Greater Christchurch Freight Demand Statement

July 2014

aurecon

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Section 1
Introduction

1. Introduction

1.1 Purpose of Study

The Greater Christchurch Transport Statement (GCTS) partnership was formed in 2012 and consists of members from New Zealand Transport Agency (NZTA), KiwiRail, Lyttelton Port Company Limited (LPC), Christchurch International Airport Limited (CIAL), Christchurch City Council (CCC), Selwyn and Waimakariri District Councils, Environment Canterbury and the Canterbury Earthquake Recovery Authority (CERA).

This partnership has collectively estimated freight growth forecasts for the Greater Christchurch region and has commissioned Aurecon to validate these forecasts and explore options to improve and increase the resilience of freight logistics across Greater Christchurch to respond to this growth.

As part of the wider package of works commissioned, a Freight Demand Statement is to be developed outlining the current and future freight demand in Greater Christchurch. The Freight Demand Statement will lead on to the development of a Freight Infrastructure Statement. This document will provide the partnership with a view on the capacity of the freight movement infrastructure and its interaction with the current or future supply chains. Finally, a Freight Management Directions Statement will identify interventions and improvements to optimise the capability and resilience of the existing freight infrastructure.

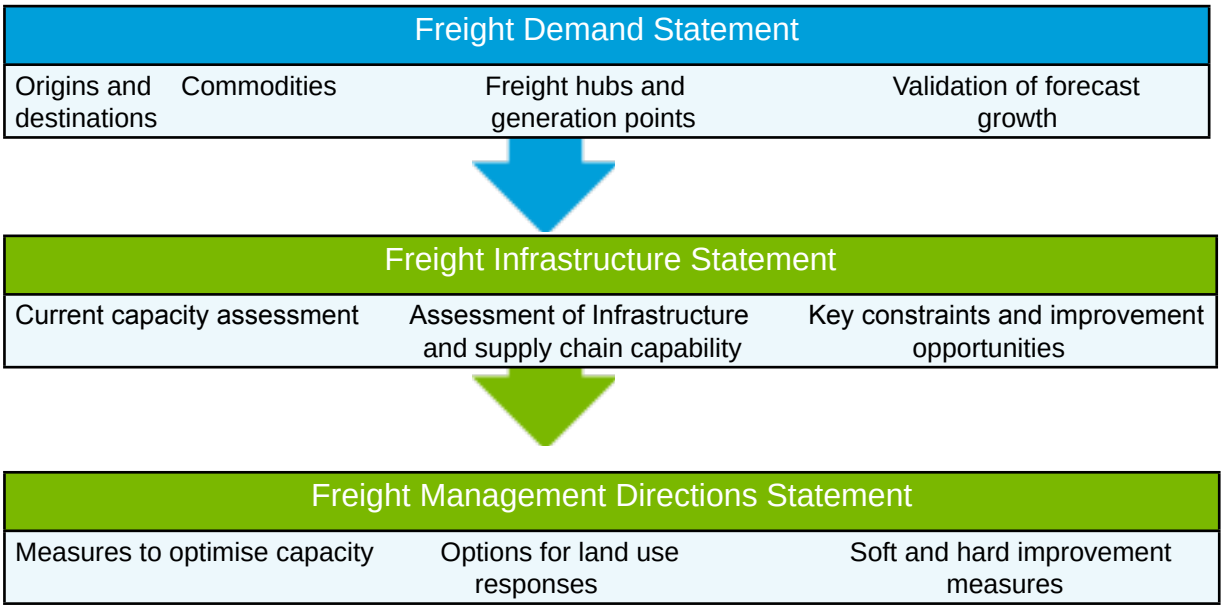

Figure 1 - Greater Christchurch Freight Study components

1.2 Aims of the Freight Demand Study

This document is known as the Freight Demand Statement. It is a desktop review of information, data and forecasts from a variety of sources (some public and some private). While the overall Greater Christchurch Freight Study will seek to develop options to improve infrastructure and capacity, remove bottlenecks in supply chain efficiency and propose measures that would focus actions to maximise the economic development of the region.

The Freight Demand Statement seeks to provide the understanding and estimated future freight volumes to underpin the following stages. It has the following aims:

- **Current freight system.** A statement of the current state and nature of the freight system. This will include: descriptions of commodities imported, exported or moving through Greater Christchurch; existing freight infrastructure, including freight hubs and key points of freight consolidation (Section 3). Constraints and

capacity for growth will not be considered in the Freight Demand Statement, but will be detailed in the Freight Infrastructure Statement.

- **Freight origins and destinations.** For each commodity that is considered in this statement, the likely or known origins and destinations will be described. These will include both production and processing points, entry and exit points in the study area and current mode of transport. Details will be given by commodity type where possible (Section 5 to Section 10 for different commodities).
- **Hazardous goods**. Assess the travel demand for hazardous and over-dimensional goods travelling to and from the Lyttelton Port of Christchurch (Section 7). Constraints on the movement of hazardous goods will be further discussed in the Freight Infrastructure Statement.
- **Validated growth forecasts.** Validate freight growth assumptions, by commodity, from the GCTS. Where these forecasts are inappropriate, provide alternative growth forecasts detailing the rationale and explanations for the predicted growth (Section 3 through to Section 10, summarised in Section 12). The validated forecasts, where appropriate, should include an understanding of land-use where freight generation is permitted and possible future changes to that land-use.

This statement contains particular commentary for supply chains, modes, origins and destinations and forecasts for each of the major commodities imported and exported through Greater Christchurch. It does not seek to give higher importance to commodities that offer higher value, more volume, or greater prospects of maximising regional economic growth. These issues are extremely important and will be considered in subsequent stages of the overall study.

In the next 12 months, a considerable ramp-up of construction activity in the region is expected, following the damage experienced in the February and June 2011 earthquakes. The heightened construction activity is expected to continue for up to 10 years; it is therefore likely to have a significant impact on the importation and transport of construction materials into and within the area.

For the validation of the individual commodity forecasts, the increase associated with any heightened construction activity will be excluded, as it is assumed that the future movements will return to the underlying individual growth trends. Activity and transport associated with the Christchurch rebuild is discussed in Section 12.

1.3 Map of Greater Christchurch, Canterbury and the South Island

The Freight Demand Statement is aimed at quantifying and validating future freight forecasts for Greater Christchurch. To this end, understanding freight production (and consumption) in Canterbury, and even the whole of the South Island, is important.

For the purposes of this study, Greater Christchurch is defined as Christchurch City, extending outwards to include the commuter belt (approximately a 30 minute drive) in the Selwyn and Waimakariri Districts (Figure 2). This definition is consistent with the Greater Christchurch Urban Development Strategy (2007) [35] and available online definitions [31, 32].

Note that since this is not a proper statistical boundary, Statistics New Zealand (StatsNZ) will not be able to provide data to match this area precisely.

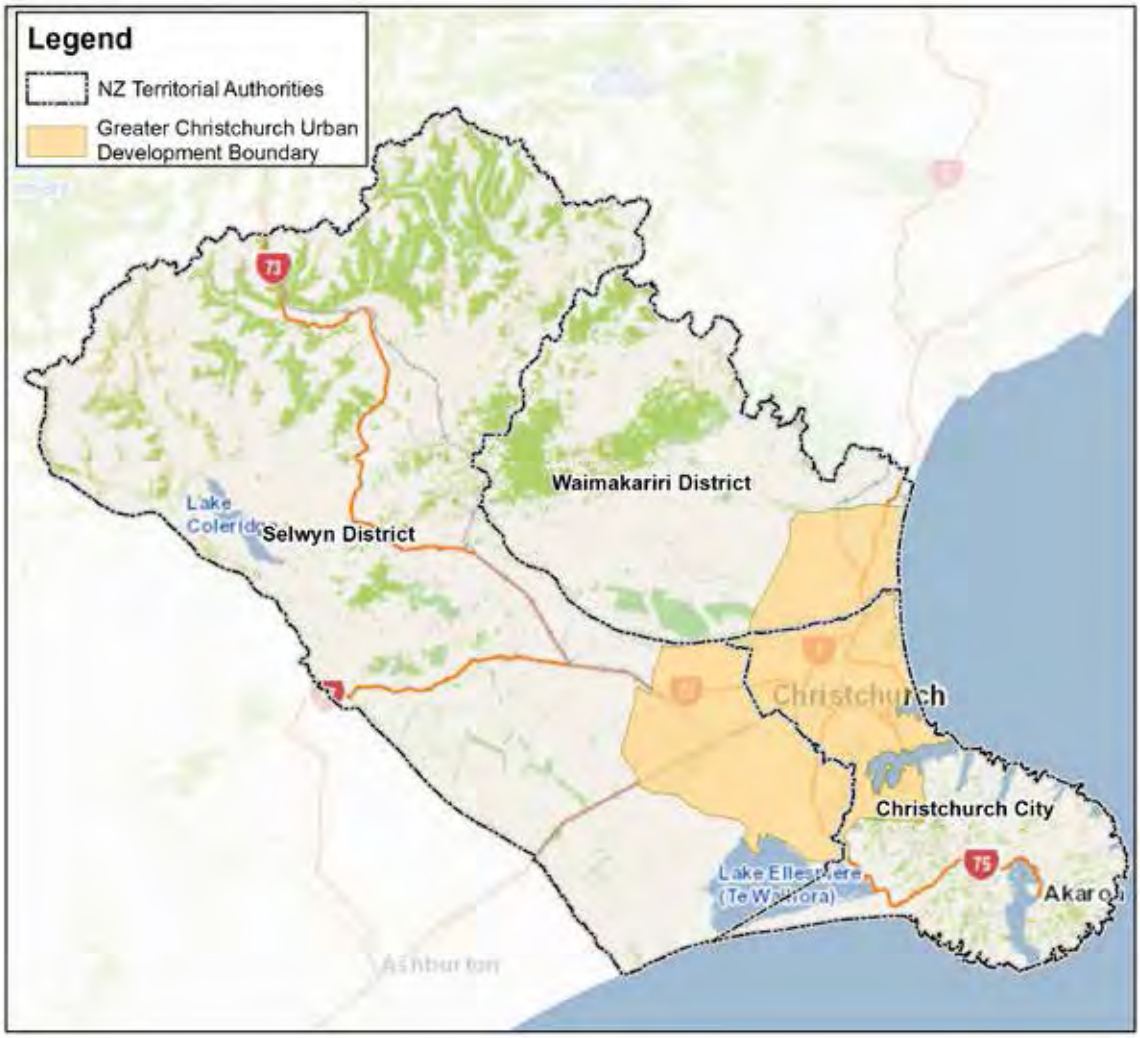

Figure 2 - Greater Christchurch boundary shown in the context of the wider definition, which includes Selwyn and Waimakariri districts

The Greater Christchurch region, as defined for this statement, is part of the Canterbury region on the South Island of New Zealand. It is important to understand the significance of these larger regions from the perspective of the movement of freight.

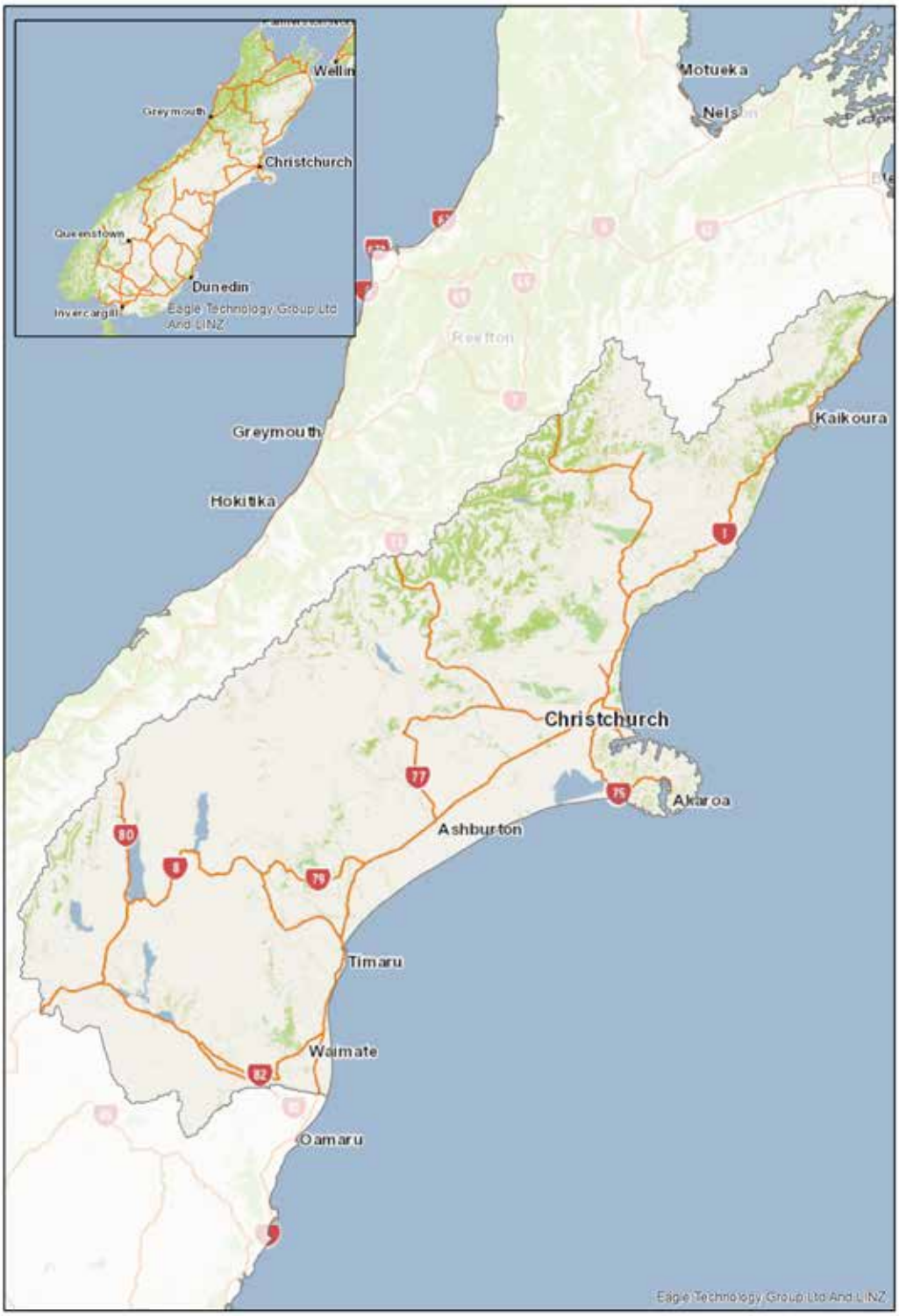

Figure 3 - Canterbury and its position on the South Island

1.4 Assumptions of the Greater Christchurch Transport Statement

One of the primary aims of the Freight Demand Statement is the validation of the freight forecasts, as provided in the Greater Christchurch Transport Statement (GCTS) [31]. The GCTS provides an overarching framework for a consistent and integrated approach to planning and implementing the transport network and services for the Greater Christchurch area.

The GCTS sets out some 30 year assumptions on population, households, employment, person trips and freight movements. These assumptions are summarised in Table 1.

30 Year Assumption				
Measure or commodity	**2010**	**2013**	**2041**	**Growth**
Population	435,000		550,000	0.9%
Employment	200,000		244,000	0.7%
Containers (TEU)	290,000	351,217	1,500,000	*5.3%
Air Freight (tonnes)	120,000		400,000	7.5%
Dry bulk (tonnes)	660,000	649,365	1,200,000	2.6%
Petroleum (tonnes)	1,000,000	1,111,189	1,800,000	2.6%
Logs (tonnes)	250,000	369,657	260,000	0.1%
Coal (tonnes	2,300,000	2,049,949	5,000,000	3.8%

Table 1 - GCTS assumptions and forecast summary

* Compound Annual Growth Rate (all other rates are based on annual linear growth)
Source: Greater Christchurch Transport Statement [31]

As shown above, over the period from 2010 to 2041, population and employment are assumed to grow by 26% and 22% respectively, while freight is expected to increase by considerably higher amounts (for example, 417% for port containers). Primarily, this document will validate these growth assumptions, by comparing forecast growth to historical trends for each of the commodities, in addition to giving consideration to changes in productive land use in the Greater Christchurch area.\

1.5 Uncertainty

Forecasting growth in population, employment, freight movements and the economy under normal circumstances is difficult. This is because each of these can be influenced, to a smaller or larger degree, by factors that cannot be reliably forecast (e.g. the Global Financial Crisis).

Forecasts for Greater Christchurch, and even the Canterbury regions, are made more difficult because of the significant earthquake events of 2011 and earlier. These events dramatically altered normal growth, in that immediately following the earthquakes, there were significant changes to population and employment, the primary demand drivers for freight activities.

The resumption of ‘normal’ population and employment growth is difficult to predict, no more evident than that shown in possible population forecasts developed for the UDS (Figure 4).

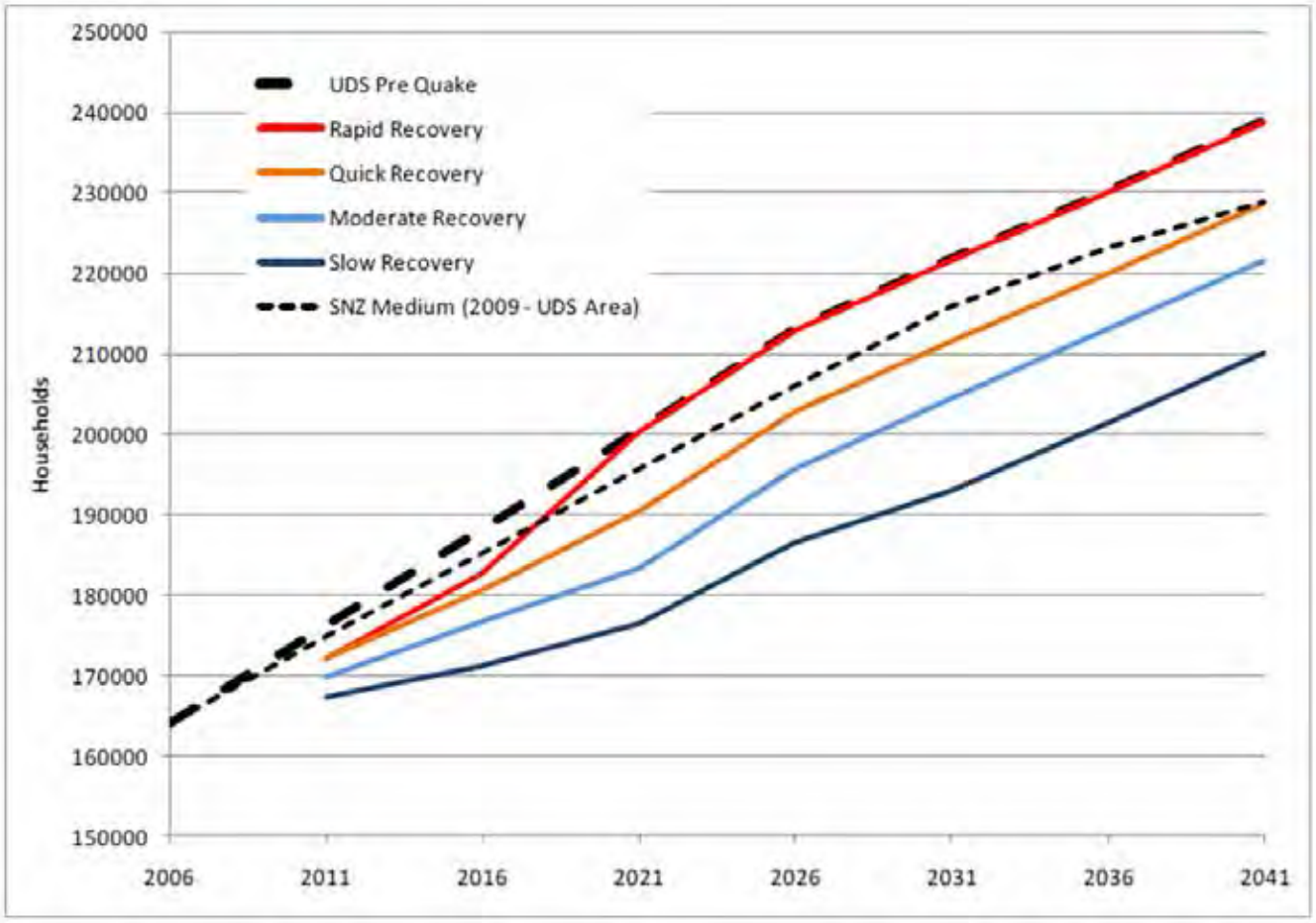

Figure 4 - Alternative number of household forecasts

Source: UDS, GCTS supporting information [32]

All of these factors and uncertainties will make precise estimation and validation of commodity growth very difficult; this should be considered in the interpretation of the validation results.

While the export of freight is less likely to be driven by population and employment changes as the result of the earthquakes, there is considerable uncertainty in estimates of future volumes, caused by the overseas demand and the international competitiveness of New Zealand exports.

1.6 Forecast validation

The Freight Demand Statement provides a validation of individual commodity forecasts from the GCTS. This should be taken in the context of an appreciation of the uncertainty of future population and employment growth and the impact that could have on internal consumption, as well as import and export volumes.

To undertake this validation, Aurecon has, in the majority of cases, compared the GCTS forecast to the linear trend of historic volumes, as well as any other available forecast. The use of linear growth, as opposed compound growth, is consistent with observed historical volumes, but where a case for compound growth is made (i.e. containerised imports and exports through LPC) Aurecon will establish the consequences of that growth assumption. When considering future volumes, we made reference to changing land use, including the increasing use of irrigation, and likely trends in imports and movement of materials associated with the Christchurch re-build.

Where appropriate, Aurecon will put forward a forecast range, indicating likely high and low bounds for future freight movements. Aurecon has not put a forecast range on every commodity, as without further more detailed

investigation (which is beyond the scope of this project) bounds would need to be set arbitrarily.

1.7 Report structure

The Freight Demand Statement has the structure shown below. The structure is designed to describe and document the major commodities either produced in, or moving through, the Greater Christchurch region:

Section 3	**National Freight Demand Study.** This section contains a brief summary of the 2014 National Freight Demand Study (NFDS) in the context of this study.
Section 4	Population. This section compares the forecast GCTS population to historical trends in the area. In addition, population trends for Canterbury and the South Island are also described, to provide context for the demand for (in particular) import containers.
Section 5	Employment. This section contains a comparison of the historical and forecast employment trends for Greater Christchurch and, as with population, it describes employment trends for both Canterbury and the South Island.
Section 6	Container trade. This section validates the GCTS projections of growth for import and export containers through the LPC. For the major import and export commodities, more detailed analysis and projections are shown, to provide a more in-depth perspective of growth.
Section 7	Air freight. This section contains a comparison and validation of the volume of freight imported and exported through the Christchurch International Airport. Major commodities are briefly discussed.
Section 8	Import dry bulk. This section describes the types of dry bulk commodities that are imported through the LPC, with their destinations. It then provides a comparison and validation of historical volumes and those proposed in the GCTS.
Section 9	Import petroleum. This section describes the types of petroleum commodities that are imported through the LPC and their destinations. It then provides a comparison and validation of historical volumes and those proposed in the GCTS.
Section 10	Export logs and timber. This section shows the quantity of logs exported through the LPC and the origins. It then provides a comparison and validation of historical volumes and those proposed in the GCTS.
Section 11	Export coal. This section describes the volume of coal that is exported through the LPC and its origins. It then provides a comparison and validation of historical volumes and those proposed in the GCTS.
Section 12	Internal freight movements. This section outlines the internal freight movements (specifically those into, out of and within Canterbury) as outlined in the NFDS.
Section 13	Canterbury recovery. This section contains an overview of the Canterbury recovery, particularly the additional construction materials and transport activity, which will influence short-term freight movements.
Section 14	Concluding remarks. This section summarises the information presented in Sections 3 to 14, in the context of providing a reliable set of overarching freight demands, to be used in subsequent project stages.
Section 15	Glossary. This section contains a description of commonly used acronyms and terms used throughout the Freight Demand Statement.
Section 16	References. This section contains a set of references and citations used in the collating of information used to compare and validate the freight forecasts proposed in the GCTS.


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Section 2

National Freight Demand Study

2. National Freight Demand Study

The National Freight Demand Study (NFDS), March 2014, updates the previous study undertaken in 2008. The study examines the New Zealand freight task in detail, considering 29 commodities and examines:

- The total size of the market and the regional distribution of freight activities;
- Determines linkages between the locations where goods are produced or imported and where they are consumed or exported.

The updated NFDS notes that as the study was undertaken at commodity level, there is variability in the growth rates for commodities – some commodities growing slower than underlying economic growth and their historical trends. The NFDS refers to this as 'decoupling of freight from economic growth'. The report goes on to state:

"Commodities which grow at a rate below GDP growth are largely those where historical trends have indicated that population growth, rather than economic growth, is the most important driver of demand. Industries where population growth is a major component of the forecast are: logs to sawmills, inputs to panel making, inputs to pulp and paper, sawn timber, pulp and paper, panels, manufactures goods, supermarkets and food goods, imported vehicles, coal and steel and aluminium and general freight.

For some other commodities (other retail goods, grain, other minerals, couriers and post) decoupling involves a downwards adjustment to the level of growth that would be expected from historical trends. In these cases the downwards adjustment results in growth rates moving towards a one for one relationship with GDP over time"

Taken together, these two effects mean that the relationship between GDP growth and freight growth in the forecasts is not as strong as has been seen in historical data".

The NFDS goes on to state growth projections by region through to 2042. Overall, it expects the freight task, in terms of tonnage, to increase by 58% over a 30 year period up to 2042. There are both commodity and regional variations in this increase, with the freight task in Canterbury forecast to increase from approximately 35m tonnes to around 70m tonnes by 2042. This reflects both the growth in dairy and dairy relates exports in Canterbury, and the importance of Christchurch in the context of South Island distribution of goods.

The NFDS does not include repositioning of empty containers. However, empty containers are an important consideration in this study. The GCTS forecast does include the empty containers. Between 2008 and 2013, full export containers have increased by 84% while empty import containers increased by 73%.


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Section 3

Population

3. Population

This section contains a validation of the population growth assumed in the GCTS. It draws upon population data from various sources (quoted in each case). We have also considered population forecasts, not just for Greater Christchurch, but also for Canterbury and the whole of the South Island. In this way, we are able to compare and contrast with other regions that are likely to affect freight moving through Greater Christchurch.

3.1 Population by area

Figure 5 shows the population areas for Greater Christchurch, Canterbury and the South Island. Greater Christchurch by itself only covers 4% of the South Island, but includes 42% of the population; Canterbury (including Greater Christchurch) has over 54% of the South Island population.

The most populated areas outside Greater Christchurch are: Allenton in Canterbury; Richmond East and West in Tasman; Redwoodtown in Marlborough; and Caversham in Otago.

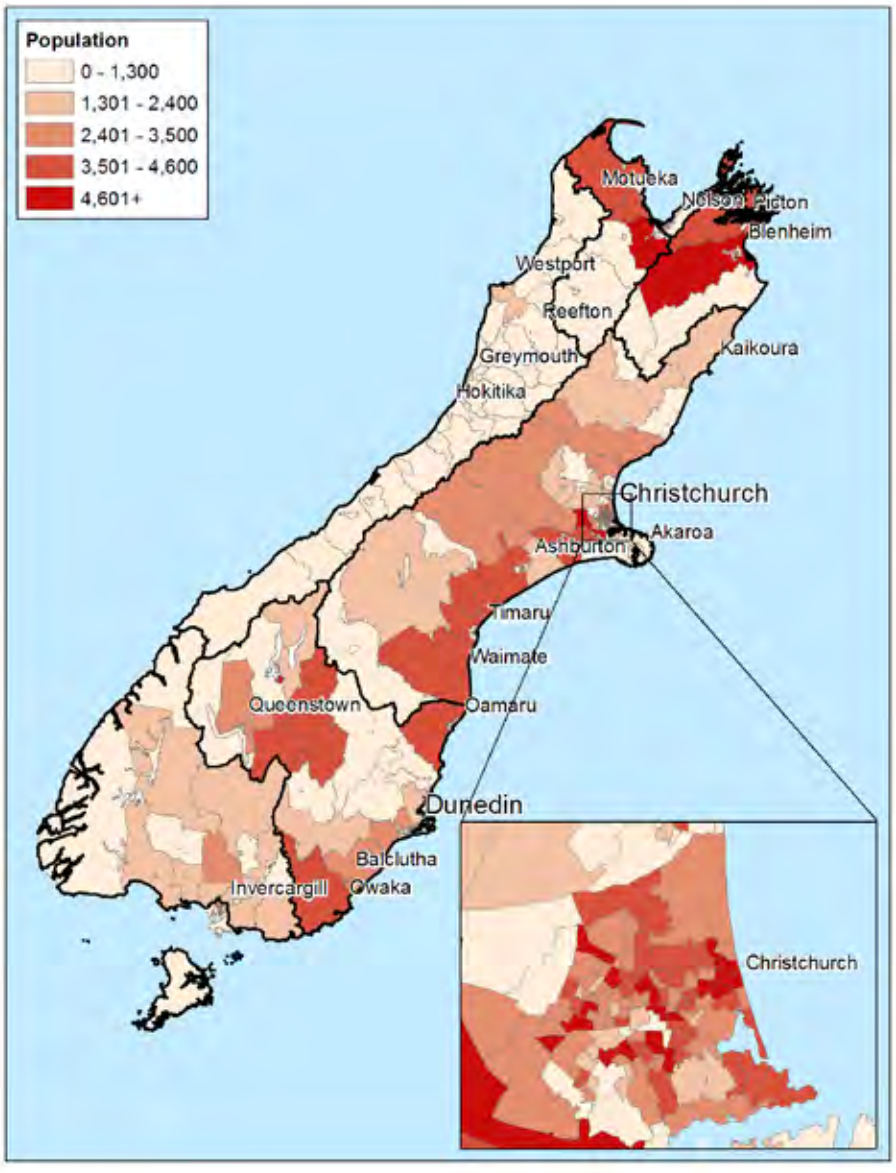

Figure 5 - Population in Christchurch and the South Island (2006)

Source: StatsNZ Census 2006

3.2 Population growth comparison

Figure 6 and Figure 8 show the growth in population for Greater Christchurch, Canterbury and the South Island. These figures are based on information provided by StatsNZ [68].

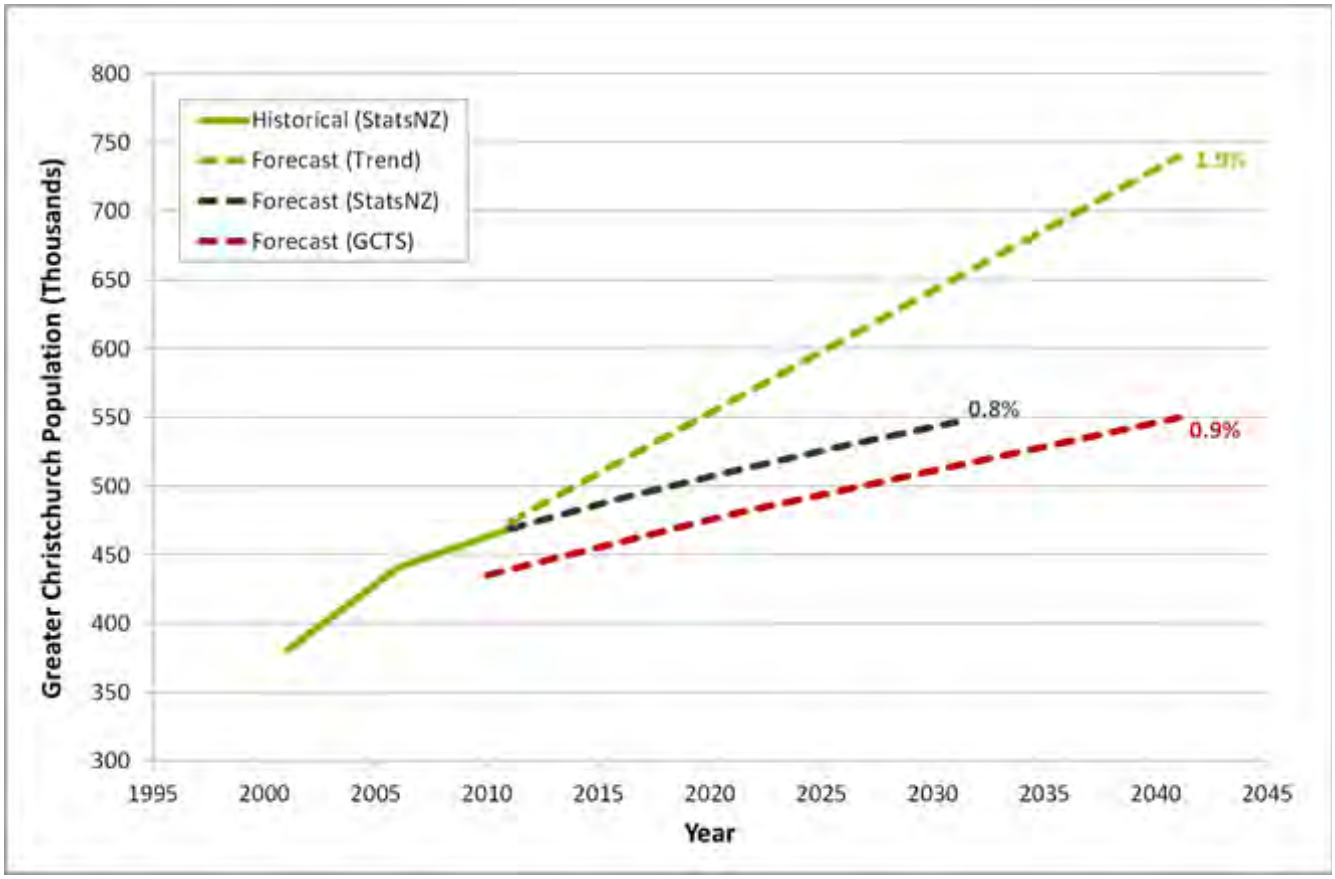

Figure 6 - Population and forecasts for Greater Christchurch [1]

Source: StatsNZ Census [68], GCTS [31,32]

As shown above, the forecast population growth, as provided by StatsNZ, is considerably slower than the underlying trend for the past 10 years. The forecast growth for GCTS, however, is consistent with that for StatsNZ. As mentioned previously, there is considerable uncertainty surrounding the growth in population over the long-term in Christchurch, which will need to be monitored to determine its accuracy.

[1] Because the Greater Christchurch area does not have an official statistical boundary, for the purposes of the comparison with StatsNZ data, Greater Christchurch is taken to include the whole of the Selwyn and Waimakariri regions. This explains the difference between the Greater Christchurch historic data and the GCTS forecast in the year 2010.

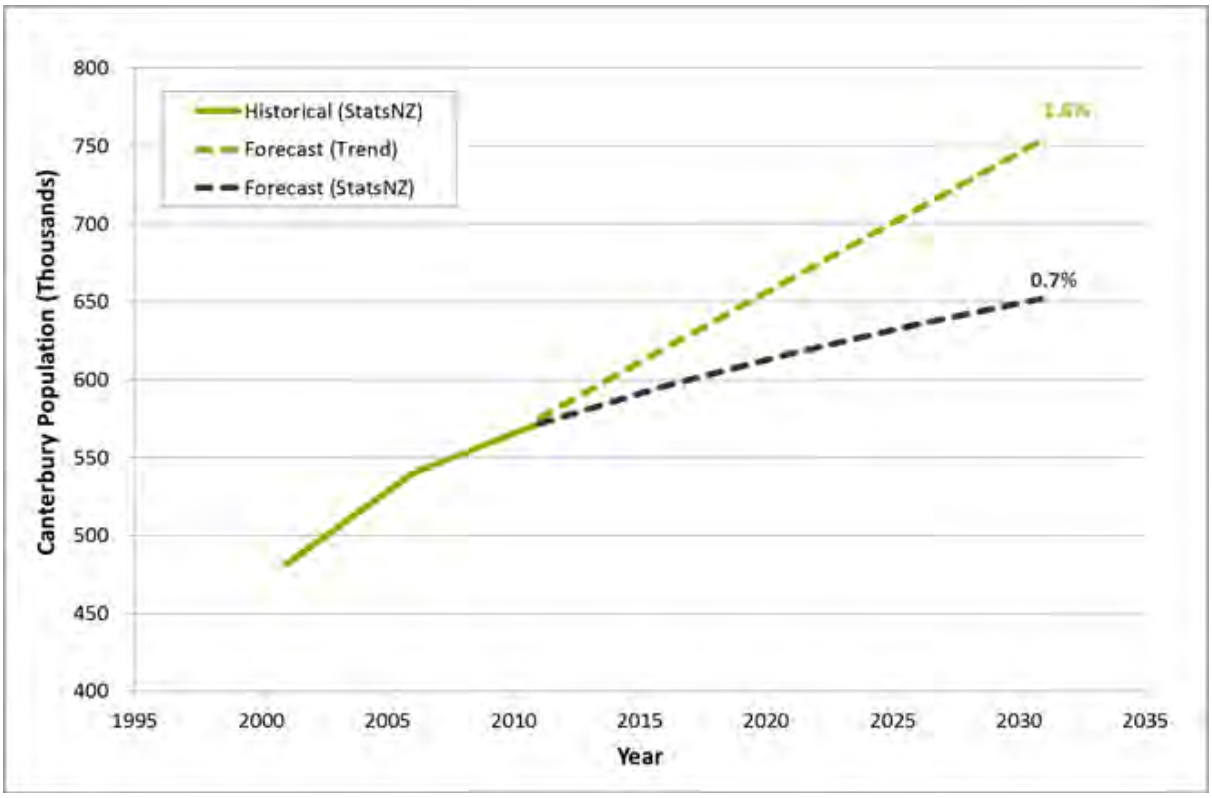

Figure 7 - Population and forecasts for Canterbury

Source: StatsNZ Census [68]

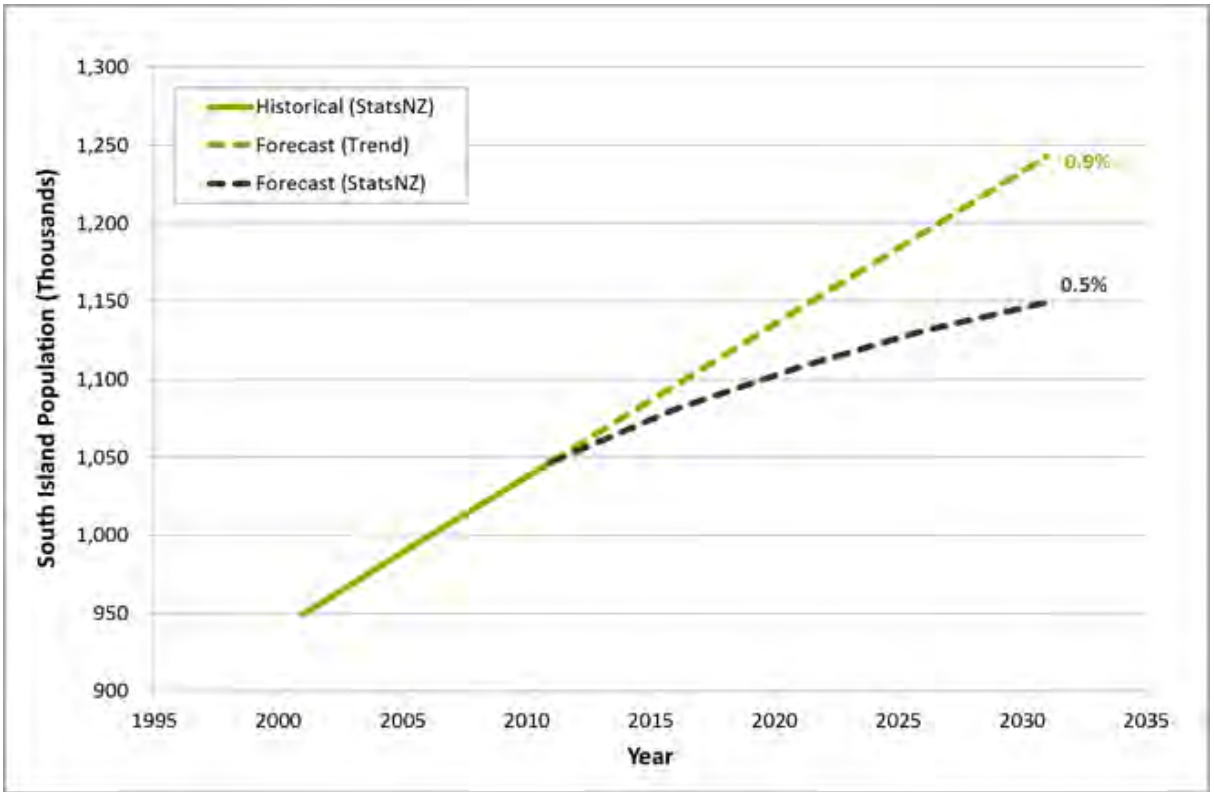

Figure 8 - Population and forecasts for the South Island

Source: StatsNZ Census [68]

In a similar way to the population growth in Greater Christchurch, the rates of growth for both Canterbury and the whole of the South Island, are considerably slower than the past 10-year trend. Of the three regions being examined, Greater Christchurch is showing the strongest growth, at around 0.8% per annum average linear growth.

3.3 Conclusion

The official StatsNZ and GCTS forecasts for Greater Christchurch show an amount of consistency (and also consistency with historic growth). Therefore, for the purposes of the Freight Demand Statement, Aurecon believes they are acceptable. We understand that the StatsNZ Census 2012 information will be released in early 2014 which have not been taken in to consideration in this report.

Section 4

Employment

4. Employment by area

This section contains the validation of employment forecasts for the Greater Christchurch region, as presented in the GCTS. As with population estimates, differences between the definition of Greater Christchurch in the GCTS and the wider definition that includes the Selwyn and Waimakariri regions (for StatsNZ), will result in small differences in the comparisons.

4.1 Employment by area

Figure 9 shows the employment areas for Greater Christchurch, Canterbury and the South Island. Consistent with the population information, Greater Christchurch has the most significant employment base, at 41% of the total for the South Island, and Canterbury (including Christchurch) a total of 53%. This compares to the next highest region, Otago, which has only 20% of total South Island employment.

As shown in this figure, the areas with the highest total employment outside Greater Christchurch are: Allenton in Canterbury; Richmond East and West in Tasman; Wairau in Marlborough; and Wanaka in Otago.

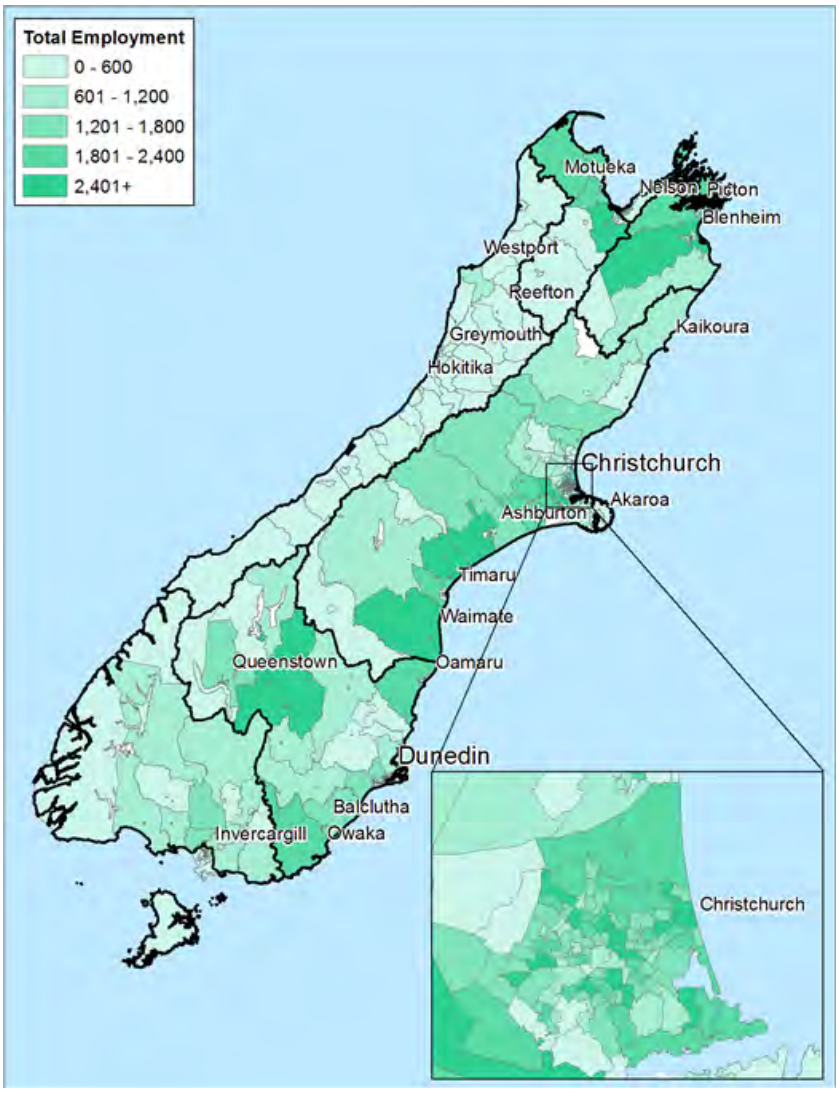

Figure 9 - Employment in Christchurch and the South Island (2006)

Source: StatsNZ Census 2006.

4.2 Employment growth comparison

Again, similar to population actuals and forecasts, we have prepared a comparison of employment for Greater Christchurch, as well as the Canterbury region and the South Island. In this way, a comparison can be made, to determine whether the different regions are exhibiting consistent or significantly different growth profiles.

Comparisons are shown in Figure 10 (Greater Christchurch) and Figure 11 (Canterbury and South Island). We were not able to source employment forecasts for Canterbury and the South Island. Consequently, we can only include commentary on historical trends.

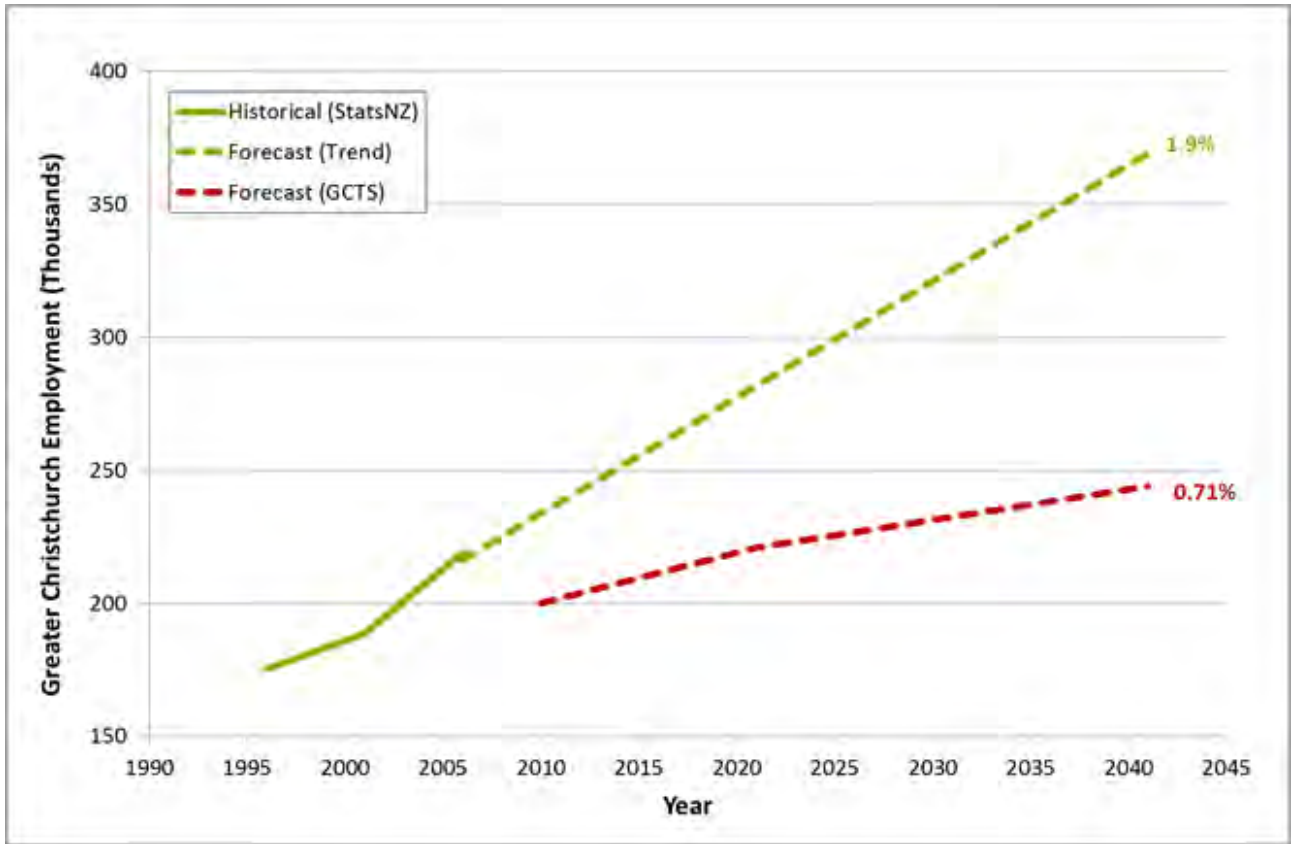

Figure 10 - Employment and forecasts for Greater Christchurch [2]

Source: StatsNZ [68], GCTS [31,32]

[2] Because the Greater Christchurch area does not have an official statistical boundary, for the purposes of the comparison with StatsNZ data, Greater Christchurch is taken to include the whole of the Selwyn and Waimakariri regions. This explains the difference between the Greater Christchurch historic data and the GCTS forecast in the year 2010.

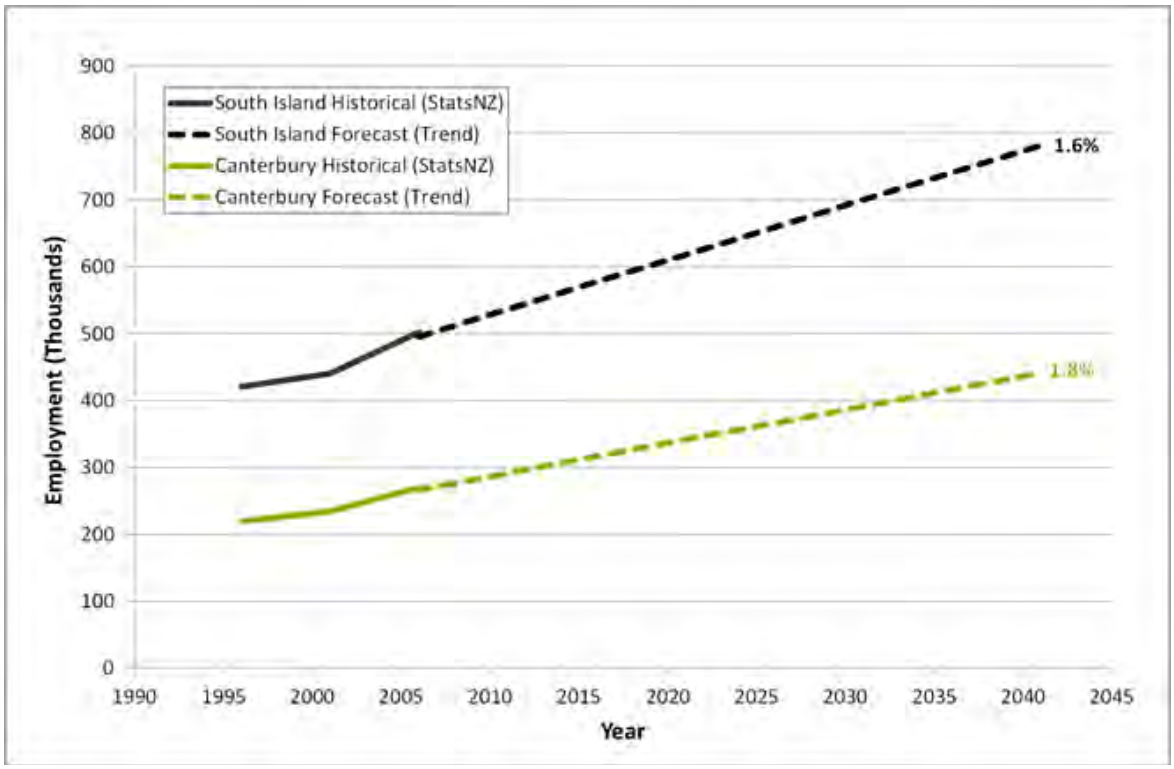

Figure 11 - Employment and trends for Canterbury and South Island

Source: StatsNZ [68]

As shown above, employment trends for the GCTS are considerably lower than the historical trend. Given the projected population growth of 0.8% (Figure 6) for Greater Christchurch, the employment growth of 0.71%, while lower, is not appreciably different.

Employment in the wider Canterbury region, as well as the South Island, is showing marginally lower overall growth compared to the Greater Christchurch region, in line with our observations for employment.

4.3 Conclusion

According to the GCTS, employment growth in the Greater Christchurch region is likely be considerably slower than historical growth, but is consistent with the projected population growth described previously.

Given the uncertainty surrounding population and employment growth in the short term, the GCTS employment growth estimates can appropriately be taken as a basis for the Freight Demand Statement, but they should be reviewed should other information and data become available.


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Section 5
Containers

5. Containers

The LPC is the largest of the five ports on the South Island that import and export containers. Validating the growth for containers, however, is more difficult than for individual commodity types (as described in later sections). This is because containers can carry a variety of different commodities, with the trade in each one quite likely growing at a different rate. In addition, there are too many different commodities to allow forecasts of individual growth rates.
In this section therefore, we give an overview of the total container trade, which includes import containers, export containers and empty containers. For the initial validation, we compare the historical growth in container movements with the GCTS forecast growth. We then drill-down to the major commodities that make up the full import and export containers.

5.1 General information

As well as importing full containers to be used in the region and exporting full containers carrying commodities produced in the region, LPC imports and exports empty containers (referred to as repositioning) and is used as a transhipment point for coastal shipping. Figure 12 shows the approximate breakdown of handling types for the 2012-13 financial year. Based on data supplied by LPC, full export containers have been growing faster than the other types since 2006.

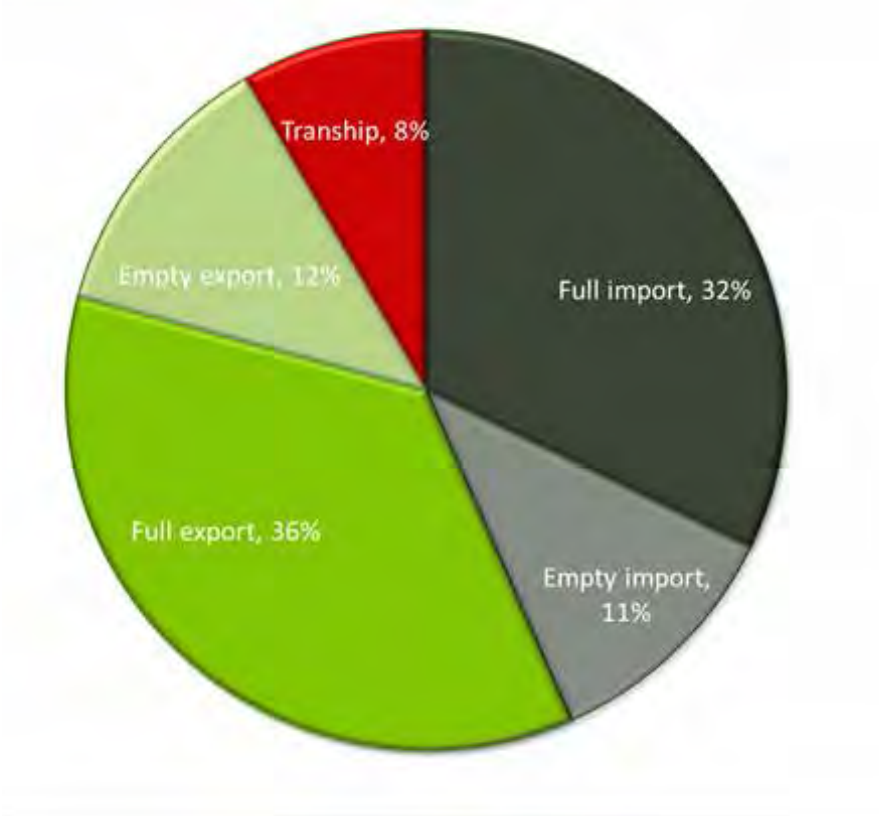

Figure 12 - Container types handled by the LPC

Source: Figs 2012-13.

Of the import containers moving through LPC, approximately 20% are carried by rail and the remaining 80% by road. Also, 35% of containerised exports arrive at LPC by rail and the remainder by road.

5.2 Container growth comparison

Figure 13 shows a comparison of historical container trade through the LPC, the projection of the underlying trend and the forecast growth assumptions from the GCTS / LPC

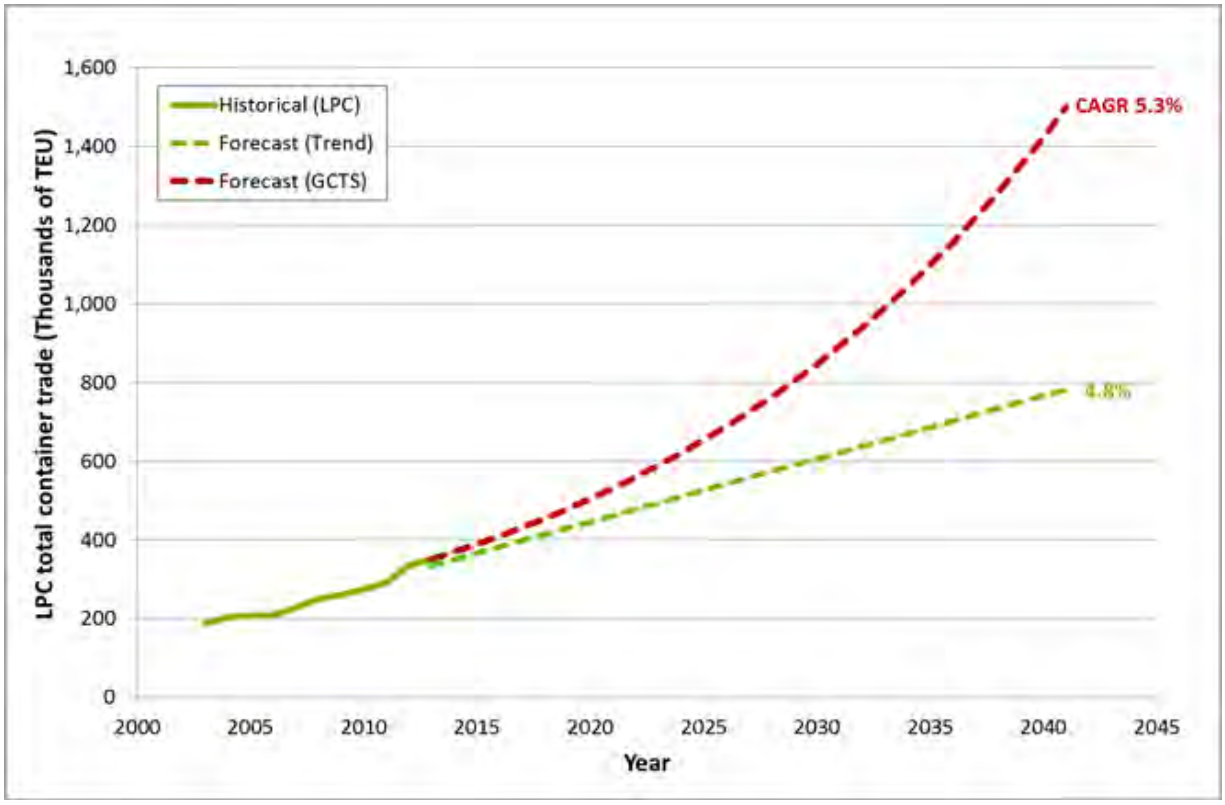

Figure 13 - Container trade and forecasts for the LPC

Source: LPC annual reports [50-60], GCTS [31,32] assuming compound growth

As shown above, based on the GCTS forecast of 1.5m TEU by 2041, and assuming compound growth (in line with LPC discussions), there is a gap between the linear trends, which naturally increases over time. The compound forecast is evidenced on historical relationships in other ports between container growth and GDP, industry assumptions and is supported by historical high growth in the dairy export industry in the Canterbury region. The case for a high growth rate for LPC also takes into account its ability to capture a higher market share for the South Island, based on future desirability to cater for large ships. Port rationalisation (and associated discussion) is beyond the scope of this statement.
To test the validity of the GCTS growth assumptions, Aurecon has undertaken some additional analysis of the major commodities being shipped (including dairy), to better understand whether the projected growth could be attained.

5.3 Import commodities and trends

This section contains additional information about containerised commodities imported through the LPC. Figure 14 shows a breakdown of the top 10 import commodities.

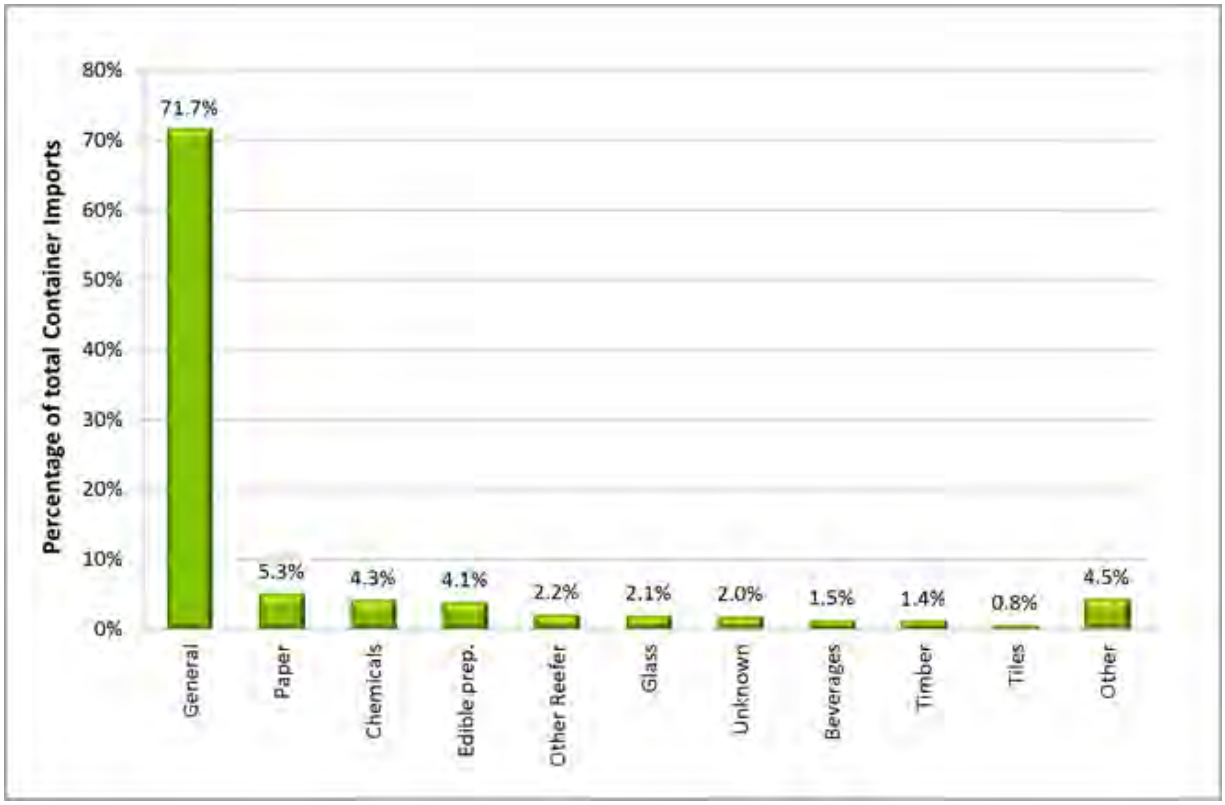

Figure 14 - Containerised commodities imported through the LPC 2011/12

Source: LPC [61]

As shown above, 'general' freight makes up the majority (71.7%) of the import freight, with the remaining 28.3% made up of lots of small quantities of commodities. Given the lack of proper classification, and based on an understanding of the types of products that often get categorised as 'general', Aurecon believes that the majority of the imports are 'finished goods'.

Unlike individual commodities, which are produced or consumed in one or more small regions, 'finished goods' most often go to wholesale and retail businesses, destined for built-up population areas. Given that containers are also imported through SouthPort, Port Otago, PrimePort Timaru and Port Nelson, containers imported through the LPC (or the freight inside them) are likely to be transported mainly to the Canterbury region (Figure 15).

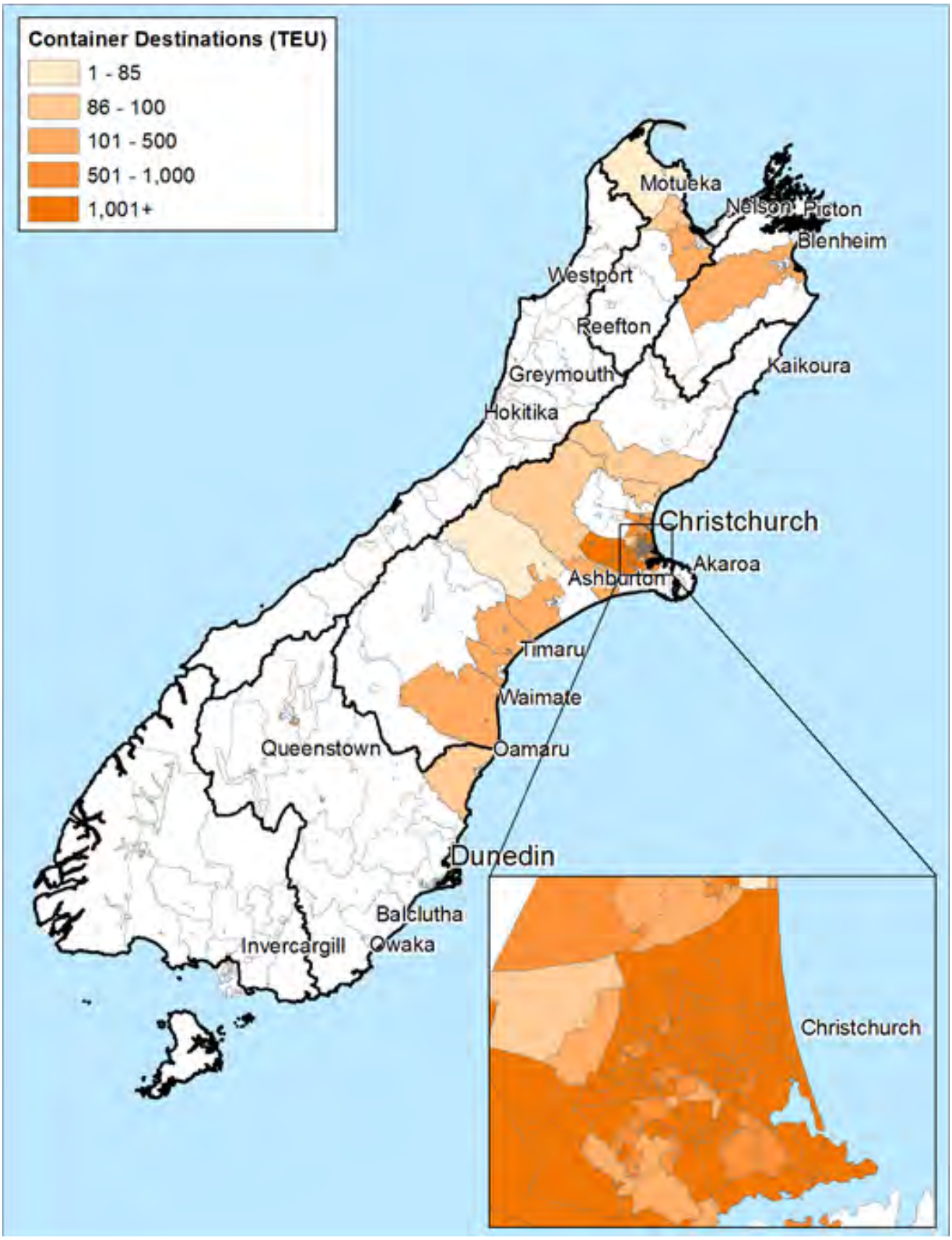

Figure 15 - Estimated destinations for containerised freight imported through the LPC

As part of this project, Aurecon was unable to collate information about the historical growth for containers imported through the LPC, so it is not possible to determine whether the movements of full import containers will grow in line with overall trade forecasts.

5.4 Conclusions

The amount of available data for this desktop review does not really provide the necessary level of detail, either on actual import commodities, or the historical growth in import containers as compared to export containers. In our opinion, it is hard to imagine that import containers will be able to grow at 5.3% compounding per annum, when population and employment for the whole South Island are growing at less than 1.0%.

5.5 Export commodities and trends

This section contains additional information about containerised commodities exported through the LPC. Figure 16 shows a breakdown of the top 10 export commodities. Unlike import commodities, the information for export commodities is much more detailed.

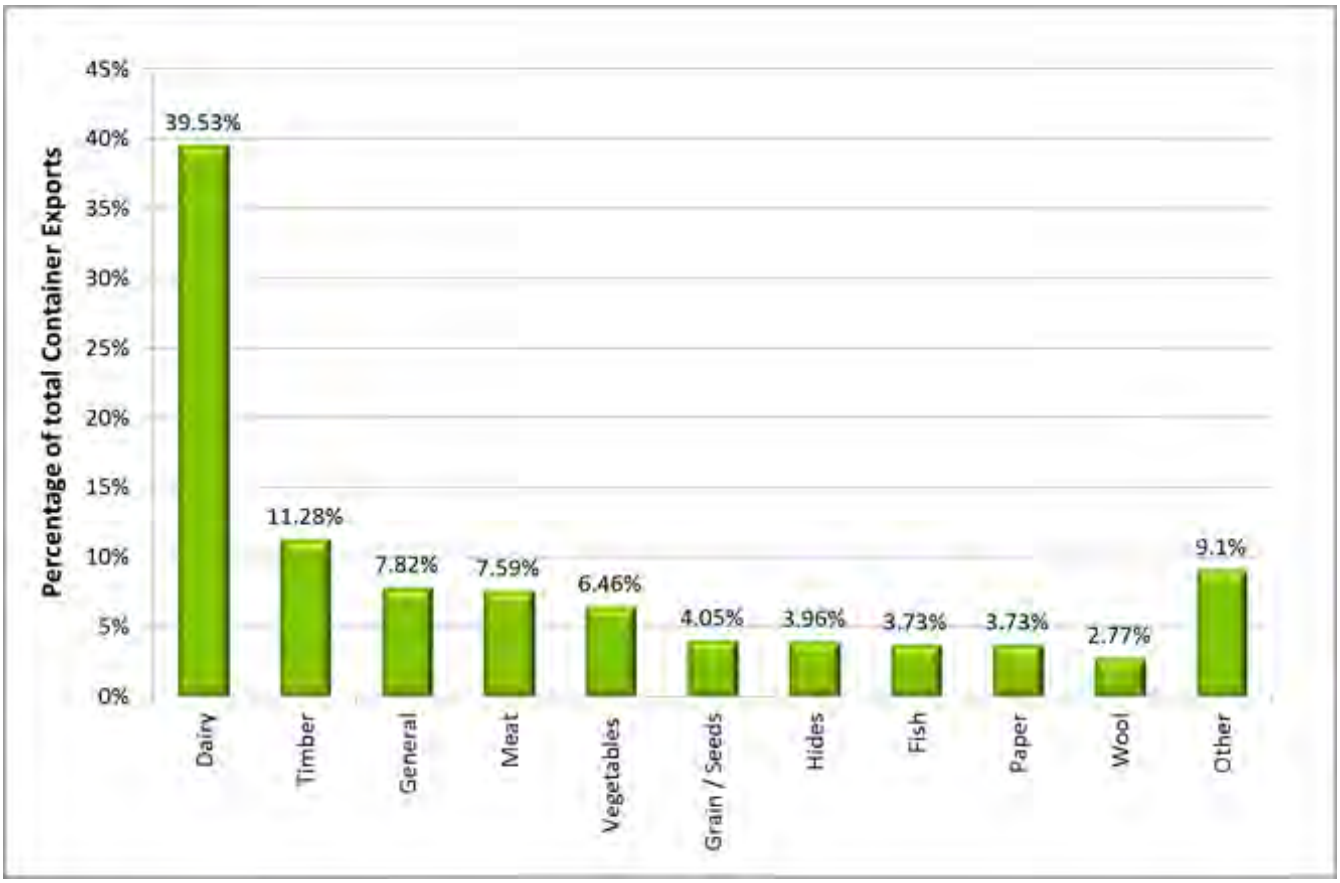

Figure 16 - Containerised commodities exported through the LPC 2012/11

Source: LPC [61]

As shown in this figure, dairy and timber, general cargo and meat are the largest export products (by number of TEUs exported). For dairy, timber and meat, we have undertaken some further analysis of the origins of the products, explained their supply chains in the context of the LPC and investigated projected commodity growth.

5.6 Dairy containerised exports

In the Canterbury region, dairy products are produced at Fonterra plants at Darfield and Clandeboye, the Westland Milk Product plant at Hokitika and Synlait's plant at Dunsandel. Milk is trucked from farms in Hokitika south and west to Canterbury, processed into finished goods, such as milk powders, cheese and butter, then packed into containers and, mainly, railed to LPC. Less than half of the dairy containers transit via City Depot.

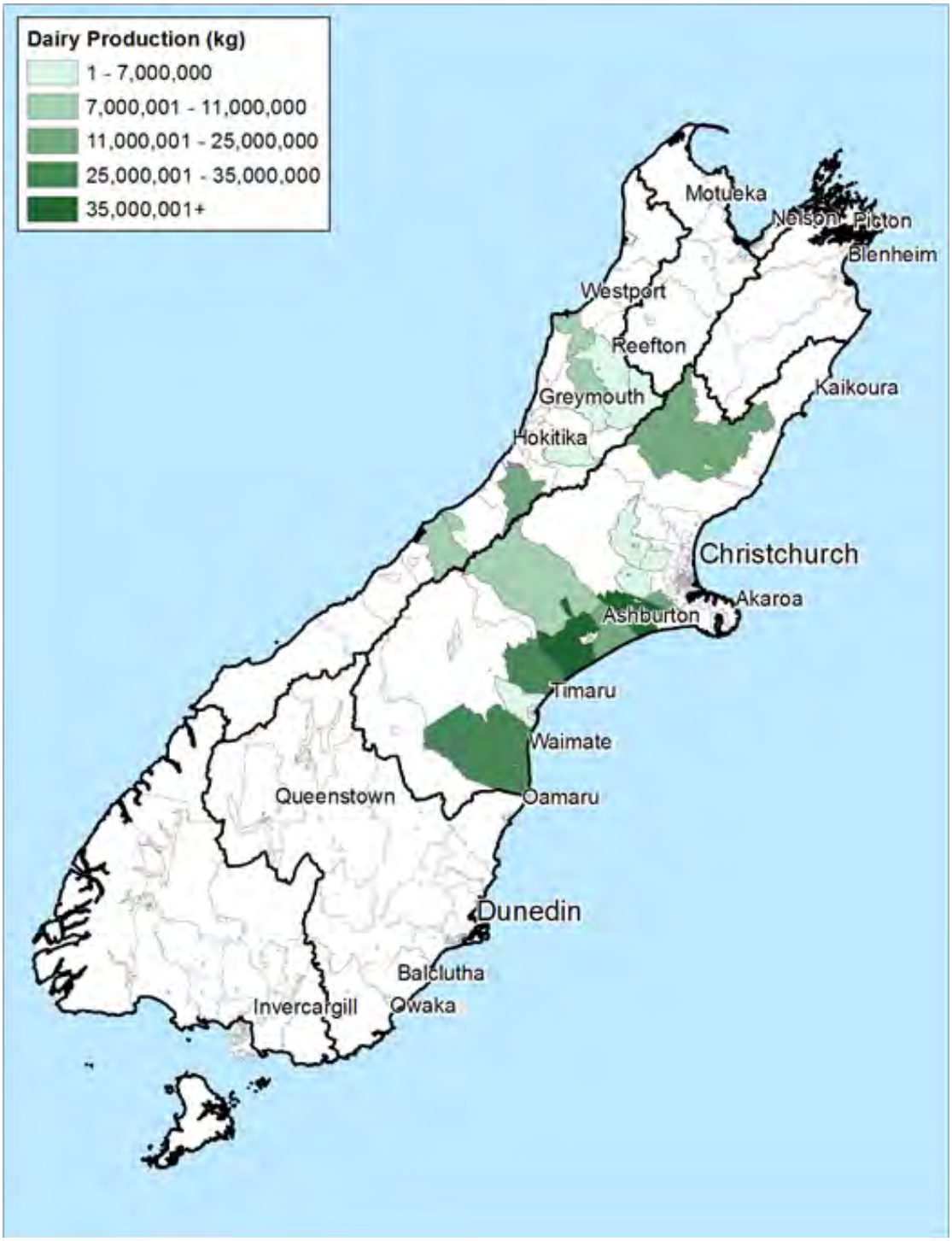

Figure 17 - Milk and dairy production and processing chain in the Canterbury region

According to DairyNZ [69], the region including North and South Canterbury and the West Coast produced 348 million kilograms of milk solids in 2011-12, up from 257 million kilograms in 2008-09. The historical figures and trend forecast are shown in Figure 18.

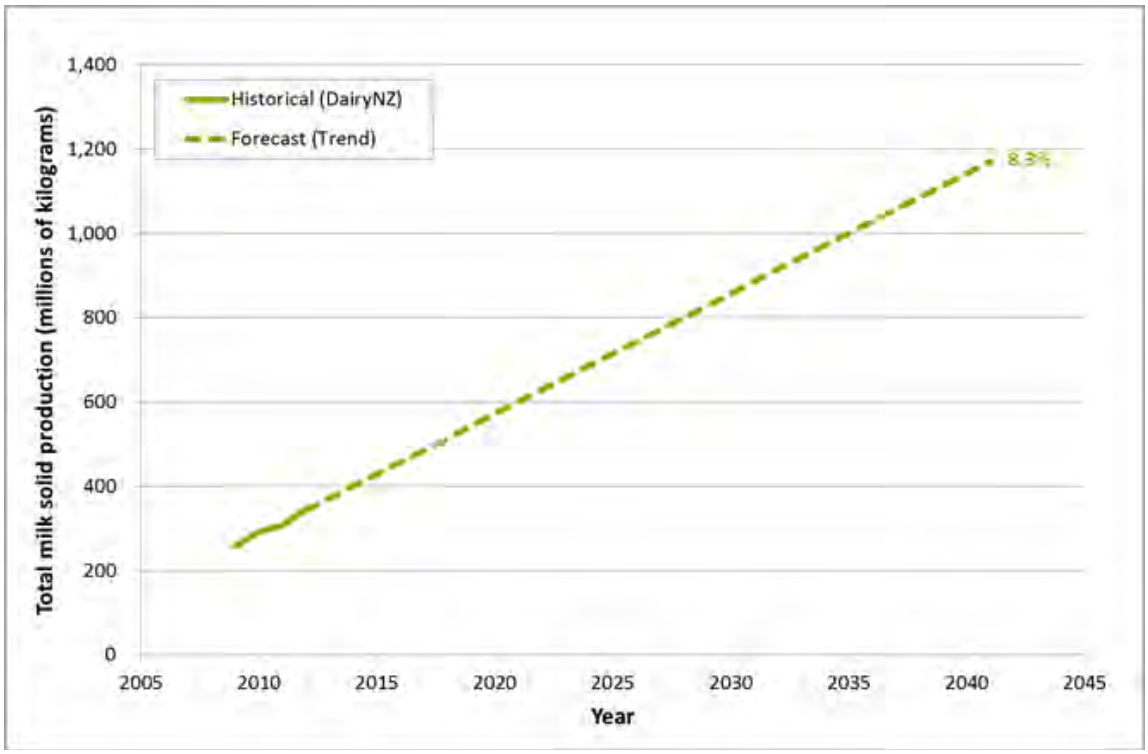

Figure 18 - Milk solid production and trend for the North Canterbury, South Canterbury and West Coast regions

Source: DairyNZ Statistics 2008-09 to 2011-12 [69]

Significant increases in irrigated land area over the past five years have helped support substantial growth in agricultural production in and around Canterbury. Since 2007, the area of irrigated land in Canterbury has increased by 60,000 hectares [70].

A study commissioned by the Canterbury Development Corporation (CDC), completed by the Agribusiness and Economics Research Unit (AERU), found a total irrigable land area of 1.1 million hectares, which includes the currently irrigated land of 0.5 million hectares. This gives a clear indication that continued significant growth in the dairy industry is possible (but not guaranteed). Environmental Canterbury (ECan) policies on effluent disposal may also have an impact on continued growth.

Higher yields of milk solids per cow and increased areas of irrigated land for dairy farming over the past 5-10 years have produced a steady increase in overall milk solid production. This equates to 3.8 times the milk solid production (with a doubling of the available irrigable land) between 2011 and 2041 if this growth continues. This does, however, fall short of overall container movement growth (5.2 times between 2011 and 2041).

5.7 Timber

According to the NFDS (2008) [9], New Zealand is home to approximately 2 million hectares of plantation forestry. Of this, 6.0% is located in Canterbury [9]. Logs are transported to timber and paper mills for production, or direct to port for export.

A number of log processing facilities are located in Canterbury and are supplied by logs from all over the South Island. Locations of woodlots and processing plants are included in the section on Logs, Section 10 page 42.

The Ministry of Agriculture and Forestry released Canterbury Forest Industry and Wood Availability Forecasts in 2007 [62]. These forecasts indicate that, beyond 2017 there is the potential for the harvested volumes of Radiata

Pine and Douglas Fir to increase significantly in the Canterbury region, as existing woodlots planted in the 1990s reach maturity.

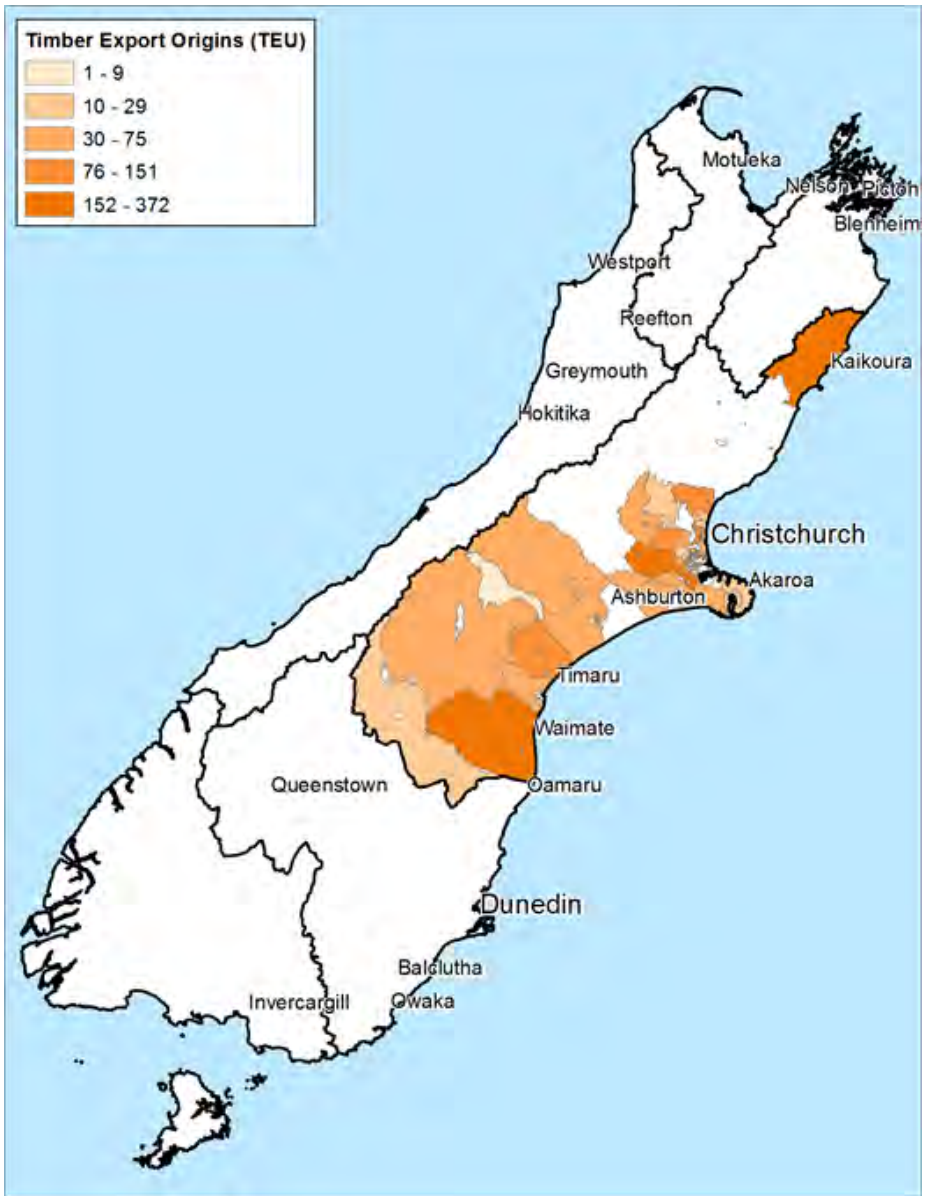

Figure 19 - Log production and timber processing chain in the Canterbury region

Based on details provided in the Wood Availability Forecast document, it is difficult to forecast log production and subsequent containerised wood exports. The Ministry of Agriculture and Forestry document indicates that wood availability in Canterbury will remain constant through to approximately 2020 and then quickly double. It will then remain stable until 2035-2040. This is further detailed in Section 8 on Logs.

5.8 Meat

The majority of livestock movements are within individual regions of the South Island, reflecting the movement of livestock from the farm to point of processing [19].

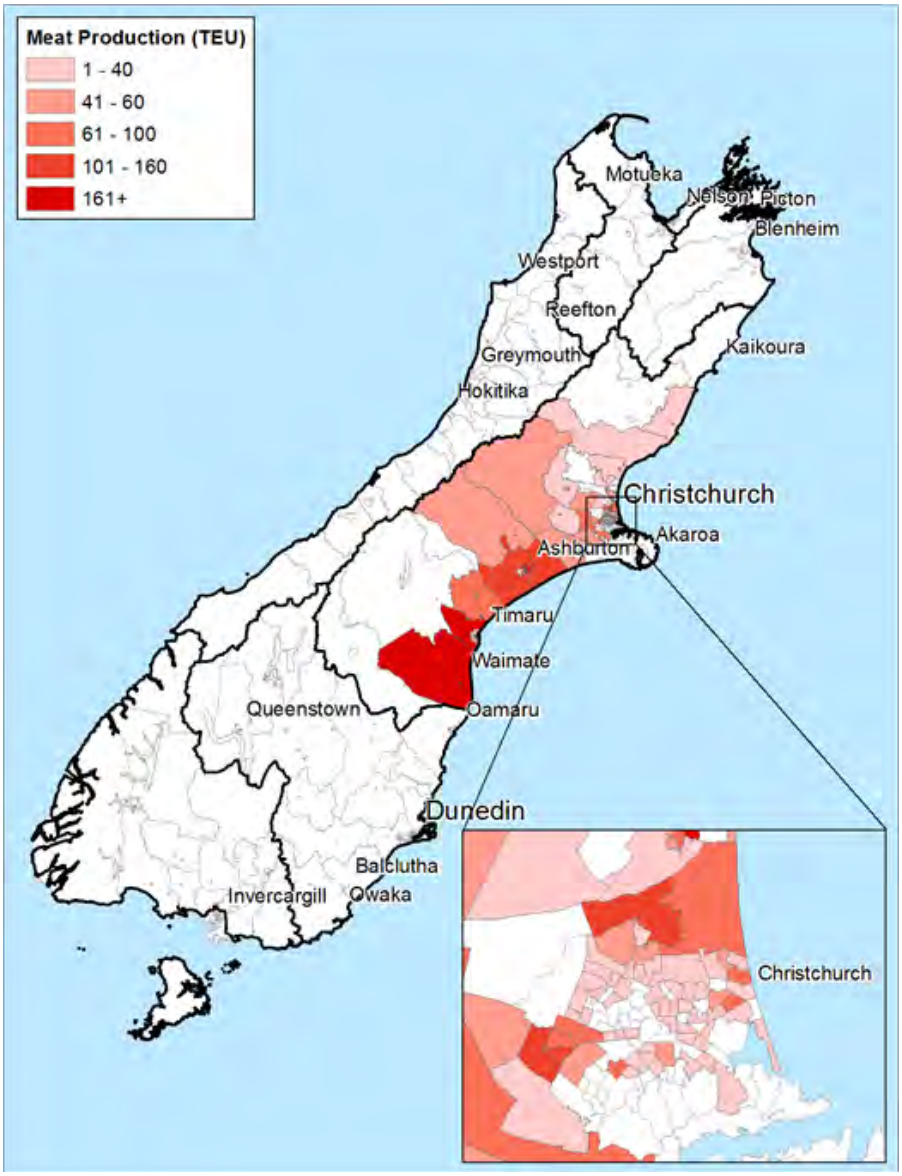

Figure 20 - Meat origin and processing chain in the Canterbury region

Once processed, the vast majority of this product is packed for export, as shown in Figure 21. For example, 78.0% of livestock slaughtered in Canterbury in 2012 was graded and packed for export (approximately 153 million kg [68]).

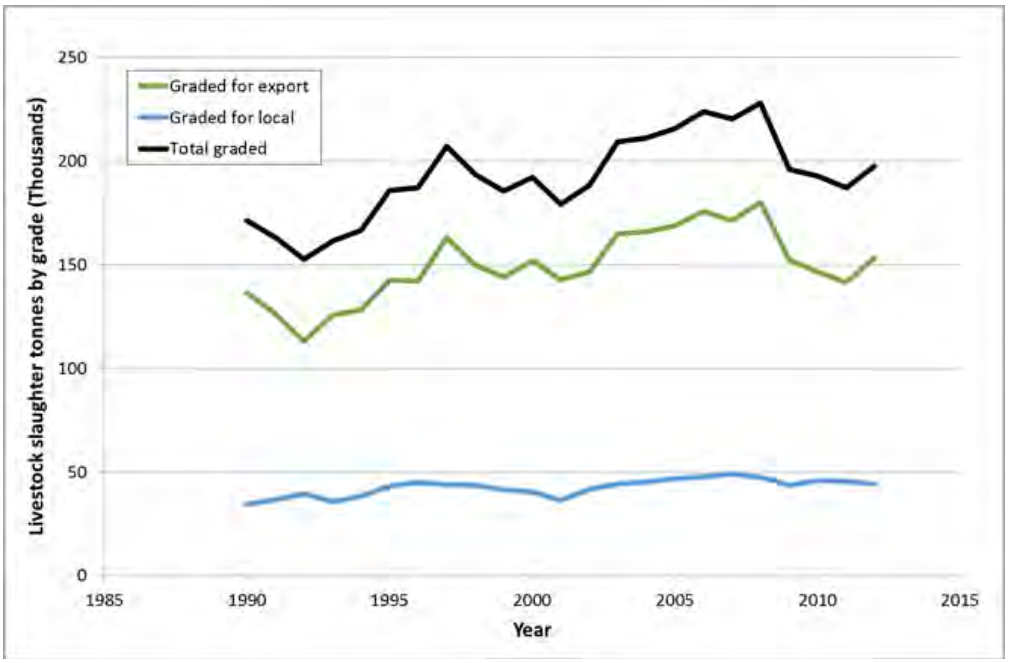

Figure 21 - Canterbury Regional Council kill data by year (1990-2012)

(total graded tonnes compared to the amount graded for local consumption and export)

Source: StatsNZ [68]

This industry is very seasonal and highly susceptible to changes in the climate, with production in 2011 and 2012 being lower than other years due to drought. Once processed, meat products are either packed into containers for export, or distributed around New Zealand (primarily to Auckland and surrounds due to its large population base) for domestic consumption [68]. Analysis of the export grade data indicates minimal growth since 1990 (1.0% linear growth per annum).

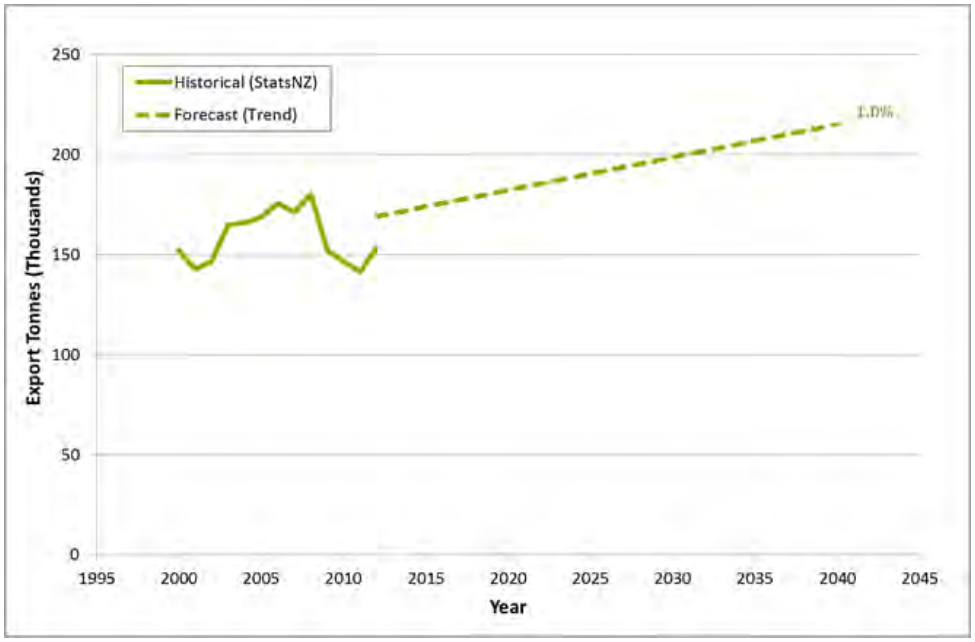

Figure 22 - Trend in exported graded kill data (trend from 1990-2012)

Source: StatsNZ [68]

5.9 Conclusion

The analysis of historical movements of import and export containers through the LPC has shown strong linear growth, equating to approximately 4.8% annual linear growth if it continues. This is strong growth by normal accounts, but is significantly lower than the GCTS projected growth in container movements of 5.3% compound.

Analysis of the major import and export commodities does not by itself support this higher growth profile. In fact, the production of milk solids (the foundation for New Zealand's biggest export sector) in the Canterbury and West Coast regions (if continuing to grow at the current rate) is only expected to grow to 3.8 times 2011 volumes by 2041. This contrasts to overall growth in container movements over the same period of 5.2 times, although this may allow for empty import containers too.

The top-down approach that forecasts can be based on observed correlation between container growth and economic factors is an important linkage, but to be sustained in the LPC case, it would need to be supported by higher international and domestic imports (possibly as a result of lower levels of manufacturing on the South Island), strong growth in exports (e.g. dairy) and possibly changes to transport structures on the South Island. This may include LPC gaining additional import and export market share (as a result of a deeper port and larger ships), and increased transhipments (LPC acting as a shipping hub for the South Island).

As these things are possible, Aurecon believe that the GCTS container forecast of 5.3% compound is aspirational, whereas steady linear growth of 4.8% (Figure 13) is likely to be conservative. Consequently, for the purposes of this Freight Demand Statement, a range of forecasts (upper and lower bound) is appropriate.


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Section 6

Imported dry bulk commondities

6. Imported dry bulk commodities

The LPC is the largest of the five ports on the South Island that import Dry bulk materials are imported through the LPC, the most significant commodities being cement, fertiliser and gypsum. Other export dry bulk commodities, such as logs and coal, are discussed separately in Sections 8 and 9. Exports of other traditional bulk commodities (e.g. grain) through LPC use containers and are discussed in Section 5.

6.1 Dry bulk growth comparison

Figure 23 shows a comparison of historical imports of dry bulk trade through the LPC, the projection of the underlying trend and the forecast growth assumptions from the GCTS.

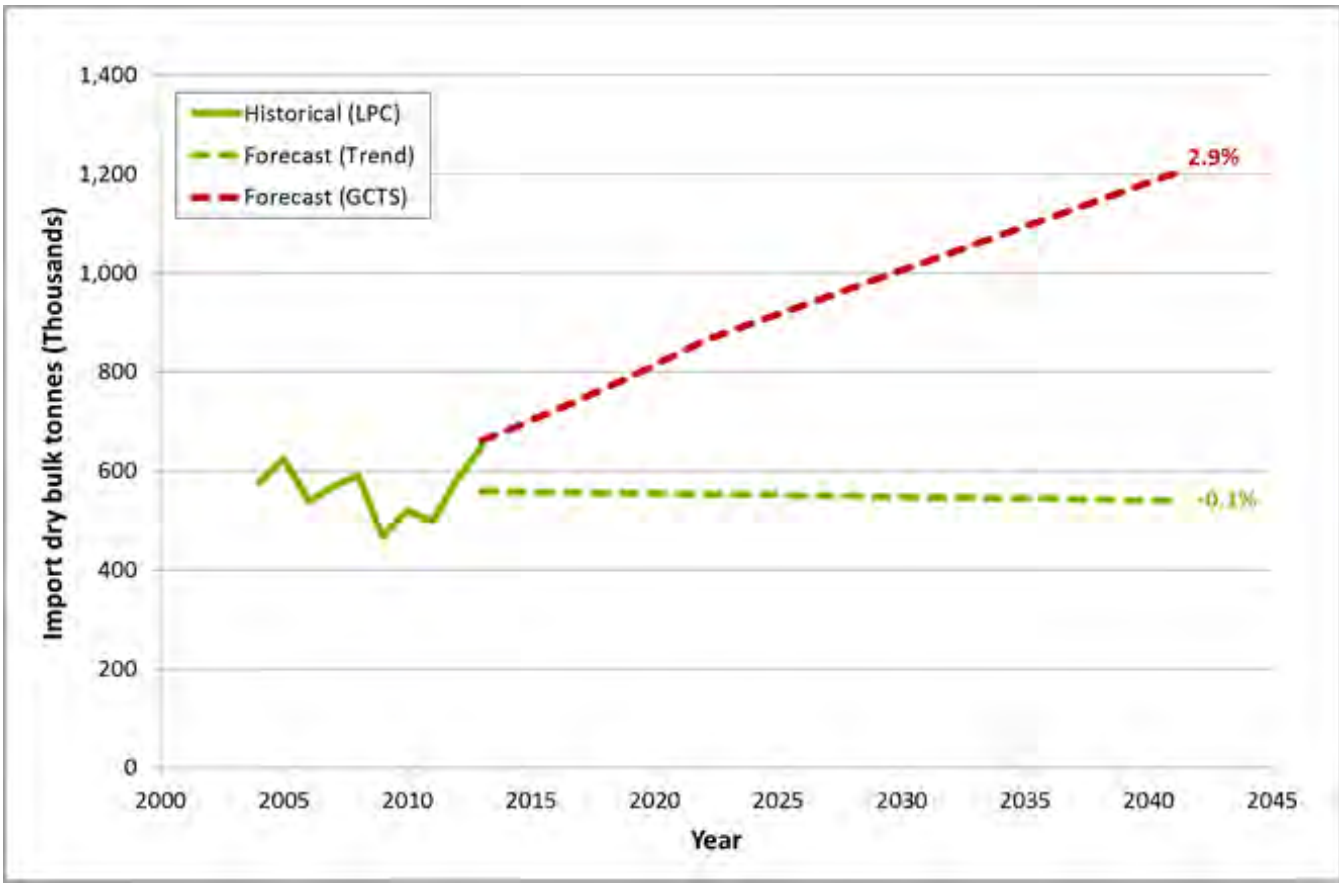

Figure 23 - Dry bulk trade and forecasts for the LPC

Source: Historical (LPC annual reports [50-60])

As shown above, trade in dry bulk is highly volatile from year to year, slightly trending down over the past 10 years. The GCTS shows steady and sustained growth of 2.9%. Understanding the individual commodities will help determine whether the projected GCTS growth is achievable.

6.2 Dry bulk commodities and trends

This section contains an overview of the destinations of dry bulk commodities imported through the LPC. In cases where the destination is not definitely known, but the use is, then destinations are estimated, based on land-use or land zoning (cement, lime, plaster and concrete product manufacturing, as well as agricultural industries).

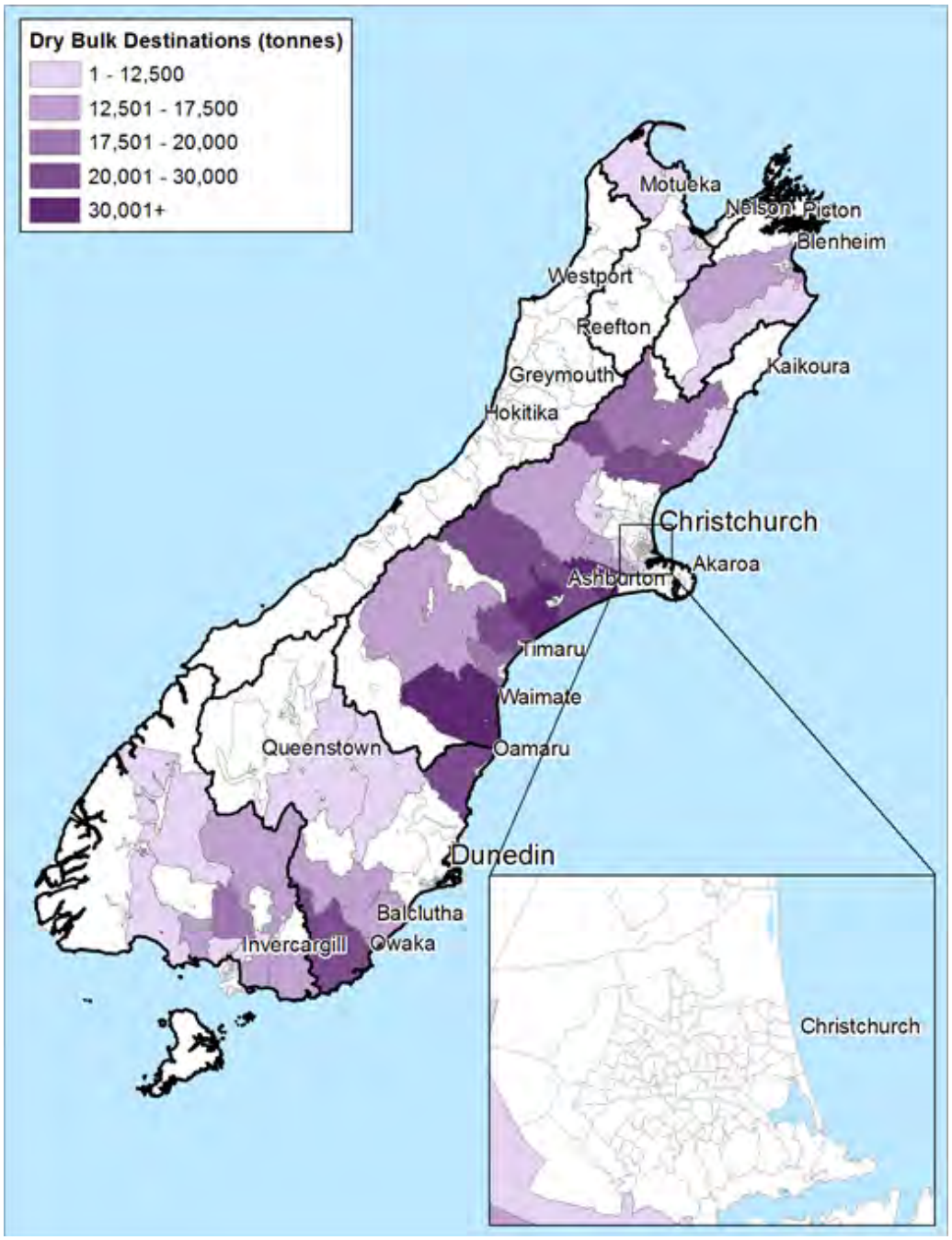

Figure 24 - Destinations for dry bulk freight imported through the LPC

As shown in above, there is strong demand for dry bulk commodities in northern and southern Canterbury, with significant employment in urban areas Allerton, Hampton and Tinwald, and in the regional areas Waihao, Mt Somers and Hurunui.

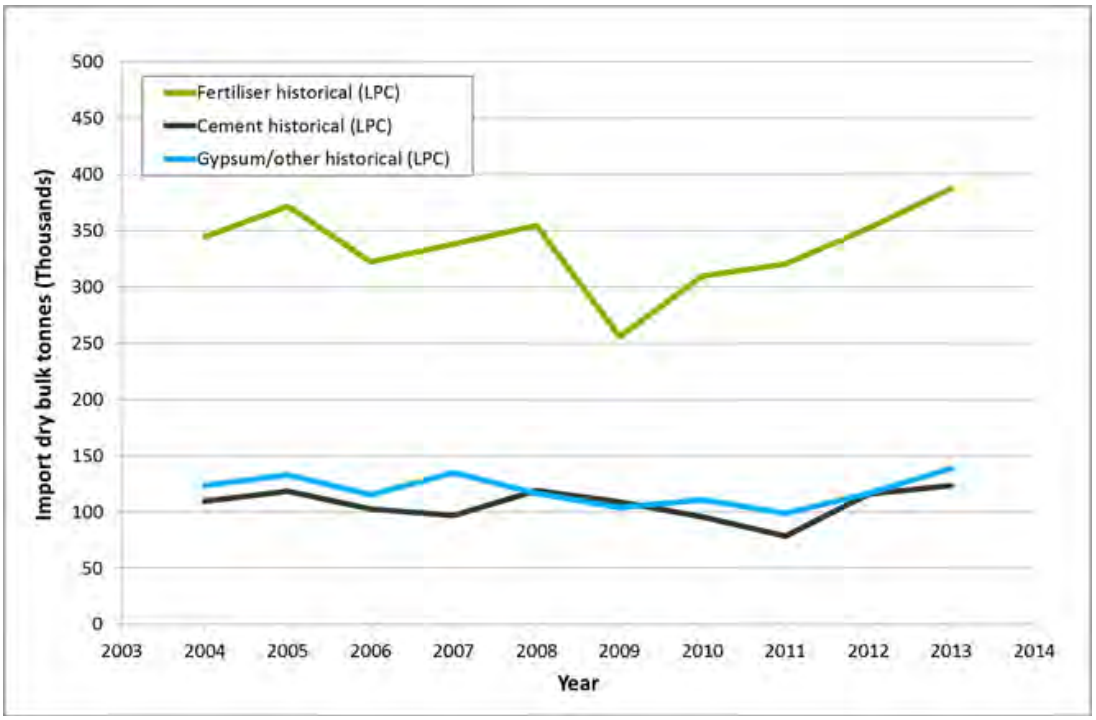

Figure 25 - Historical trade in dry bulk commodities for the LPC

Source: LPC annual reports (with Aurecon estimates of individual commodities where not specified, [50-60])

As shown above, fertiliser imports contribute the majority to dry bulk, but also show the highest variability. The drop experienced in fertiliser trade in 2009, contributes to the overall flatness of growth shown in Figure 23.

6.2.1 Cement

Currently cement is imported by Holcim and Golden Bay Cement via coastal shipping, from their production points at Westport and Whangarei. Holcim stores this cement at its site located at LPC.

Recent media statements have indicated that Holcim will close its Westport plant in approximately two years and will instead import cement. The new cement import terminal is to be constructed at PrimePort Timaru to store and process this commodity for distribution throughout New Zealand. This processing facility would have the capacity to handle 1.0 million tonnes of cement a year. There will be no change to import volumes going through Lyttelton.

6.2.2 Fertiliser and gypsum

Fertiliser and gypsum are mainly used in primary industries, to promote growth in feed for cattle and/or agricultural crops. The LPC imports the largest quantity of fertiliser and gypsum for the South Island (SouthPort also imports a significant amount) and therefore the distribution of destinations is likely to extend from the north through to Otago in the south (as illustrated in Figure 24).

Any future growth in fertiliser and gypsum is likely to be driven by changes and growth in the agricultural sector and future irrigation strategies being developed, particularly for the Canterbury region.

6.3 Conclusion

The forecast growth proposed in the GCTS is not high, but is significantly different from historical trends in imports of dry bulk products. While cement projections have not been made available for this project (most likely due to commercial sensitivities), Aurecon believes that the GCTS forecast for growth is appropriate to be used for later stages of the project. Fertiliser, gypsum and grain/feed are likely to grow in response to projected growth in agricultural activities and planned irrigation schemes in the Canterbury region.

Section 7

Import petroleum

7. Import Petroleum

In this section we give an overview of petroleum imports, which includes information on different fuel types where information has been found in the public domain. For the initial validation, we compare the historical growth in fuel imports with the GCTS forecast growth.

7.1 Import petroleum supply chain

The production facility for petroleum products in New Zealand is the Marsden Point Refinery (North Island above Auckland). Oil and associated products are imported to Marsden Point for refining. According to the Ministry of Economic Development, the refinery produces petrol, diesel, jet-A1, fuel oil, bitumen and other petroleum products. The majority of these refined products are consumed in New Zealand; in 2011, the refinery supplied approximately 70% of New Zealand's consumption of oil products [67].

The finished products are transported by coastal tanker to Wellington, Lyttelton or Mt. Maunganui, where they are stored at a storage tank farm, prior to distribution by truck. Some fuel (petrol and diesel) used for transport in New Zealand is also imported directly, mainly from refineries in Asia, the Middle East and the Pacific region. This is a pooled storage system, allowing each of the four major oil companies access to manage their stock levels and coordinate and optimise import shipments.

Destinations for petroleum products, shown in Figure 24, are based on demand for petrol (population), diesel (agricultural activities) and aviation fuel (air transport activities) throughout the South Island. Not surprisingly, due to the large centre of population and employment in Canterbury, approximately 27% is destined for Greater Christchurch, with a further 25% for the remainder of the region. By contrast, Tasman, Otago and Southland range from 11-15%.

Certain grades of fuels are piped through Mobil's pipeline from Lyttelton to Woolston, with the remaining fuel taken by tanker through the Lyttelton Tunnel. Prior to the earthquakes, Evans Pass was used by the tankers, but this route requires significant work to bring it back to pre-quake standard.

The use of the tunnel is considered a temporary measure until the pass reopens. The tankers take fuel through the tunnel at night during designated periods and, due to the dangerous nature of the goods, under strict conditions. When vehicles carrying hazardous goods require passage through the tunnel, the Tunnel Control Centre will clear the tunnel of all other vehicles, and then allow the vehicle to pass through the tunnel unaccompanied. Typically, 8-30 vehicles carrying hazardous goods use the tunnel each night.

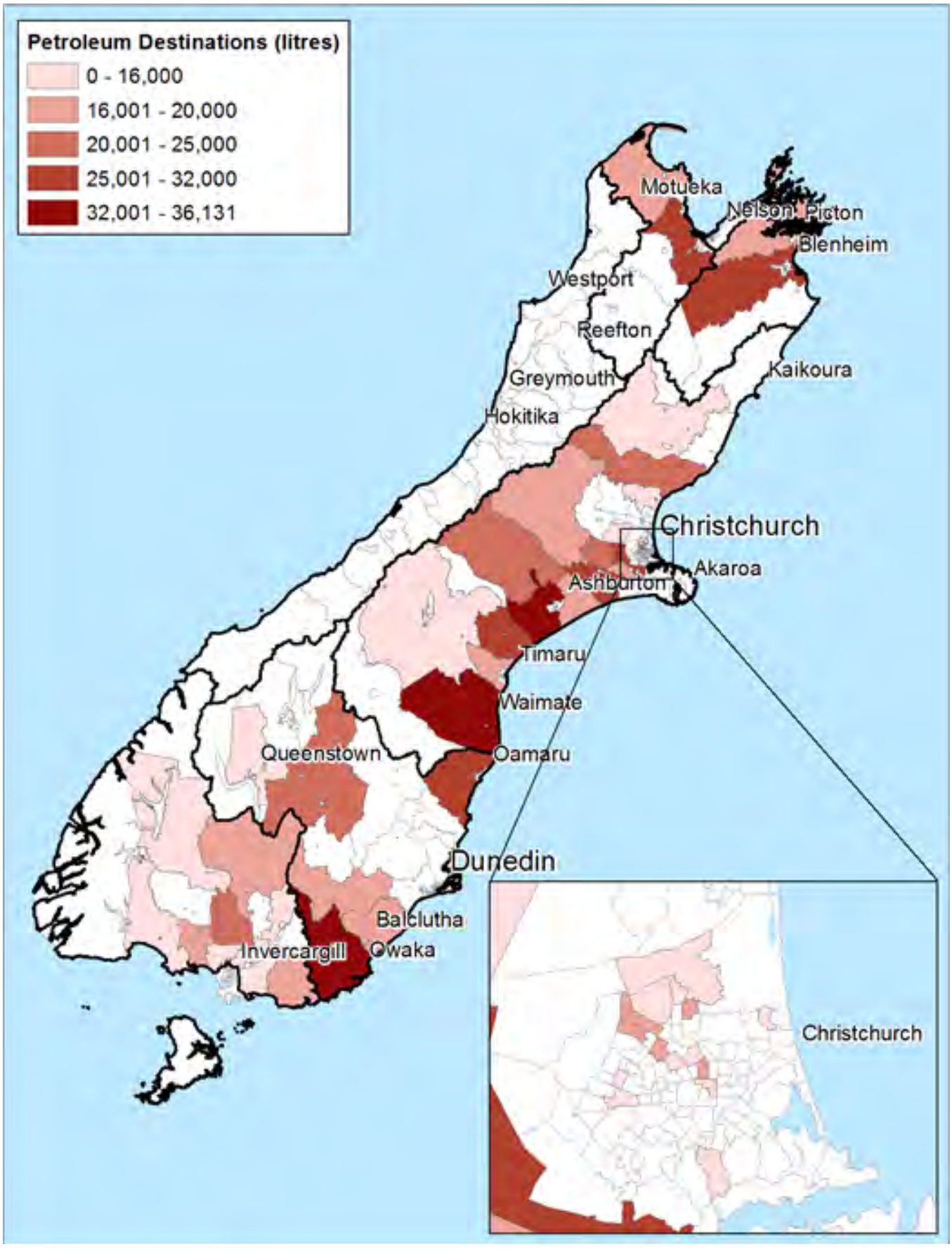

Figure 26 - Destinations for petroleum imports through LPC

Certain grades of fuels are piped through Mobil's pipeline from Lyttelton to Woolston, with the remaining fuel taken by tanker through the Lyttelton Tunnel. Prior to the earthquakes, Evans Pass was used by the tankers, but this route requires significant work to bring it back to pre-quake standard.

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7.2 Petroleum growth comparison

Figure 27 shows a comparison of historical fuel imports (measured in tonnes) through the LPC, the projection of the underlying trend and the forecast growth assumptions from the GCTS.

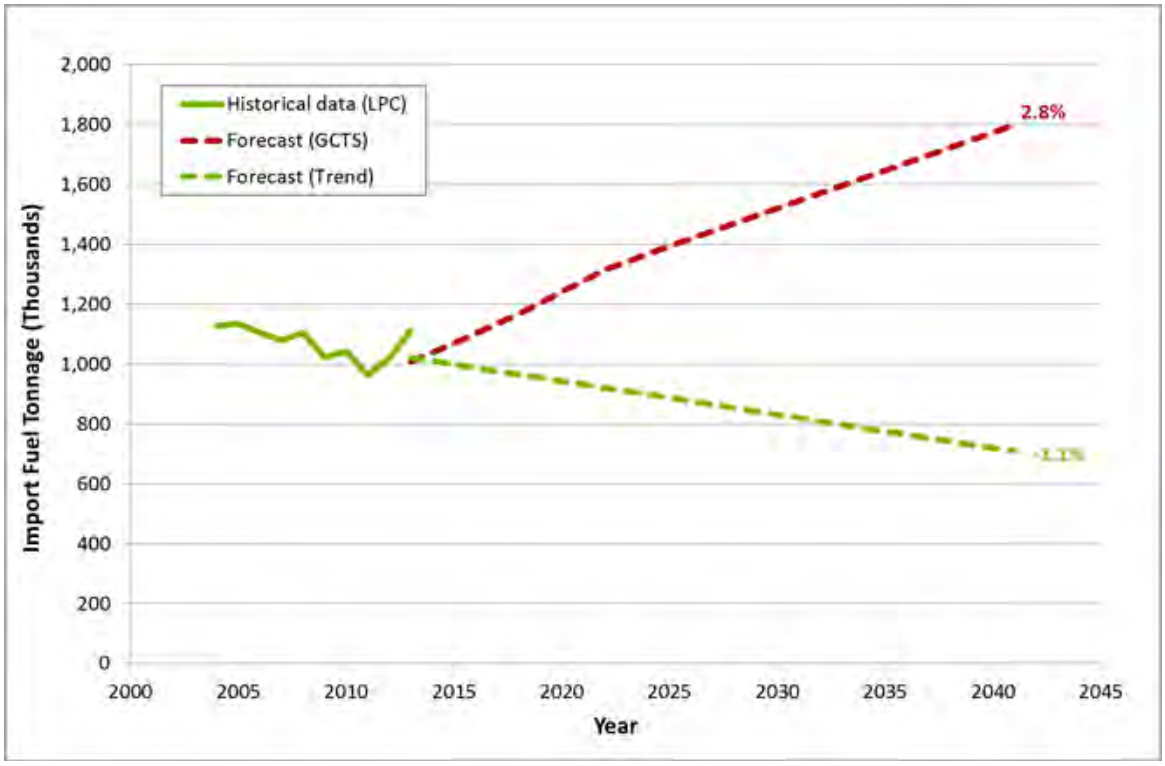

Figure 27 - Petroleum imports and forecasts for the LPC

Source: LPC [50-60], GCTS [31,32]

As shown above, the forecast GCTS growth of 2.8% is considerably higher than the past 10-year trend of -1.1%. Information sourced from the 2013 LPC Annual Report [50] indicates that fuel imports have been consistently around 1.0 million metric tonnes for the previous three years (2010 through 2013) and that this is unlikely to change significantly in the future.

At face value, the GCTS forecasts are optimistic, however, Aurecon has undertaken some additional analysis of the major fuel types being shipped and consumed (with limited available information), to better understand whether the projected growth could be achieved.

7.3 Petroleum commodities and trends

At the time of writing, no information is available on the breakdown of petroleum imports at LPC into various product types. We have therefore considered the production of various petroleum products at Marsden Point as an indicator for the products imported through LPC (Figure 28).

Marsden Point Refinery's primary outputs are petrol and diesel products. Over the ten-year period to 2011, production of petrol decreased, but was replaced by diesel. Fuel oil accounts for 14% of production and aviation fuel 21%. Other petroleum products include: bitumen, lubricants, solvents, waxes, petroleum coke, white spirit and other liquid fuels (2% of production outputs).

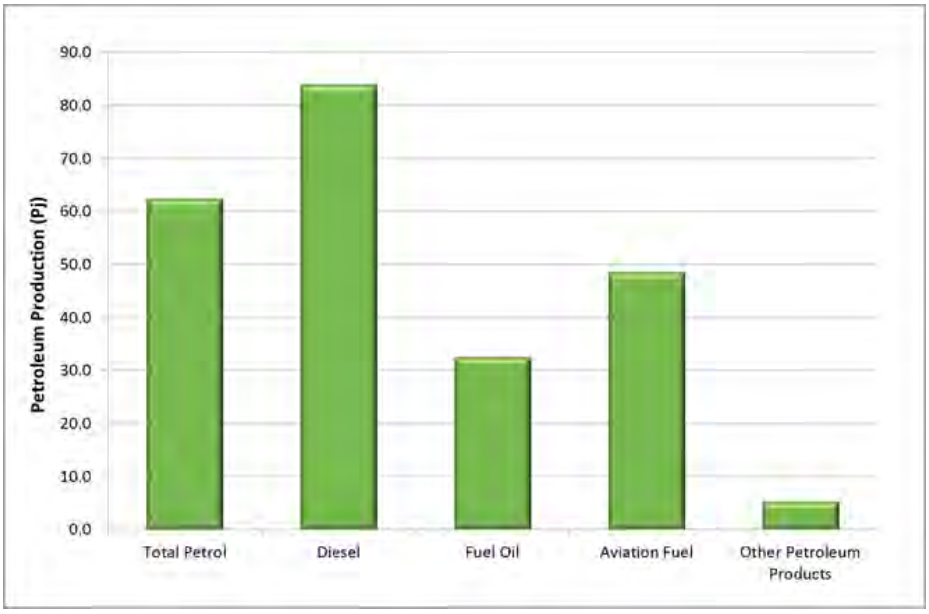

Figure 28 - Petroleum production (Pj) at Marsden Point Refinery in 2011

Source: Energy Data File [67].

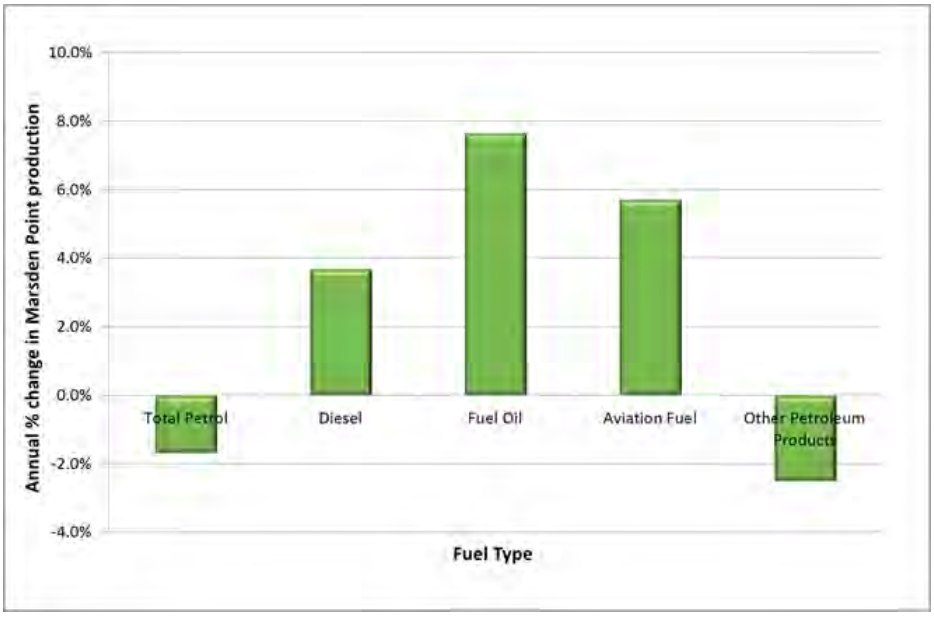

Figure 29 - Annual percentage change in production by product type at Marsden Point Refinery, 2001-11

Total petrol - total production of unleaded 91 octane and premium unleaded 95-98 octane. Other petroleum products - bitumen, lubricants, solvents, waxes, petroleum coke, white spirit and other liquid fuels.
Source: Energy Data File [67].

The petroleum imports can be broken down into a number of products, each of which has different drivers and growth patterns. Commentary on each is provided below.

- Total Petrol - This unleaded fuel is primarily used to power cars and motorcycles. Increased fuel costs and initiatives to discourage the use of cars on the South Island, are likely to lead to a decrease in petrol consumption, as people seek to save fuel and money by using more sustainable transport modes, such as walking, bicycles and public transport. Between 2001 and 2011, petrol production at Marsden Point decreased by 1.7% per annum, reflecting this trend.
- Diesel - This fuel is primarily used by industry to power heavy machinery. It is also used by some vehicle manufacturers to power private vehicles. Diesel consumption in New Zealand is primarily driven by industry. In the Greater Christchurch region, works relating to earthquake recovery have contributed to diesel consumption. Strong growth in dairy production and agriculture in the surrounding areas is also likely to continue, resulting in strong demand for this fuel type in the medium-term.
- Aviation fuel - Aviation fuel produced at Marsden Point is consumed at airports throughout New Zealand. Commercial flight numbers at Christchurch International Airport have steadily decreased since the earthquakes (Figure 30). However, the magnitude of any change in aviation fuel demand would depend on the make-up of the fleet (aircraft types), as well as the origins and destinations (routes) of those flights.

  The LPC fuel storage also services other airports in the South Island, including Queenstown, Invercargill, Nelson and Dunedin. In aircraft movements and passenger numbers, however, Christchurch International Airport is the largest.

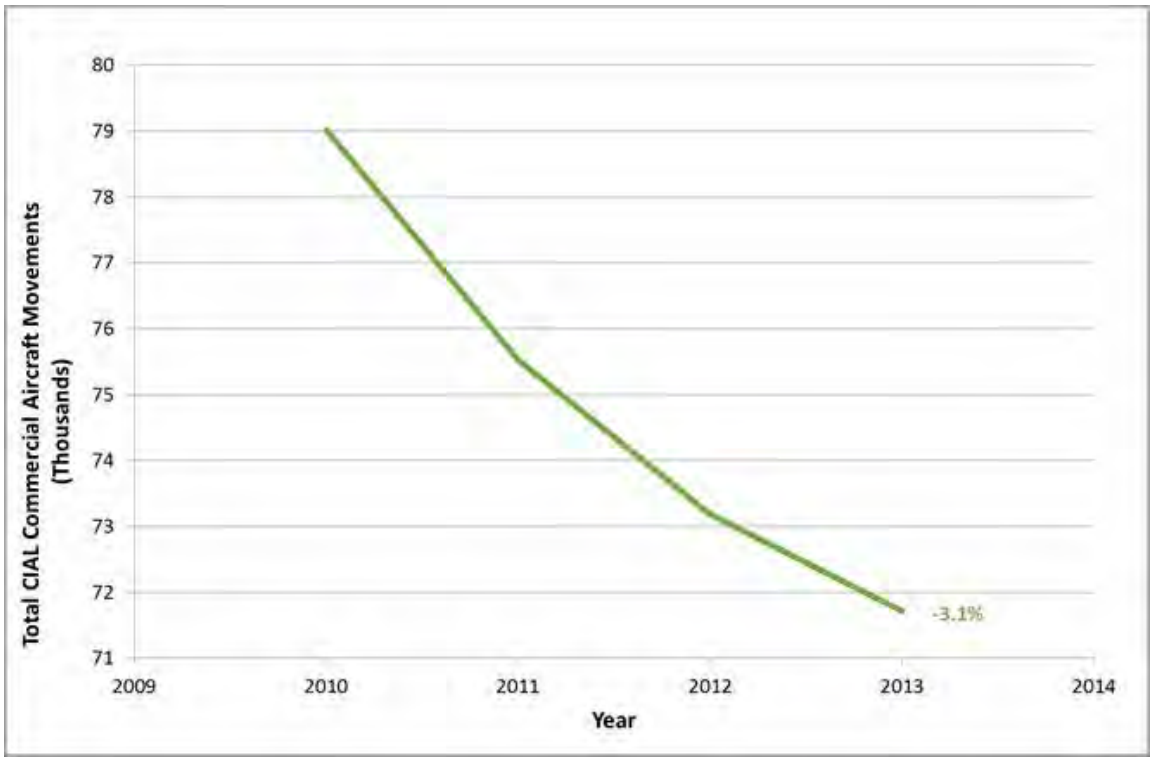

Figure 30 - Total commercial aircraft movements Christchurch Airport, Financial Years 2010-2013

Source: CIAL [713]

- Fuel oil. Fuel oil refers to liquid petroleum that can be burned in a furnace or boiler for the generation of heat or power. Marsden Point has increased its production of this product in recent years.
- Other products (includes: bitumen, lubricants, solvents, waxes, petroleum coke, white spirit and other liquid fuels). These are produced in relatively small quantities at Marsden Point compared to petrol, diesel and aviation fuel. Bitumen is being used in the earthquake rebuilding program. The production of these commodities has fallen in recent years.

7.4 Alternative forecast for petroleum imports

To establish a more conservative forecast for petroleum imports, we have assumed that:

- Split by product type. Petroleum imports to LPC are assumed to be split according to the production proportions at Marsden Point (that is, Total Petrol 29.1% of imports, diesel 36.9%, fuel oil 10.2%, aviation fuel 20.7% and other products 3.0%, based on information from the Energy Data File [67]).
- Total Petrol. Growth in this product is linked to growth in population in the region. Population growth is assumed to be 0.7% per annum, consistent with GCTS and StatsNZ estimates [68].
- Diesel, Fuel Oil and other products. Growth in these products is linked to growth in employment in the region. Employment growth is assumed to be 0.7% per annum, consistent with GCTS estimates [31, 32].
- Aviation Fuel. Growth in this product is linked to growth in aircraft movements, particularly at Christchurch International Airport [71]. The long-term growth in aircraft movements is assumed to be only moderate (2% per annum), as the historical information available, showing decreasing flight movements, is impacted by the Christchurch earthquake.

Based on these assumptions, we have produced the forecast in Figure 31. This blended forecast results in an annual growth rate of 1.2% per annum.

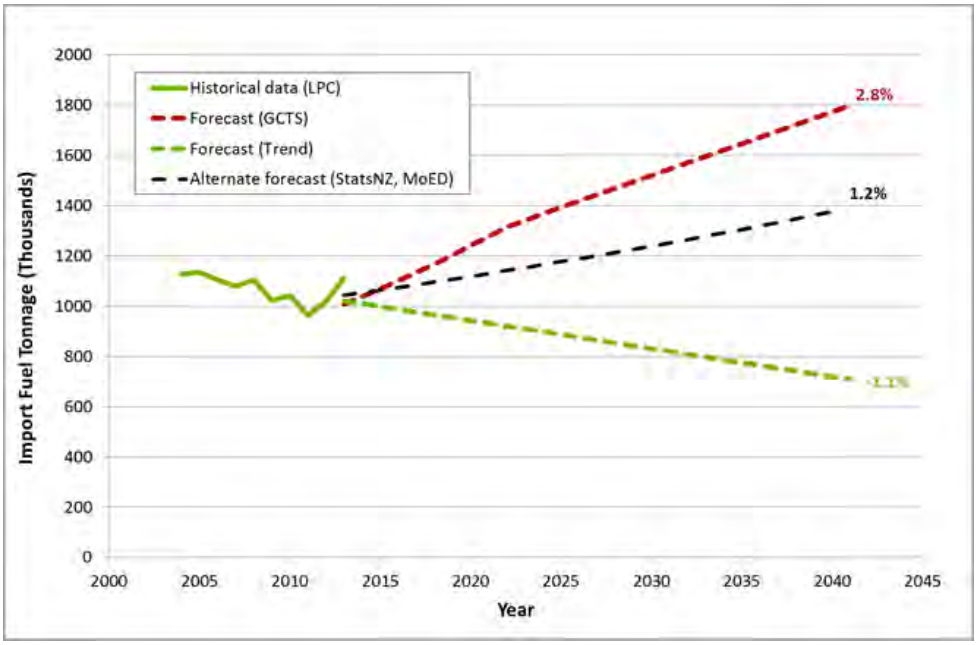

Figure 31 - Alternate forecast growth in petroleum imports compared to the historical trend and the GCTS estimates

7.5 Conclusion

Growth in petroleum imports through LPC is assumed to increase slightly over the coming 30-40 years, primarily driven by gradual increases in population numbers and employment. The alternate forecast indicates that a growth rate of 1.2% per annum may be achieved. However, as more detailed import information becomes available post-earthquake recovery, these forecasts should be reviewed and revised as necessary.

Increases in storage at LPC (for example an additional 30 million litres of storage was added by Z Energy in 2011 and it also has resource consent for an additional 25 million litres) appear adequate to meet demand.

Fuels are classified as hazardous goods and therefore can only be transported through Lyttelton Tunnel at night, when the tunnel is closed to general traffic. As fuel movements increase they will require additional tunnel capacity at night. This may impact on schedules for maintenance work to be completed in the tunnel, or, alternatively, the maintenance works may affect the ability to move hazardous goods, such as fuel. This will be outlined further in our Freight Infrastructure Statement.

Section 8

Export logs

8. Export logs

8.1 Logs supply chain

According to the National Freight Demand Study (2008) [9], New Zealand is home to approximately 2 million hectares of plantation forestry. Of this, 6.0% is located in Canterbury. Logs are transported to timber and paper mills for production, or direct to port for export. For example, approximately 250,000 tonnes of logs were exported in 2011 through LPC [53].

Based on the location of plantation forestry, logs come from all over the South Island and are exported primarily through LPC, but also Port of Napier, PrimePort Timaru and Port Otago. Locations of woodlots are shown in Figure 32

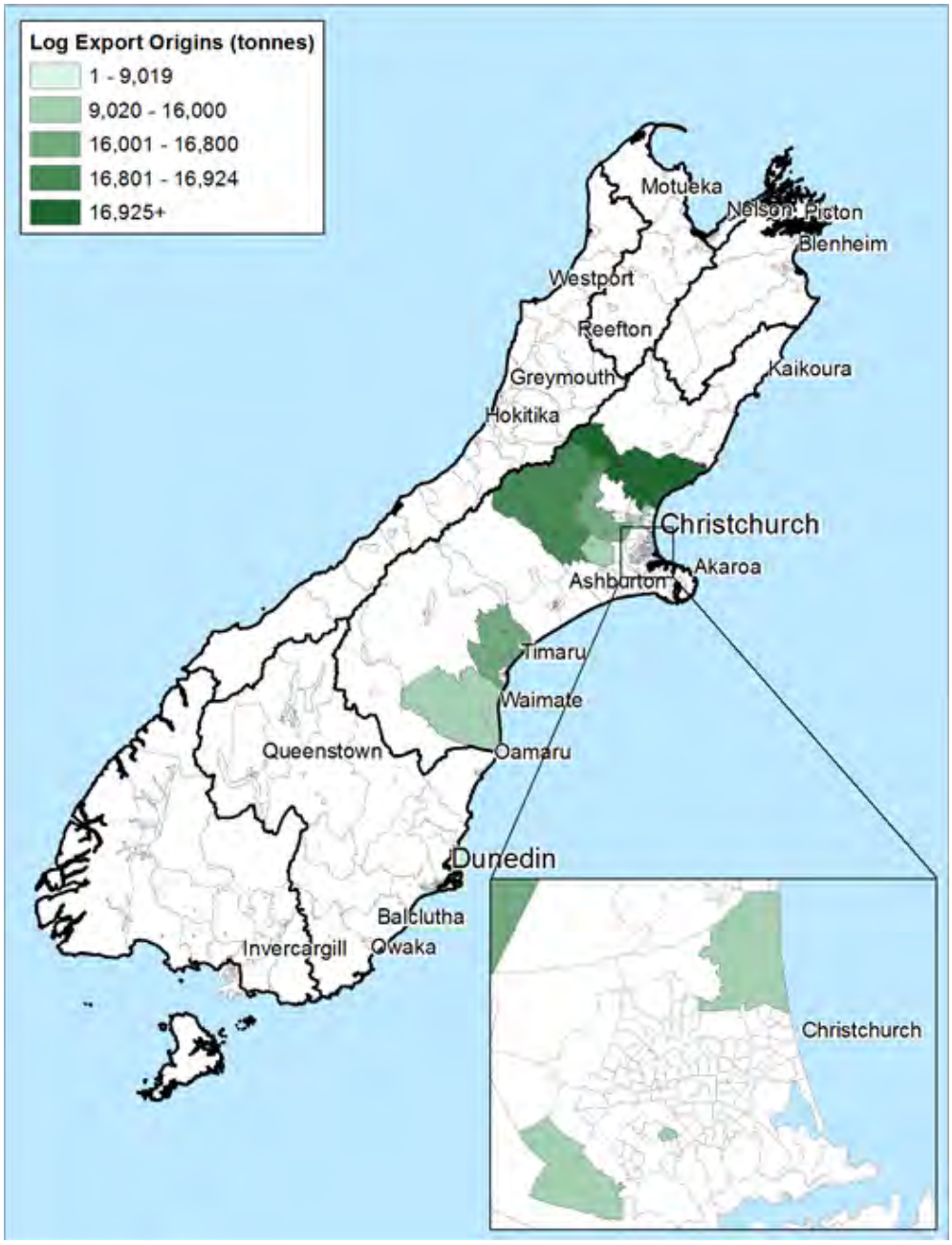

Figure 32 - Origins of logs in the Canterbury region exported through LPC

8.2 Log growth comparison

Historical log exports show a linear growth rate of 10.6% per annum, which is significantly higher than the GCTS forecasts (Figure 33). The GCTS forecasts initially appear low; however, further analysis is provided to explain this difference.

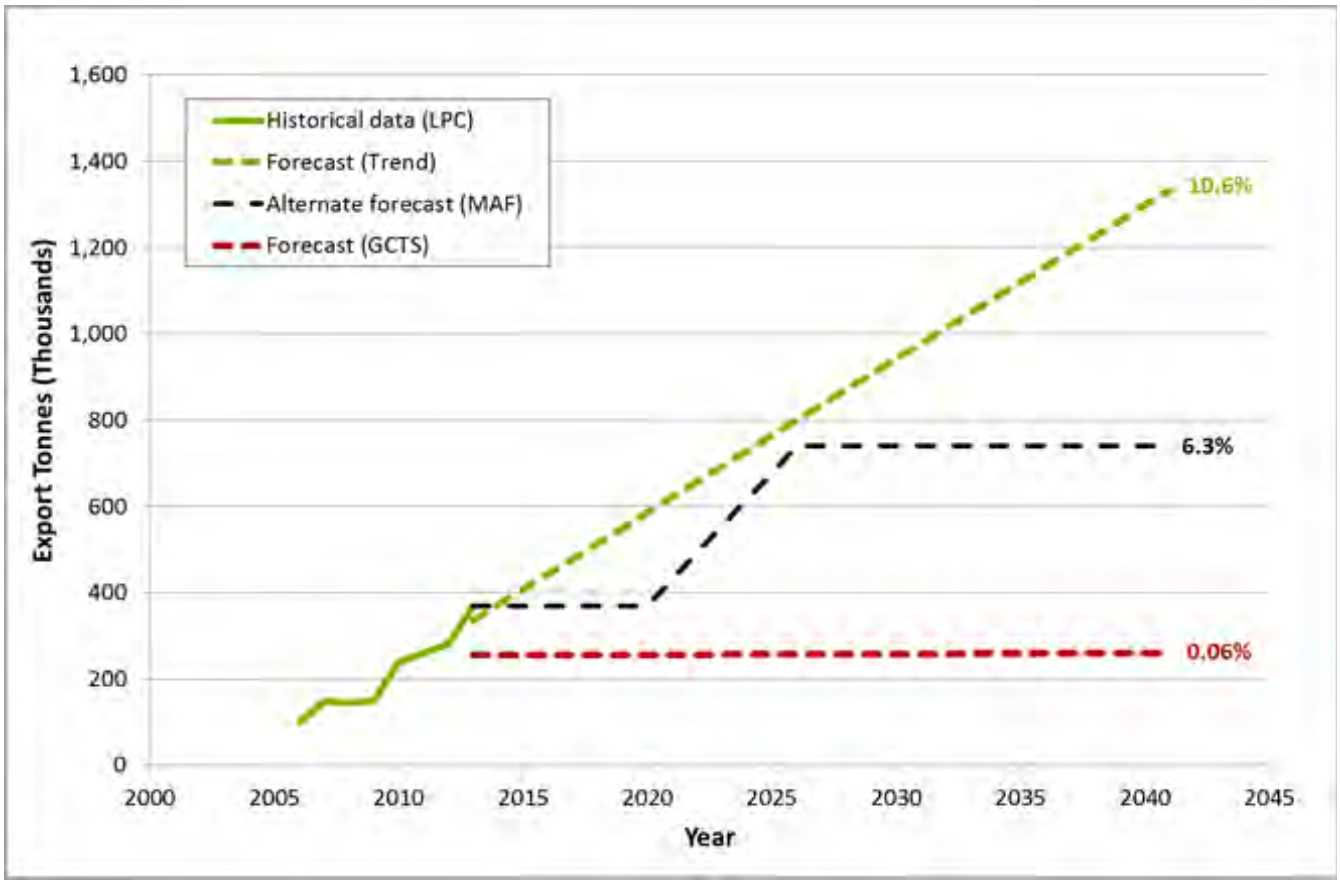

Figure 33 - Forecast growth and trend in logs as outlined in the GCTS

Source: LPC, GCTS, Ministry of Agriculture and Forestry

Negligible growth in log exports has been forecast in the GCTS. The Ministry of Agriculture and Forestry (MAF), however, released Canterbury Forest Industry and Wood Availability Forecasts in 2007 [72]. These forecasts indicated that, beyond 2017, there is the potential for the harvested volumes of Radiata Pine and Douglas Fir to increase significantly in the Canterbury region, as existing woodlots planted in the 1990s reach maturity.

Based on details provided in this document, it is difficult to forecast log exports having a linear growth rate. In fact, the likely scenario, as outlined in the MAF document, is that wood availability in Canterbury will remain constant through to approximately 2020 and then quickly double. It will then remain stable until 2035-2040.

The annual linear growth in this MAF forecast is 6.3% between 2010 and 2041, but growth does not occur until the woodlots planted in the 1990s are ready for harvesting in around 2025.

8.3 Conclusion

Growth in log exports has increased recently, with developments undertaken at the LPC to increase log storage capacity. Historical trends indicate strong growth in log exports; however, the GCTS forecasts indicate growth in log exports to be negligible to 2041. No reasons are provided for this stagnation in growth other than it represents the cyclical nature of the primary product.

A desktop review of MAF documentation has indicated that woodlot production capacity in Canterbury is likely to remain relatively constant for the next five to ten years, as trees planted in the 1990s approach maturity and their harvest date. Woodlot production and the logs subsequently available for export are likely to double from approximately 2020-2025 and remain stable at that level through to the end of the forecast period.

This potential increase in yield is dependent on a number of factors, including:

- Size of operators. Many of these woodlots were created by small operators and therefore it is possible that not all of this resource was planted for harvesting.
- Harvest planning. Smaller operators are less likely to stick to planned harvesting schedules, making this yield highly variable, as they wait for high log prices for one-off harvests.
- International markets. Trends in international wood prices and international demand for New Zealand wood will play an important role in wood and log volumes in Canterbury.
- Farming conversion. There is a trend in Canterbury for some existing woodlots to be converted to farming land.

Log forecasts should therefore be reviewed as more information becomes available.

Section 9

Export Coal

9. Export Coal

9.1 Export Coal supply chain

According to the National Freight Demand Study (2008) [9], New Zealand The South Island is home to a number of major coal mines. These are primarily owned and operated by Solid Energy, with a number of smaller mines operated by privately-run companies.

According to Solid Energy, the Stockton Mine near Ngakawau produces approximately 2 million tonnes of high value coal per year. This mine is expected to continue production at these levels to approximately 2028. Up to six trains per day transport this coal to LPC for export [20].

Operations at Solid Energy's Spring Creek mine have recently been suspended, impacting on volumes of coal being exported through LPC. Upon this suspension, volumes dropped by approximately 18% during the 2012-13 financial year; after record exports of approximately 2.5 million tonnes had been recorded in 2011-12 [12].

The ROA Mining Company Ltd site in Greymouth is another mine that uses LPC as its export port. This underground mine stockpiles coal at a site in Stillwater, then transports it by rail to LPC for export. The company has not provided details of how many tonnes are produced annually from this site. Figure 34 shows land currently designated for coal mining and the major rail lines used to transport it to LPC.

Figure 34 - Origins for coal exported through LPC

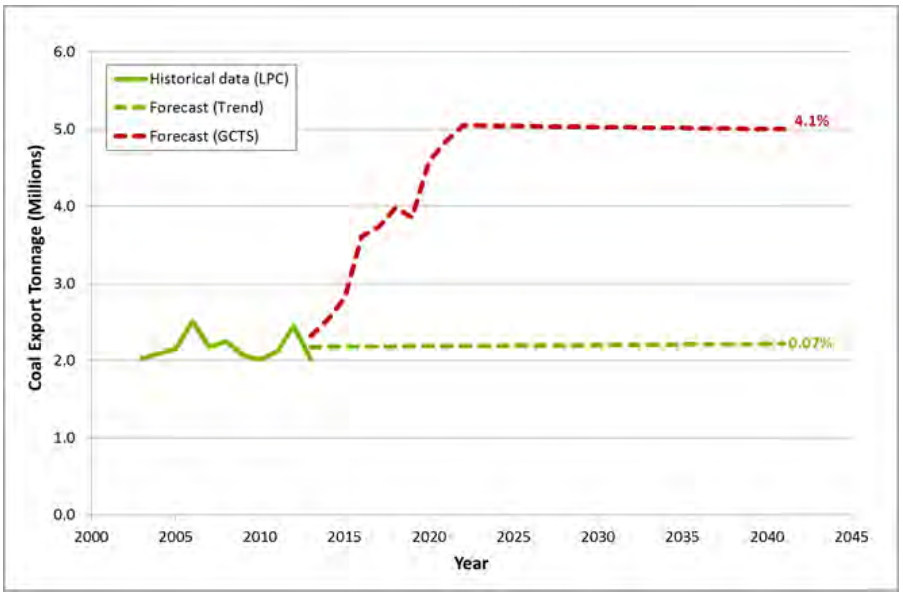

Figure 35 - Forecast growth in coal volumes through LPC, as outlined in the GCTS

Source: LPC, GCTS

9.3 Alternative forecast for coal exports

As indicated, coal is transported to LPC exclusively by rail. Current rail siding capacity at LPC for coal trains is 30 wagons, this can be increased to 45 wagons should volumes require it (personal communication). The rail line has capacity for eight trains per day, although current volumes only require five trains a day.

Based on the current demand for coal on the international stage, available infrastructure capacity and planned works to increase this over time, it is doubtful that coal exports are likely to reach 5 million tonnes by 2041. It should be noted, however, that coal exports appear quite variable and therefore additional information and renewed forecasting will be required in the future, as commodity prices and worldwide demand change.

As an alternative, more conservative, forecast, we have assumed that commodity prices and demand both increase so that coal movements through LPC reach current infrastructure capacity (i.e. eight trains per day of 45 wagons in length). This capacity is approximately 3 million tonnes per annum.

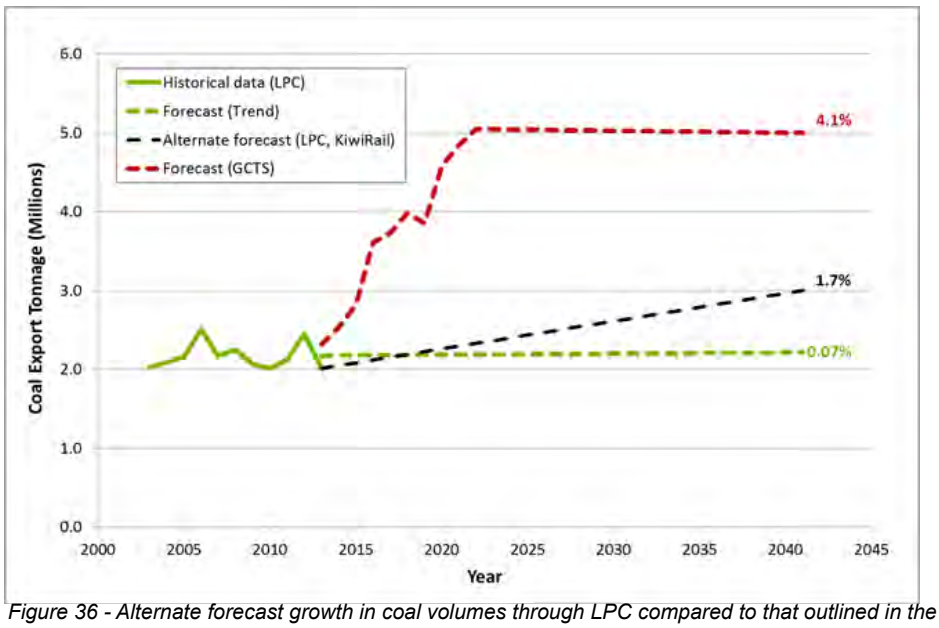

Figure 36 - Alternate forecast growth in coal volumes through LPC compared to that outlined in the GCTS

Source: LPC and KiwiRail.

9.4 Conclusion

Estimates indicate that New Zealand's coal reserves exceed 15 billion tonnes. Total extraction of coal was 4.9 million tonnes in 2011, indicating that mines currently have the capacity to produce this amount; however, current international demand does not support exports at this level.

As described previously, coal is transported to LPC exclusively by rail. Current rail siding capacity at LPC for coal trains is 30 wagons, this can be increased to 45 wagons should volumes require it. The rail line has a capacity of eight trains per day, although current volumes only require five trains a day.

Based on this information, an alternate forecast has been produced, where it is assumed that coal exports at LPC increase at approximately 1.7% per annum through to 2041. This results in a throughput of 3 million tonnes, with current infrastructure reaching capacity.


TOYOTA

Section 10

Air freight through Christchurch International Airport

10. Air freight through Christchurch International Airport

Christchurch International Airport provides import and export services for high value and time sensitive freight; it also operates as an air base for New Zealand and international governments to supply food and materials for Antarctic scientific research.

At the time of writing, the available commodity data is very limited for high value time sensitive air freight in and out of Christchurch, but from a total New Zealand air freight perspective, the biggest import commodities are appliances, machinery and printed materials. Major export commodities are seafood, vegetables, fruit and meat.

Adjacent to the main terminal is an existing freight precinct, tenanted by large multi-national transport businesses, such as FedEx and DHL, as well as a number of local operators. A new specialist freight area with an adjacent apron is being established within the airport and is called Dakota Park.

Total volumes of freight associated with the Antarctic activities are not clearly understood, but Aurecon is working with authorities to obtain some information to allow an estimate of those volumes.

10.1 Origins and destinations

Given that the Christchurch International Airport is the only major airport handling freight on the South Island of New Zealand, the likely origins and destinations for high value, time sensitive air freight would be spread throughout the South Island, in relative proportion to the particular industries or the production of the known high value commodities.

Figure 37 shows estimations of origins of time sensitive, high value air freight based on employment levels in the production of meat, seafood and fruit on the South Island. As shown, approximately 56% of this freight would originate within the Canterbury region (with 16% of that from within Greater Christchurch itself).

Similarly, initial destinations of appliances, machinery and printed materials are likely to be biased towards wholesale and transport related businesses throughout the South Island. In this case, the majority of destinations would be in Greater Christchurch (75%), and 9% for the remainder of Canterbury. In contrast, Otago, the next largest region, would receive approximately 6% of the volume.

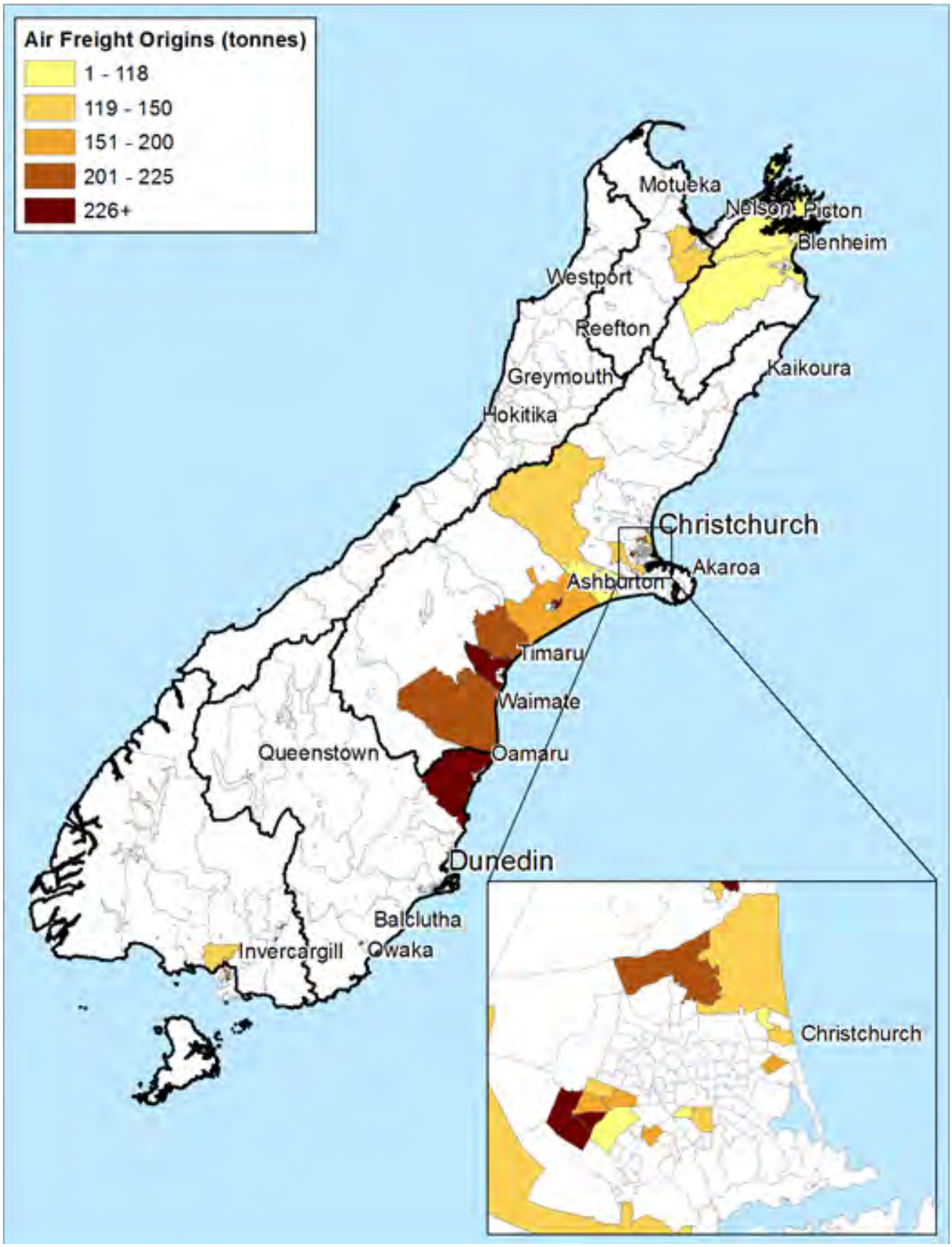

Figure 37 - Origins of high value, time sensitive air freight exported through Christchurch International Airport

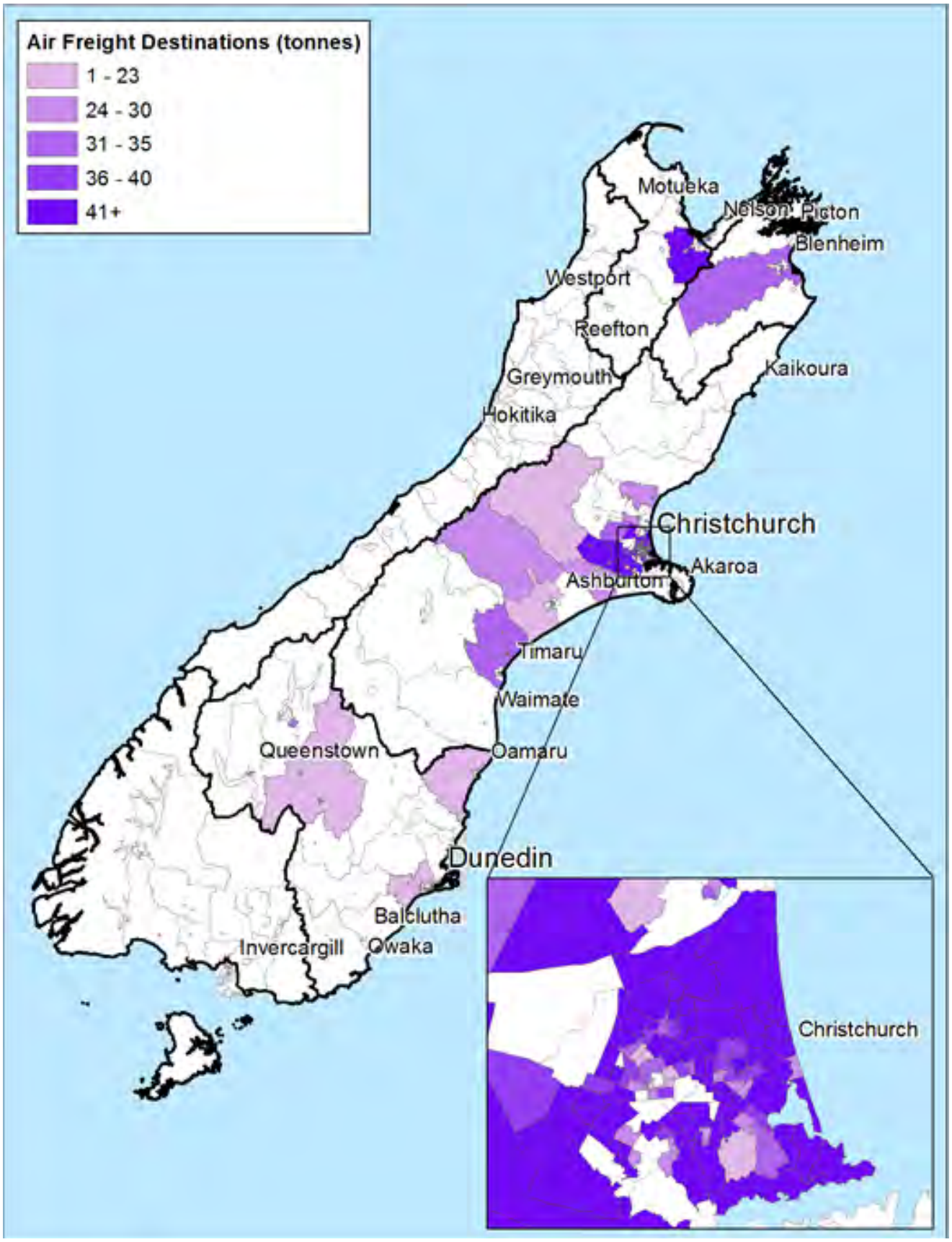

Figure 38 - Destinations for high value, time sensitive air freight imported through Christchurch International Airport

Origins for Antarctic freight movements is unknown, but likely to be a combination of locally sourced perishables and other food (probably sourced mainly from Canterbury), equipment flown in from overseas (that may never leave the airport), and equipment imported into New Zealand via LPC.

10.2 Air freight volumes and forecasts

Figure 39 shows an account of the current level of high value, time sensitive import and export movements through the Christchurch International Airport and two different forecasts.

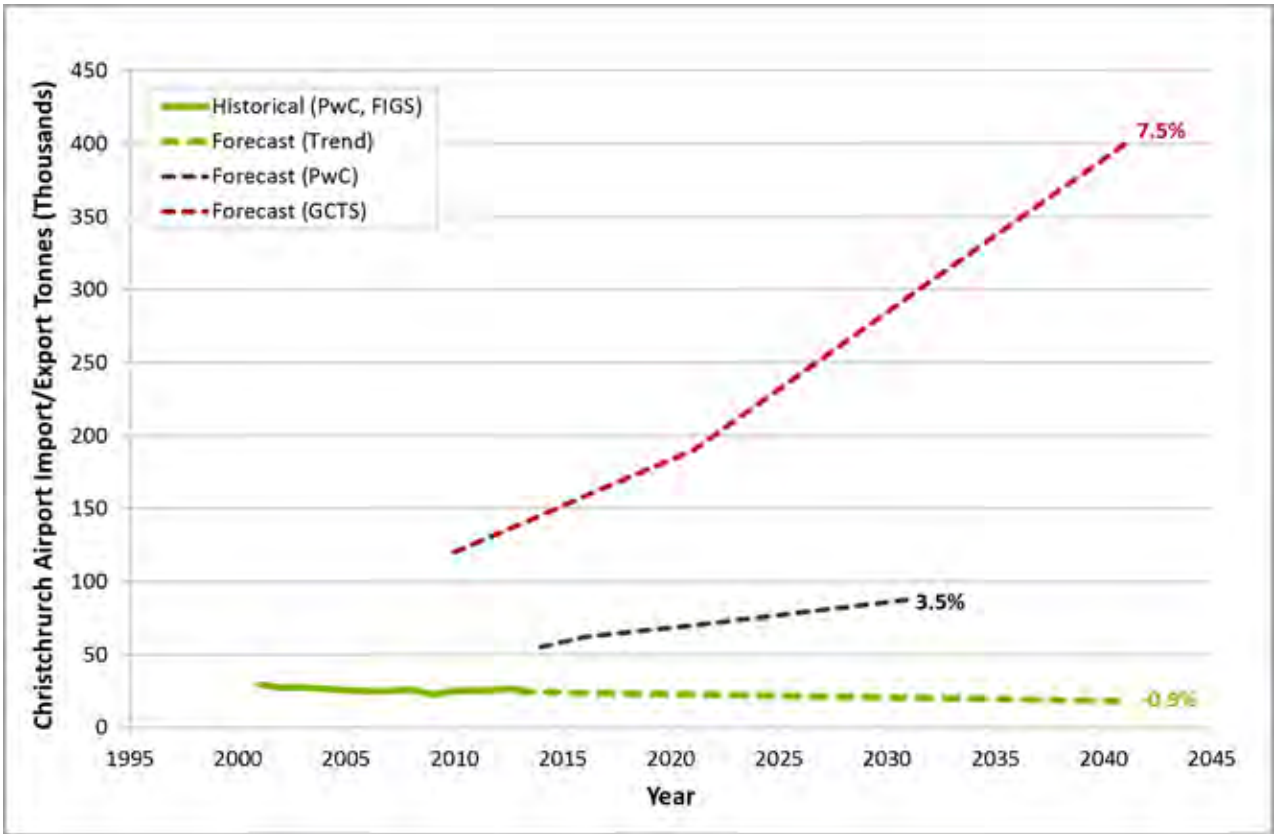

Figure 39 - Christchurch International Airport air freight historical volumes

Source: Historical (PwC [20], FIGS, 2012-2013 [5]), Forecast (PwC, 2011 [20]), Forecast (GCTS [31,32])

It is important to note that these historical values exclude air freight to Antarctica, but Aurecon is endeavouring to obtain that data from the relevant authorities.

As shown in the above figure, there is a significant difference between the forecasts (that may be explained by the Antarctic air freight). The GCTS forecast is significantly higher than the observed freight volumes, and shows significant growth thereafter.

Discussions with CIAL have revealed that the quantity of high value, time sensitive freight has been slightly decreasing over time. This is not because of lowering demand, but rather that capacity on existing flights into and out of Christchurch International Airport has been decreasing, due to fewer flights and the use of narrow body aircraft. In the short- to medium-term, CIAL anticipates growth in freight capacity due to increases in flight frequencies, particularly to Australia and Asia.

The PricewaterhouseCoopers forecast (‘Opening up the Skies’) is a potential forecast, based on the assumption that the Christchurch International Airport is able to capture market share from Auckland International Airport for freight destined for, or produced on, the South Island. This could be through a possible range of interventions, including the use of wide-body aircraft.

Currently, other high value, time sensitive freight that cannot be transported from Christchurch International Airport due to available capacity, is transported by road to or from Auckland Airport, which has both the trade routes and higher capacity aircraft.

Growth in air freight is likely to be driven by the following factors:

- Additional freight capacity. The re-introduction of wide-body planes and projected increases in the frequency of passenger flights, particularly to Australia and Asia, are also likely to drive growth.
- Internet sales. Internet sales will continue to grow, which will erode traditional retail market share. Therefore, there is likely to be an increase in small parcel delivery, this could increase the amount of freight transported by air and, possibly, bring down air freight costs.
- Growth in aquaculture, meat production, dairy and agriculture. As specified previously, the dairy and agriculture industries (in particular) are likely to exhibit significant growth in Greater Christchurch and Canterbury. Other industries, such as meat production and aquaculture, are also likely to continue to be strong exporters through Christchurch International Airport, particularly to niche markets where fresh New Zealand produce is highly sought after and commands a high price.

10.3 Conclusion

Currently, there is not a complete picture of all air freight being imported or exported through Christchurch International Airport, due to the unavailability of Antarctic air freight movement data.

While the current reported air freight through Christchurch International Airport is showing a very small rate of negative growth, the lack of available freight capacity is being reported as the reason. At this point, Aurecon believes that the PricewaterhouseCoopers forecast is appropriate to use as a basis.

Section 11

Internal freight movements

11. Internal freight movements

Information on freight movements within the Greater Christchurch region, or, more broadly, movements across the South Island, is limited in the public domain. The only publicly available information on these movements is the historical data contained in the NFDS (2008) [9]; however, this information is broken down to a Regional Council level, meaning that the finest detail possible for this report is to show movements into, out of and within Canterbury.

11.1 Summary of NFDS (2008) internal movements

This information is provided below for the 2006/07 Financial Year only, and no trend information is available. Adjustments have been made to the data to exclude import and export volumes, as outlined in the NFDS (2008), where possible. Therefore, only internal movements, specifically those movements of freight consumed and/or produced in the Canterbury region, are shown and destinations for high value, time sensitive air freight would be spread throughout the South Island, in relative proportion to the particular industries or the production of the known high value commodities.

Figure 37 shows estimations of origins of time sensitive, high value air freight based on employment levels in the production of meat, seafood and fruit on the South Island. As shown, approximately 56% of this freight would originate within the Canterbury region (with 16% of that from within Greater Christchurch itself).

Similarly, initial destinations of appliances, machinery and printed materials are likely to be biased towards wholesale and transport related businesses throughout the South Island. In this case, the majority of destinations would be in Greater Christchurch (75%), and 9% for the remainder of Canterbury. In contrast, Otago, the next largest region, would receive approximately 6% of the volume.

The data provided in the NFDS (2008) [9], describes the various movements along the production chain for a number of commodities. For example, the movement of liquid milk is outlined, showing the movement of milk from the farm to the factory. Approximately 2.21 million tonnes of liquid milk was transported within Canterbury in 2006/07. The production points use this liquid milk to produce dairy products, of which significant amounts are exported (0.12 million tonnes as outlined in the NFDS (2008)). The remaining dairy volumes are transported within Canterbury and to other locations on the South Island. Some dairy product is also sent to the Canterbury region from other locations for domestic consumption.

Similar supply chain movements can be seen for logs and timber, with some logs being transported directly to the port for export and some being transported to sawmills for further production. Some of the products created at the sawmills (and board mills) are destined for export markets, with the remainder distributed throughout Canterbury and the South Island for domestic consumption.

The NFDS (2008) data indicate that the Canterbury region is a significant producer and consumer of freight; that is, the majority of freight produced in Canterbury is also consumed in that region. The two commodities being transported within the region in significant volumes are liquid milk and aggregates. A significant amount of supermarket and other retailing product is also transported throughout the region.

Commodity	To Canterbury	From Canterbury	Within Canterbury	Import Volume	Export Volume
Liquid Milk	0.02	0.01	2.21	0.00	0.00
Dairy	0.08	0.05	0.50	0.00	0.12
Export logs and woodchips	0.00	0.00	0.00	0.00	0.30
Logs to sawmills	0.00	0.00	0.44	0.00	0.00
Sawmill outputs to markets	0.24	0.02	0.16	0.00	0.16
Board mills	0.08	0.27	0.27	0.00	0.24
Livestock	0.03	0.08	0.71	0.00	0.00
Processed meat	0.02	0.11	0.03	0.00	0.06
Horticulture and grain	0.27	0.81	0.16	0.08	0.11
Aggregates	0.34	0.34	5.97	0.00	0.00
Coal	0.41	0.06	0.01	0.00	2.29
Petroleum	0.00	0.00	0.00	0.99	0.00
Steel, scrap and slag and aluminium	0.00	0.00	0.14	0.00	0.00
Limestone, fertiliser and cement	0.25	0.06	1.07	1.02	0.00
Other minerals	0.00	0.00	0.02	0.00	0.00
Supermarkets*	0.18	0.42	0.56	0.00	0.00
Other retailing*	0.31	0.12	0.01	0.00	0.00
Total Freight	2.25	2.35	12.25	2.09	3.28

Table 2 - Summary of 2006/07 freight movements into, out of and within the Canterbury region, after imports and exports have been excluded (million tonnes).

Source: NFDS (2008) [9]

No information was provided in the NFDS (2008) indicating the proportion of supermarket and other retailing freight that is imported through LPC from international locations.

11.2 Conclusion

As is the case with much of the data in this report, information on internal freight movements is limited. We have used information available in the NFDS (2008) to summarise freight movements not related to international imports and exports for Canterbury. This has shown that the major commodities being moved into, out of and within Canterbury are, in order of largest to smallest:

1. Aggregates;
2. Liquid milk;
3. Limestone, fertiliser and cement;
4. Horticulture and grain; and,
5. Supermarket products.

The data provided give a historical snapshot only and it has not been possible to provide forecasts for the future movement of this freight in the region; nor has it been possible to determine what proportion of these freight movements occur within the Greater Christchurch region.

Section 12

Christchurch rebuild

12. Christchurch Rebuild

12.1 Christchurch rebuild impact

Christchurch is likely to undergo a rapid increase in construction traffic, due to the movement of material associated with the rebuilding work. This construction work is estimated to peak around 2014 to 2017 and may place significant strains on the current freight network in supplying the key building materials and raw materials such as aggregates, concrete and timber. This is likely to be focussed in the CBD, where much of the concentrated re-build will take place.

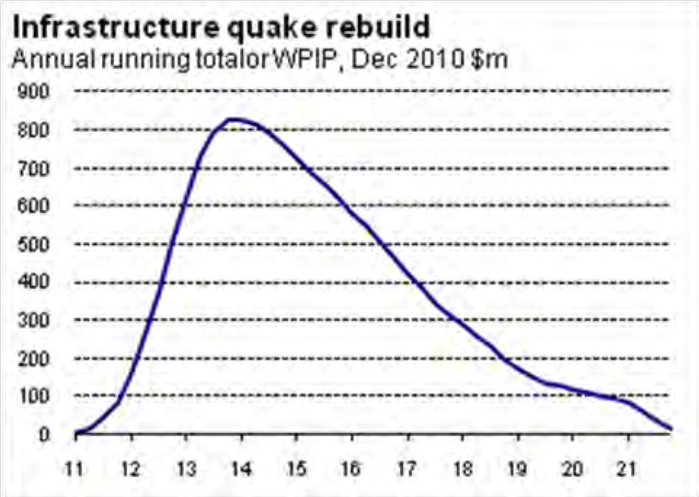

Figure 40 - Infrastructure Spend Profile

Source: Economics Forecasts July 2011 - Guessing how the quake rebuild will pan out 30 June 2011

Suppliers are reported to be expecting increases in business of around 30% during the rebuild.

It is vital that the supply chain is able to respond to the needs of construction associated with the rebuild. Although outside the scope of this report, constraints associated with infrastructure and the supply chain should be identified to enable the movement of materials facilitating the rebuild. This aspect will be discussed in more details in subsequent stages of the study.

The volumes of material required for the rebuild have been estimated by CERA and are reproduced in Table 3 below. To put this in to the context of goods vehicle movement and to facilitate an assessment of possible impact on the freight network, Aurecon have subsequently broken this data down in to an estimated volume of goods vehicle movements. As can be seen from Figure 42 this represents a significant number of goods vehicle movements even considering they are likely to be spread over a number of years.

The following data was released by CDC regarding the estimate of material demand.

Material Type	To Canterbury	From Canterbury
Aggregate	4,596,977	tonnes
Aluminium joinery & glazing	5,133,177	m2
Colorsteel roofing	2,206,101	m2
Concrete	620,710	m3
Floor coverings	2,631,346	m2
Kitchen joinery	11,018	houses
Paint	3,900,473	litres
Pipe - 150 mm diameter and greater	815,772	m
Pipe - 100 mm diameter PVC	303,583	m
Plasterboard	6,788,047	m2
Pre-nail trusses	11,793	houses
Pre-nail framing	11,762	houses
Reinforcing	20,928	tonnes
Structural steel	2,857	tonnes

Table 3 - CDC data released May 2012 – "On the Move: The Christchurch Rebuild"

Given the possible increase in material costs being driven by demand, it is important that the supply chain and infrastructure are able to react to this as efficiently as possible. This will be discussed in more detail in subsequent stages of the study when infrastructure, the supply chain and key constraints and opportunities for improvement in the freight system are discussed.

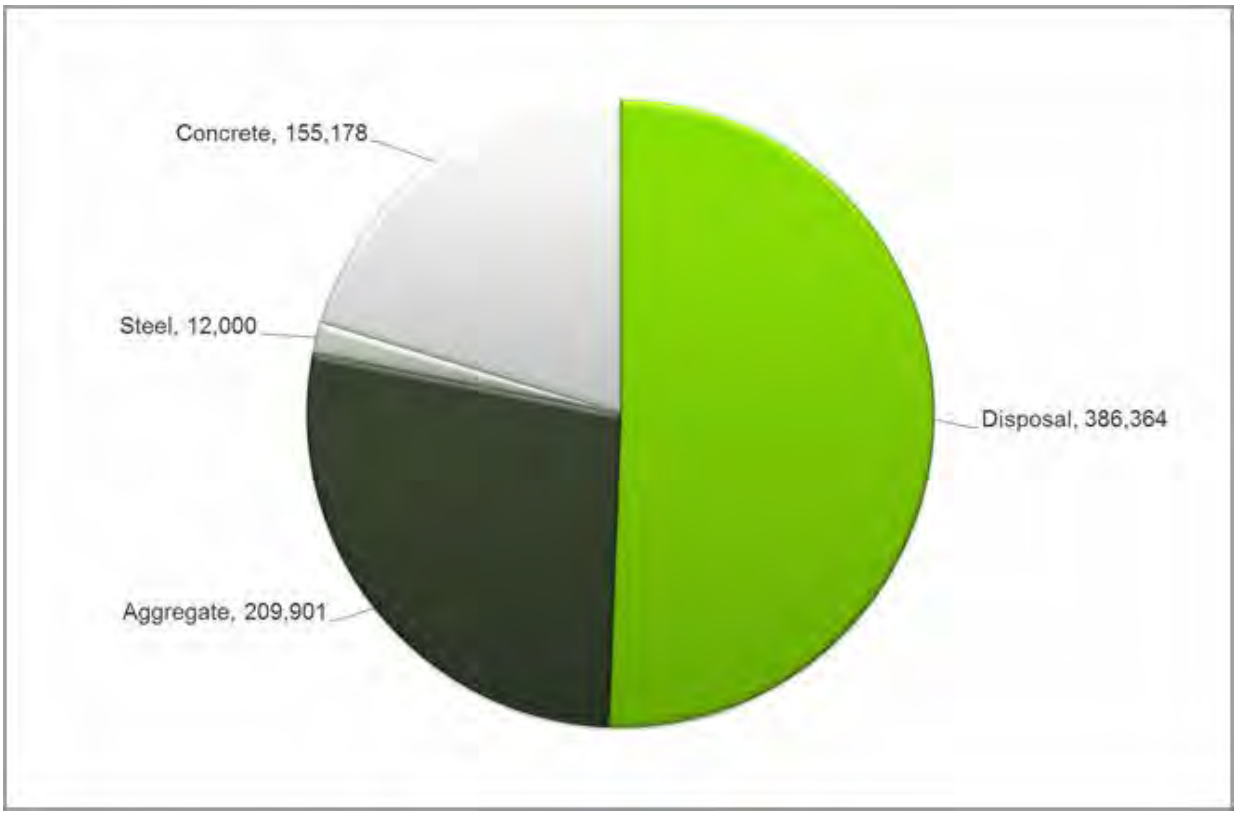

Figure 42 - Estimate of goods vehicle movements based on CDC material volumes (m3)

Section 13

Concluding remarks

13. Concluding remarks

13.1 Christchurch's role in moving freight in New Zealand

Due to the large population and employment located in and around Greater Christchurch, as well as the production of export commodities throughout Canterbury, the region plays a critical role in the production of goods for domestic and international markets. As described in this statement, production of a number of major commodities is growing, particularly dairy and other agriculture. Producers are heavily reliant on the efficient movement of their freight from the point of production, through the manufacturing process to the port for export. Inefficiencies in these supply chains, in particular congestion issues relating to road, rail and port access, add costs to businesses and impact more broadly on overall productivity and the nation's economic health.

Current freight demand in the Greater Christchurch region is concentrated primarily on the export of a number of key commodities, including: dairy and milk products, meat products, coal, logs and timber products. Increasingly, these products are transported to LPC by rail, particularly dairy products (transported by rail from Clandeboye, Darfield and Rolleston) and coal (transported by rail from the West Coast).

This is putting increasing pressure on existing rail infrastructure and adding to congestion in the Woolston area, around LPC's City Depot site. Currently all containers transported between the City Depot and LPC use road transport.

Imports from LPC through the Greater Christchurch region are commodities such as dry bulk and petroleum. General container freight used for domestic consumption is also imported in significant quantities through LPC. The majority of this freight is transported through Greater Christchurch and the wider Canterbury region and South Island by road..

13.2 GCTS forecasts

The primary aim of this statement has been to analyse and validate the growth forecasts as outlined in the GCTS. Publicly available data has been used to compare trends in historical information to the forecast growth. Where significant differences were encountered for particular commodities, alternate data sources were interrogated and considered, to determine likely reasons for these discrepancies and, if required, to formulate alternate forecasts.

This statement does not seek to give higher importance to commodities that offer higher value, more volume, or greater prospects of maximising regional economic growth. These issues are extremely important and will be considered in subsequent stages of the overall study.

A comparison of the forecasts outlined in the GCTS and the alternate forecasts provided in this report is shown in Table 4.

30 Year Assumption				
Measure or commodity	**2015**	**2014**	**2041**	**Growth**
Population	435,000		550,000	0.9%
Employment	200,000		244,000	0.7%
Containers (TEU) (lower)	290,000	351,217	782,000	5.5%
Containers (TEU) (upper)	290,000		1,500,000	5.3%*
Air freight (tonnes)	25,000		107,000	10.6%
Dry bulk (tonnes)	660,000	649,365	1,200,000	2.6%
Petroleum (tonnes)	1,000,000	1,111,189	1,371,000	1.2%
Logs (tonnes)	250,000	369,657	739,000	6.3%
Coal (tonnes)	2,300,000	2,049,949	3,000,000	1.0%

* Compound Annual Growth Rate (all other growth rates are based on annual linear growth)

The GCTS population growth rate appears to be in line with StatsNZ growth estimates. Because the Greater Christchurch area does not have an official statistical boundary, for the purposes of the comparison with Statistics NZ data, Greater Christchurch is taken to include the whole of the Selwyn and Waimakariri regions. This explains the difference between the Greater Christchurch historic data and the GCTS forecast in the year 2010.

The employment growth rate in the GCTS is lower than the StatsNZ estimate. Again, boundary differences make comparisons difficult. We recommend that the population and employment forecasts should be reviewed when new Census information is made available from early 2014.

The GCTS growth forecasts appear significantly higher than indicated in historical information available for container trade, dry bulk, petroleum and coal. Analysis of publicly available information for these commodities has shown that the projected growth rates may be aspirational rather than based on historical information and likely trends in land-use and production.

For example, container volumes are driven primarily by dairy and meat exports and imports of consumer goods. Analysis of dairy and meat production does show that increases in exports of these products is likely, but is unlikely to be high enough to drive an overall container movement growth of approximately 5.3% compounding per annum. However, the GCTS forecast is likely to consider an increase in South Island share of shipping due to the possibility of allowing larger ships, and this could help increase the overall total. Aurecon therefore have recommended in this case to provide a range of forecasts, a lower bound based on continued strong growth, and an upper bound based on compounding growth that considers these other factors.

Similarly, historical information on coal, dry bulk and petroleum movements, does not support the growth rates as outlined in the GCTS.

Alternate forecasts are provided for airfreight, based on information outlined in FIGS and the ‘Opening Up the South’ report. Interestingly, the observed figures from these data sources are significantly lower than those provided in the GCTS, but this may be explained by freight destined for Antarctica, for which detailed volume information has not been available at the time of writing. This means that although the growth in airfreight as outlined in the alternate forecast is higher than GCTS, the 2041 volumes are only 25% of those outlined in the GCTS.

A higher forecast is provided for logs compared to the GCTS. This is in line with MAF predictions that significant log volumes will become available from approximately 2020, as wood lots planted in the 1990s reach maturity.

In the short-term (12 months or so), there is expected to be a considerable ramp-up of construction activity in the region, following the damage experienced in the 2011 earthquakes. This construction activity is expected to continue for up to 10 years; is likely to have a significant impact on transport of construction materials into and within the region.

13.3 Future growth

A critical point to highlight is that the growth rates in freight demand for different commodities and freight types are interdependent, as all commodities and freight types are part of the broader freight and logistics supply chain for the region. Positive growth in one commodity may impose constraints on the broader supply chain; just as negative growth will provide added capacity. For example, growth in container freight and related train and truck movements to and from LPC is likely to constrain other trains and heavy vehicles moving coal and bulk goods.

The Freight Infrastructure Statement and the Freight Management Direction Statement, to be completed at later stages of this project, will therefore consider this growth in freight demand and its impact on the overall system of freight movement in Greater Christchurch. Proposed solutions will consider the following objectives:

- Ensure sufficient capacity is available for freight growth (ports, inland ports, road and rail networks).
- Improve or retain supply chain efficiency by lowering supply chain costs and improving transit times.
- Efficient and rational capital investment to optimise future investment, minimise duplication and obtain efficiency gains through the achievement of greater scale.
- Minimise the impact on the environment, and carbon emissions in particular, by optimising freight movements and increasing the use of rail and coastal shipping, where appropriate.
- Ensure Greater Christchurch remains competitive on a national and international scale.

13.4 Overview of future stages

The Freight Demand Statement (this statement) aim is to provide an overview of the movements of freight commodities that move into, out of, or through Greater Christchurch. Necessarily therefore, a lot of the detail contained in this report is centred on the transport of import and export commodities. For each of these commodities, Aurecon has undertaken a validation of the GCTS future forecast, and if necessary, provided an alternative forecast (outlining the assumptions or rationale of the new forecast).

Deliberately, this statement has not focussed on what is working well, what is capacity constrained, and what interventions could be undertaken to ensure efficient freight movements in the future. This task will be covered in the next phase of work, the Freight Infrastructure Statement, which will discuss operational aspects and infrastructure used in the transport of freight within or impacting Greater Christchurch. This may cover aspects such as rail capacity on the lines connecting LPC to their markets, port storage capacity, staging/hubbing locations, etc.

The final stage is to develop the Freight Management Directions Statement, which, based on demand and infrastructure information from the first two phases, will propose opportunities, future directions and options in relation to infrastructure and policy to ensure capacity issues identified can be managed, with the overall goal of enhancing the economic prosperity and resilience of Greater Christchurch and the Canterbury Region. Again, through necessity of achieving this goal, higher value commodities or commodities contributing to more will take on more importance that the lower value ones.

Section 14

Glossary

14. Glossary

Term	Definition
3PL	Third party logistics providers - provide transport services for customers, including storage of freight.
Backloading	The practice where a container or non-container truck makes a delivery and a collection during the same trip, i.e. truck is laden in both directions.
CIAL	Christchurch International Airport Limited. Operators of Christchurch International Airport.
CHE	Container Handling Equipment. This may include gantry cranes, full and empty container handling forklifts, reach stackers and straddle carriers.
Consignee	A business receiving and unpacking a container for domestic rail movements (for the purposes of this study), equivalent to an importer for international shipping movements.
Consignor	A business packing and dispatching a container for domestic rail movements (for the purpose of this study), equivalent to an exporter for international shipping movements.
Container or shipping container	Steel boxes designed to carry freight. Maritime containers are often standardised: 20 feet or 40 feet long and 8 feet wide and high. Domestic containers are much more varied, with lengths including 30, 45, 48 and 53 feet.
Container movement	A container movement is the collection of a container from one location (e.g. an intermodal terminal) and transporting it to another location (e.g. an importer).
De-hire	The process of returning an empty container to an empty container park.
Empty container park	A handling, repair and storage facility for empty containers, usually located close to the port to minimise repositioning costs for shipping lines.
Export	For the purposes of this study, export refers to the dispatch of containers from a gateway port (e.g. Auckland or Tauranga) by a vessel to an international or mainland coastal destination.
Exporter	A business operated primarily for the purpose of exporting freight, or providing export-related services to other businesses.
Gantry crane	A large crane mounted on a platform that usually runs back and forth on parallel tracks (can be rubber tyred or rail mounted) astride the container stacks. These cranes are generally used at a marine or intermodal terminal to load/unload containers from trains or trucks.
Hardstand	An open ground area with a prepared, hard wearing surface. For the purposes of this report, this includes all surfaced intermodal terminal land including the container stacking area. Hardstand is normally built and rated to take a certain weight, which can dictate stack height.
Full container handling forklift	Forklift capable of carrying a fully loaded 20 foot or 40 foot container. These forklifts are generally used to transfer fully loaded containers between the hardstand area and trucks or rail wagons.
Import	For the purposes of this study, import refers to the discharge of containers into a gateway port (e.g. Auckland or Tauranga) from an international, or mainland coastal vessel.
Importer	A business operated primarily for the purpose of importing freight, or providing import-related services to other companies.

Term	Definition
Intermodal	Movement of containers interchangeably between transport modes (e.g. road and rail), where the equipment is compatible within the multiple systems.
Empty container handling forklift	Forklift capable of carrying an empty 20 foot or 40 foot container. These forklifts are generally used to transfer empty containers between trucks and empty container storage facilities. Some empty container handling forklifts are able to carry two 20 or 40 foot containers at the same time.
Logistics chain	A logistics management system that integrates the sequence of activities from delivery of raw materials to the manufacturer, through to the delivery of the finished product to the customer.
LPC	Lyttelton port of Christchurch. Located in Lyttelton, this is the major gateway port in the Canterbury region and acts as a major trade gateway to the South Island of New Zealand.
Rail terminal operators	A business that engages in the loading and unloading of freight and containers on and off trains.
Reach Stacker	Reach stackers are able to transport containers (both 20 foot and 40 foot, full or empty) short distances very quickly and to stack them in various rows and heights depending on its access and the weight of the container. Reach stackers usually have a higher stacking capacity than forklifts. Using reach stackers, container blocks can be kept 2 deep due to the second row access. Reach stackers are generally used to transfer containers between the hardstand area and trucks or rail wagons.
Reefer	Refrigerated container designed to transport refrigerated or frozen freight. They have their own refrigeration equipment incorporated into the container design.
Repositioning	Movement of a normally empty container from one location where it is not needed, to another where it is. The export of an empty container is often referred to as repositioning.
Stevedore	A business that engages in the loading and unloading of cargo vessels at a port. For the purpose of this study, this relates to containerised freight.
Straddle carrier	A straddle carrier is a non-road going vehicle for use in gateway ports, intermodal terminals and transport yards and is used for stacking and moving standard containers (both full and empty). Straddle carriers pick and carry containers while straddling their load and connect to the top lifting points of the container. Straddle carriers have the ability to stack containers up to 4 high; however, container stacks can only be one container wide with small gaps in between rows.
TEU	Twenty Foot Equivalent Unit, container counting unit based on the International Standards Organisation, 20-foot by 8-foot container
Transhipments	To transfer freight or a container from one ship, truck or freight vehicle to another. For the purposes of this study a transhipment refers to the transfer of containerised freight from one train to another, e.g. maritime import container to a domestic train for delivery intrastate or interstate.
Transport operator	A business that transports containerised or non-containerised freight between two locations, e.g. port and import customer.

Section 15
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