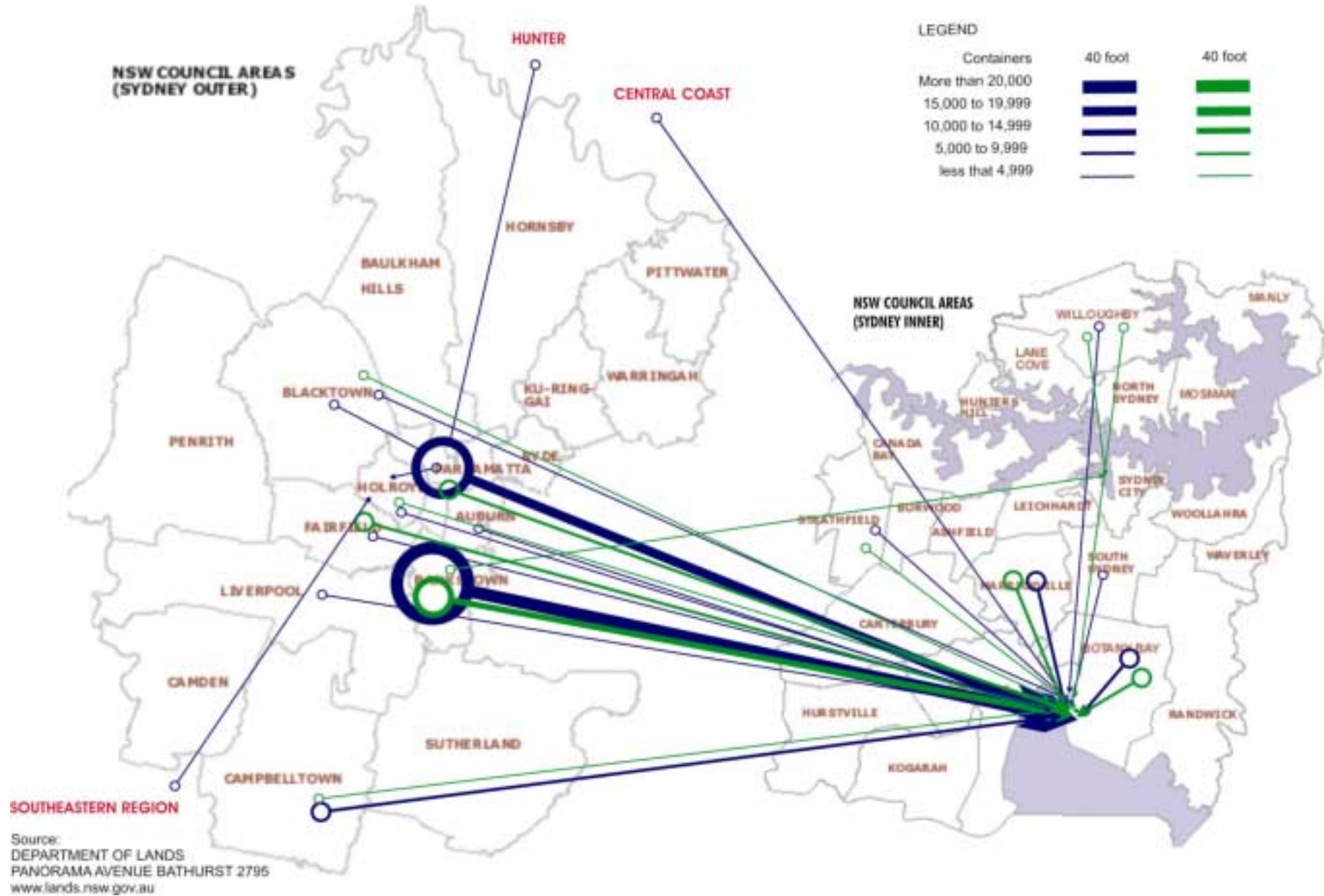
Secondary Move			Primary Move (to Ports)	
From	Proportion	To	From	Proportion
Hunter	14.27%	Parramatta	Bankstown	12.89%
Blacktown	21.40%	Parramatta	Parramatta	10.85%
			Central West	9.99%
			Hunter	8.76%
			North Western	8.38%
			Brisbane	8.13%
Northern	3.84%	Northern	Northern	7.56%
Bankstown	18.02%	Botany Bay		
Liverpool	2.14%	Botany Bay	Botany Bay	5.63%
Marrickville	1.18%	Botany Bay	Fairfield	5.01%
			Campbelltown	4.82%
Murrumbidgee	2.14%	Murrumbidgee		
South Eastern	0.71%	Murrumbidgee	Murrumbidgee	4.26%
Illawarra	1.78%	Murrumbidgee		
			Illawarra	2.49%
			Blacktown	2.47%
			Willoughby	2.04%
South Eastern	23.19%	Holroyd		
North Western	5.98%	Holroyd	Holroyd	1.23%
Northern	2.46%	Holroyd	Mid North Coast	1.15%
			South Sydney	1.07%
			Leichhardt	0.75%
Liverpool	0.56%	Marrickville		
Marrickville	2.33%	Marrickville	Marrickville	0.62%
			Liverpool	0.39%
			Central Coast	0.59%
			Auburn	0.20%
			South Eastern	0.18%
			Penrith	0.13%
			Warringah	0.08%
			Sutherland	0.07%
			Strathfield	0.05%
			Hornsby	0.01%
			Alice Springs	0.00%
			Rockdale	0.00%
			Dubbo	0.06%
	100.00%			100.00%

Appendix C

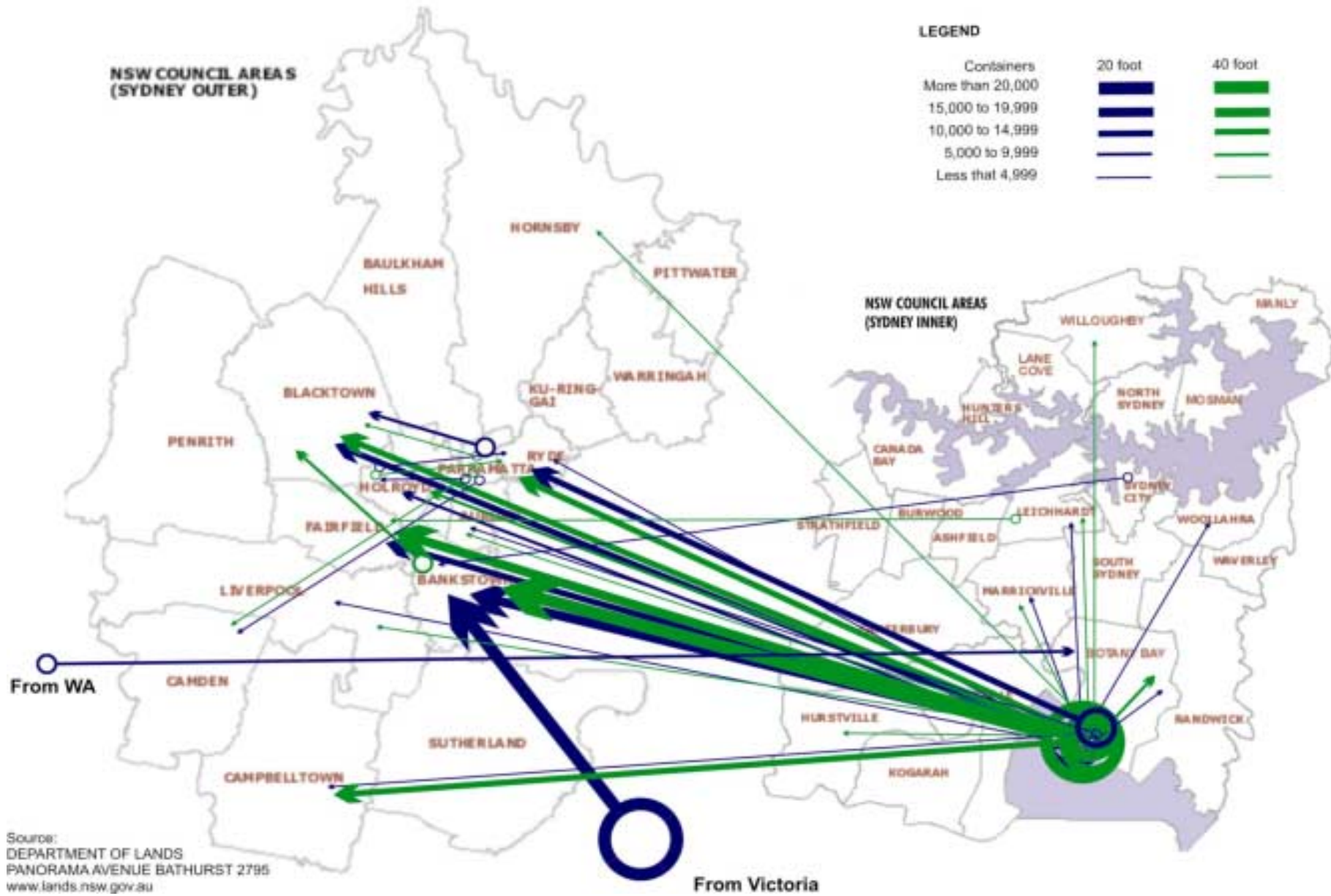
Empty Container Movements (TEU's)

From	To	Proportion	From	To	Proportion
Port	Parramatta	1.67%	Auburn	Bankstown	0.66%
	Botany Bay	0.70%	Bankstown	Botany Bay	1.92%
Auburn	Botany Bay	1.19%		Strathfield	0.62%
	Port	0.54%	Blacktown	Botany Bay	0.63%
Bankstown	Botany Bay	3.18%		Bankstown	0.64%
	Hunter	1.50%	Botany Bay	Botany Bay	3.39%
	Auburn	0.66%		Blacktown	3.04%
	Blacktown	0.64%		Bankstown	3.18%
	Parramatta	0.41%		Fairfield	3.11%
Blacktown	Parramatta	3.44%		Parramatta	0.95%
	Botany Bay	3.04%		Holroyd	0.59%
Botany Bay	North Western	6.69%		Auburn	1.19%
	Port	19.46%		Port	0.70%
	Central West	5.86%		Marrickville	0.53%
	Hunter	4.71%		Liverpool	0.53%
	Murrumbidgee	4.35%		South Sydney	0.35%
	Botany Bay	3.39%		Leichhardt	0.39%
	Northern	2.63%		Ryde	0.35%
	Melbourne	2.30%	Central West	Botany Bay	5.86%
	Illawarra	2.29%	Fairfield	Botany Bay	0.41%
	Bankstown	1.92%	Hunter	Botany Bay	4.71%
	Blacktown	0.63%		Bankstown	1.50%
	Leichhardt	0.55%		Parramatta	0.64%
	Fairfield	0.41%	Illawarra	Botany Bay	2.29%
Central West	Marrickville	0.61%	Leichhardt	Botany Bay	0.55%
Fairfield	Botany Bay	3.11%	Marrickville	Fairfield	1.01%
	Marrickville	1.01%		Holroyd	0.79%
	Parramatta	0.86%	Melbourne	Central West	0.61%
Holroyd	Botany Bay	0.59%	Murrumbidgee	Botany Bay	2.30%
	Marrickville	0.79%		Botany Bay	4.35%
	Port	0.49%		Melbourne	1.99%
Leichhardt	Botany Bay	0.39%	North Western	Botany Bay	6.69%
Liverpool	Botany Bay	0.53%	Northern	Botany Bay	2.63%
Marrickville	Botany Bay	0.53%		Parramatta	1.36%
	Port	3.64%	Parramatta	Blacktown	3.44%
Melbourne	Murrumbidgee	1.99%		Port	1.67%
Parramatta	Hunter	0.64%		Bankstown	0.41%
	Botany Bay	0.95%		Fairfield	0.86%
	Parramatta	1.20%		Parramatta	1.20%
	Northern	1.36%	Port	Botany Bay	19.46%
	Port	3.38%		Parramatta	3.38%
Ryde	Botany Bay	0.35%		Holroyd	0.49%
South Sydney	Botany Bay	0.35%		Auburn	0.54%
Strathfield	Bankstown	0.62%		Marrickville	3.64%
		95.56%			95.56%

Note: The Proportion column does not add to 100% - locations of less than 2,000 TEU have been omitted.



Appendix D – Metropolitan Export Container Movements



Appendix F - Regional Export Container Movements

