Appendix B – Data & References

Secondary data sources incorporated in this report include (but are not limited to):

- Freight data by port and commodity, StatisticsNZ.
- Freight Information Gathering System (FIGS) container trade data, Ministry of Transport.
- Port of Otago container data for the year ending June 2023, 2024 and 2025
- Ministry for the Environment. 2024. Measuring emissions: A guide for organisations: 2024 summary of emission factors. Wellington: Ministry for the Environment.
- Vehicle Emissions Prediction Model (VEPM) v7.1.

Publications and reports reviewed and/or relied on include (but are not limited to):

- New Zealand Ports and Freight Yearbook 2024. Deloitte Access Economics.
- Dunedin Future Development Strategy 2024 2054, Dunedin City Council/Otago Regional Council, April 2024.
- Metcalf, J. September 2023. Effect of Speed on Emissions and Air Quality.
- Infometrics Regional Economic Profile – Dunedin City and Otago Region 2025.
- Gallardo, P. 2023. A shift to coastal shipping and rail could cut NZ's freight transport emissions – why aren't we doing it? Canterbury University.[120]
- Ernst &Young. The Value of Rail in New Zealand. February 2021.
- NZIER. February 2024. Regional Economic Impact Assessment – Assessing the contribution of Port Otago to the economy[121]

[120] Sourced from: A shift to coastal shipping and rail could cut NZ's freight transport emissions – why aren't we doing it?

[121] Supplied commercial in confidence.

Appendix C – SH88 Images/Articles


Rail Line


Rail Line not shown located several 100 metres to right (and tunnelled)

Photo: NZTA/WAKA KOTAHI

Work will be carried out to fix a slip affecting Dunedin's State Highway 88 on Friday.

Emergency services were alerted on Thursday night after the slip blocked part of the highway near Blanket Bay Rd in St Leonards.

(Source: Otago Daily Times, 19 September 2024)

Dunedin's Port Chalmers Highway: More Material Than Expected, Large Boulders To Be Broken Up, Ongoing Delays SH88

Tuesday, 8 October 2024, 10:38 am
Press Release: NZ Transport Agency

NZ Transport Agency Waka Kotahi (NZTA) is advising drivers to expect ongoing delays this week getting to and from Port Chalmers as contractors continue to make SH88 safe for two-way traffic. To make the most of the workday, hours have been extended to start at 7 am and finish at 6 pm.

Investigations to date after last week's downpour have shown much more material needing to be removed than initially assessed and some huge boulders have to be broken up first, says NZTA Journey Manager Nicole Felts.

- There will be up to 30-minute delays between 7am and 6pm for the next four days (including Tuesday) on SH88 at the Parry Street rockfall site (near Forsyth Barr Stadium). Traffic control is in place keeping the road single lane at that point so contractors can remove rocks safely.

Source: Scoop, 8 October 2024

Appendix D – Key Assumptions for IO Modelling

This appendix sets out additional assumptions and limitations of the IO modelling carried out in Section 6.3 (Medium Term Construction Impacts) and Section 9.2.1 (Loss of Land based Primary Production).

About IO Modelling and Key Terms

Multiplier analysis is a commonly used modelling technique for measuring economic impacts. Direct, indirect and induced economic impacts can be estimated using multipliers derived from regional or national input output tables. Multipliers are summary measures of the economic interdependence between sectors and final demand. The contribution of a sector to an economy is not limited to the value it creates directly. This is because an increase in final demand for a sector has repercussions throughout the whole economy, causing increases in output beyond the initial change in demand. This is known as the multiplier effect. The higher the multiplier the more far-reaching the value added and employment impacts are likely to be from an increase in demand.

The most common limitations of all input-output based modelling (including multiplier analysis) is the historical and fixed nature of multipliers which are typically calculated from input output tables from surveys undertaken several years earlier. Therefore, they may not accurately reflect the relationships between sectors in the current economy.[122] This assessment relies on the latest national input-output table prepared by StatisticsNZ[123] which reflects the economy in the year ending March 2020. While the construction sector has faced significant cost increases since 2020, it is considered that the supply chain structure of all sectors (including the construction sector) is still broadly relevant today.

This assessment includes the following types of economic impacts:

a) Direct effects – which capture onsite and offsite activities directly engaged by the proposed project;

[122] In the real world, technical relationships will change over time. These changes are driven by new technologies, relative price shifts, product substitutions and the emergence of new industries. For this reason, input-output analysis is generally regarded as suitable for short-run analysis, where economic systems are unlikely to change greatly from the initial snapshot of data used to generate the base input-output table.

[123] Accessed, with thanks, from Insight Economics.

b) Indirect effects – which arise when businesses working directly on the project stimulate the creation of further demand through the purchases that they make in other sectors of the economy; and

c) Induced effects – which arise from the increased demand for goods and services made by households who have received increased income as a result of the direct and indirect effects of the project.

These economic impacts have been measured in terms of:

- Contributions to value-added (akin to GDP). Value added is the principal measure of economic activity, and is estimated as operating surplus, wages and salaries paid to staff and working proprietors, depreciation, taxes and subsidies. It measures the contribution of individual sectors, or firms to the economy.
- The number of FTEs employed – which is measured in terms of full-time equivalent workers (FTEs) for a 12 month period.
- Total wages and salaries paid to workers, which are often labelled 'gross household incomes'.

Assumptions and Modelling Inputs

Savvy has adopted the multipliers from the following sectors contained in the national input-output table (where applicable):

109 Sectors	PPI Adjuster Applied (Q3 2025 to Q1 2020) *	Valued Added Direct Multiplier **	Valued Added Indirect Multiplier **	Valued Added Induced Multiplier **	Employment Direct Multiplier ***	Employment Indirect Multiplier ***	Employment Induced Multiplier ***
Construction services	0.776	0.41	0.38	0.25	3.50	2.87	1.73
Electronic and electrical equipment manufacturing	0.850	0.50	0.24	0.20	2.67	1.72	1.43
Fabricated metal product manufacturing	0.711	0.36	0.38	0.25	3.79	2.75	1.73
Heavy and civil engineering construction	0.778	0.33	0.47	0.29	2.58	3.58	2.04
Local government administration services	0.754	0.64	0.29	0.40	9.75	2.70	2.82
Machinery and equipment wholesaling	0.862	0.56	0.32	0.31	4.22	2.46	2.18
Non-residential building construction	0.757	0.14	0.62	0.26	1.28	4.95	1.82
Scientific, architectural, and engineering services	0.754	0.59	0.32	0.30	4.02	2.44	2.13
Basic material wholesaling	0.728	0.38	0.45	0.26	3.22	3.25	1.87
Sheep, beef cattle, and grain farming	0.796	0.43	0.41	0.14	2.34	3.02	1.00
Horticulture and fruit growing	0.834	0.43	0.42	0.22	5.56	3.70	1.55

Source: Savvy, Statistics NZ, National Accounts.

** No PPI values are provided for Local Government Administration Services. Savvy has applied the PPI deflator for the Scientific, Archtectural and Engineering Services Sector as a proxy. ** per dollar of output. *** per million dollars of output.*

Other key assumptions for the modelling contained in this report are as follows:

- Anticipated expenditure is deflated to March 2020 prices prior to applying the 2020 multipliers. This is done using the Producers Price Index, with actual deflators relied on for this assessment shown in the table above.
- Economic impacts are expressed in 2020 dollar and employment terms. It is not appropriate to re-inflate economic impacts to dollars of the day.
- The national multipliers are assumed to represent the multipliers that applied in the Project's district and region in 2020. That is, it is assumed that industries in the district/regional economy have the same interdependencies with other industries as they do nationally. Savvy acknowledges that using national multipliers is not as accurate as applying multipliers specific to the district/region, such as can be sourced from multi-regional input-output (MRIO) tables. As discussed in the body of this report, for construction related sectors in a large city like Dunedin, the use of national multipliers is not expected to introduce any material risk for the reliability of the results for their intended purpose.
- All or most direct expenditure on the proposed development, including indirect and induced spending, is assumed to be with business located in Project's region. In this case, it is assumed that approximately 95% of direct construction expenditure is directed to businesses in the Otago Region. While this does not mean that all indirect and induced spending also occurs in the Otago Region, a significant share of total economic impacts are assumed to accrue to the regional economy.

Other IO Modelling Limitations and Consequences for Interpretation

- The district/region economic impacts calculated in this report apply to the proposed development. It is important to acknowledge that these same or similar impacts would arise from a development of a similar scale and composition in another location in the district or region and are not entirely unique to this proposal/site.
- IO modelling assumes no supply constraints in the economy, which assumes that businesses can source sufficient resources (labour, capital, land, etc) to meet new demands without displacement. In everyday terms, this means the model assumes that extra workers, machinery, and land are always available whenever businesses need them, no matter how big the increase in demand is. In reality, shortages or competition for resources can drive up costs (discussed below) or limit output, so the model's estimates of value added and employment impacts should be seen as an upper-bound

rather than a guaranteed outcome. They should also be considered as 'gross' impacts as no displacement effects have been identified or accounted for (if applicable).[124]

- IO modelling assumes constant returns to scale, which means that there are no economies of scale or diminishing returns in the model. In simple terms, this means the model assumes that producing twice as much output always requires exactly twice as many inputs, with no bulk discounts, efficiency gains, or bottlenecks. In reality, businesses may become more efficient—or less efficient—as production scales up, so the model's estimates of value added and employment impacts should be interpreted as indicative rather than precise, especially when analysing large changes See also discussion in Section 6.3 on how employment impacts should be interpreted as a result of this limitation of IO modelling.

- The IO model applies static prices, which assumes that prices remain at 2020 values (including over time). The model does not account for substitution effect or dynamic feedback from changes in demand and prices One potential effect of new projects such as proposed here, is that to secure goods and suppliers in the time frames assumed for development, the purchaser may need to accept a higher price. Price changes could also apply for indirect demand generated by the project. If prices were higher than embedded in the multipliers, the multiplier effect on economic activity would be lower than modelled as less of each dollar spent translates into real increases in output If labour is scarce (including where unemployment is very low), then higher wages/salaries may be required to attract/secure that labour to meet the increased demand. This can however be more relevant for specialist labour, and is unlikely to apply for the construction of this project which is not dissimilar to other industrial developments (albeit large in scale).

- Employment impacts are calculated assuming constant productivity – that is, each industry and location produces the same amount of output per employee It also assumes that all businesses are equally as productive. In reality some businesses will be more or less productive than the average for that sector. For future developments such as the proposed project, the exact suppliers may not be known. Even if they were, the IO model operates at a higher economic level than individual business entities.

[124] Note, the use of 'gross' here is in the context of the modelled impacts, and not in the wider sense of cost reducing gross impacts or benefits to give a net result.

Appendix E– Case Study Modelling

This appendix provides the detailed tables of the case studies discussed and summarised in in Section 7.3. They should be read in conjunction with Figure 7.1 and the transport costs/travel time rate assumptions discussed in Section 7.3. Other key assumptions for the modelling (many of which have been discussed in earlier sections of the report) include:

- Curtain-sider trucks carry 35 tonnes per load.
- Each TEU equates to 12.5 tonnes of product.
- Container skel trucks carry 2 x TEUs per load, so a total payload of 25 tonnes.
- Shuttle trains have 24 wagons and each rail wagon is able to take 2 x TEUs
- Total payload per shuttle train is therefore estimated at 600 tonnes.

CO2e Emissions Factors

Savvy has identified two key sources of CO2e emissions factors that could be used in the modelling. One is the Vehicle Emissions Prediction Model v7.0 (VEPM) - a data source of emissions factors recommended to be used by NZTA in traffic modelling such as that used in transport business cases - and the other is the freight transport emissions factors produced by MfE - a data source of emission factors to be used by organisations wanting to calculate their GHG emissions).

The advantage of the VEPM data is that you are able to account for the effect of average vehicle speed on emissions. Broadly, higher emissions are generated when average speeds are lower (i.e. more stopping and starting) and vice versa (less emissions when vehicles are travelling more efficiently at higher speeds).[125] The unit of the emissions factors from the VEPM is g/km. Using the VEPM, Savvy has generated two emission factors (CO2e) for heavy goods vehicles (i.e. the sorts of trucks used by Icon) when travelling in the Open Highway Zone and Urban Area Zone. The calculations adopt the average speed settings supplied by Icon for the two zones.

The emissions factors from the VEPM are as follows:

- 700 g/km CO2e – Open Highway Zone – VEPM settings: based on reticulated heavy vehicle 28-34 tonnes, 100% load, 86km/hour average speed (max option), 0% gradient

[125] See for example: Emissions Impossible. Effect of speed on emissions. May 2023.

average, cold start and degradation included, ambient temperature 13.1 degrees Celsius (default), average distance 25km (max option).

- 1,125 g/km CO2e – Urban Area Zone – VEPM settings: based on reticulated heavy vehicle 28 34 tonnes, 100% load, 30km/hour average speed), 0% gradient average, cold start and degradation included, ambient temperature 13.1 degrees Celsius (default), average distance 15km.

The VEPM implies (based on the settings adopted) that heavy vehicles goods truck CO2e emissions are 61% higher when travelling in the Urban Area Zone compared to the Open Highway Zone.

The VEPM does not provide an equivalent emissions factor for rail (as the model has only been developed for road traffic modelling). A rail emissions factor (CO2e) is however available from the MfE dataset.[126] The units used in the MfE dataset are kg CO2e/net Tonne Kms. The emissions factor for rail freight is 0.0276 kg/ onne Kms.[127] This rate is relied on in a number of KiwiRail reports, including for example, 'The Value of Rail in New Zealand' (February 2021).

The MfE dataset also provides a range of emissions factors for freighting goods by truck, using the same unit as the rail figures. This data source is therefore preferred because it allows for consistent units of measurement.[128] Savvy has adopted the 'Long-haul heavy truck' emissions factor from Table 27[129] of the MfE dataset to represent emissions generated in the Open Highway Zone. The guide describes this as applying to vehicles with 3 or more axels used for relatively long distance travel. This has an emissions factor of 0.105 kg CO2e/tonne Km.

The MfE dataset does not provide a comparable figure for the same heavy freight vehicles travelling in urban environments (with the same/similar load). While there is an Urban Delivery Heavy Truck emissions factor, the detailed guidance indicates that this vehicle fleet is generally for small trucks, and not those used by Icon. As such, Savvy has applied the ratio of emissions factors calculated from the VEPM (1.61 (Urban Area Zone: Open Highway Zone) to the MfE Long-haul heavy truck emissions factor. This gives an estimated emissions factor for those same vehicles when travelling through the Urban Area Zone of 0.169 kg CO2e/tonne Km.

[126] Freight transport emissions factors (Summary Guide), Table 28 – Freighting goods in Aotearoa New Zealand (or Table 60 in the Detailed Guide).

[127] MfE note that the figure for net tonne Kms includes the weight for third-party tare weight containers. The figures reflect the actual freight that KiwiRail moved.

[128] MfE emphasise that all emissions factors in the guide are average emissions factors for certain vehicle categories in the New Zealand vehicle fleet. The actual emissions for a specific vehicle in a specific trip could be different.

[129] Or Table 55 in the Detailed Guide.

Other Assumptions in Modelling

The detailed tables below include the status quo supply chain scenario (no Inland Port) and the future supply chain scenario with the Inland Port For consistency, the scenarios use the same tonnes of product so do not assume any growth (despite the fact that the Inland Port would not be operational for a few years if approved). Other key assumptions/limitations for the modelling include:

- The scenarios relate only to one-way trips from the processing plants to Port Chalmers. As such, they do not account for truck movements from Dunedin to the processing plants, travel to/from the Icon/Dynes truck depot Dunedin (or [redacted] depot is [redacted] or Case Stude 2) at the beginning and end of each day, travel associated with the movement of empty containers, or travel associated with the movement of imported goods for the same export customer (whether on net additional or back loaded trips).

- The with Inland Port scenario equally does not include the return trip of the shuttle trains from Port Chalmers back to the Inland Port (which may be used for empty container transport and full container transport (i.e. back loading).

- Any marshalling/shunting of the shuttle train that is required (for example if the trains need to turn around) is not included, although any delays for this activity are assumed to be captured in the total travel time assumption for the train to travel between the Inland Port and Port Chalmers.

- The modelling matches travel distance by Transport Productivity Zone with the nature of the product being moved (i.e., bulk/palletised or containerised). This is because this impacts the truck that is used and therefore the payload of those trucks.

- While the report has focussed on TEUs as the metric to explain container trade, this modelling is based on tonnes as the key input. This was necessary as the GHG emission (CO_2e) factors applied use a 'Tonne Kilometres' metric.

- Vehicle movements are derived from total tonnes of product and payload assumptions. These may differ from actual truck movements for a range of operational reasons. Vehicle movements are not additive across the zones (when totalled), as it is the same vehicle travelling through the zones until such time as they reach the warehouse, and a separate (and different type of) truck then makes a separate trip. For that section of the table, the Total row is the maximum number of vehicle movements per year.

- Transport costs are costs to the service provider and may not be the costs charged to customers. They are indicative only based on averages, with the focus being on the relative changes.
- While the modelling could be extended to estimate changes in urban road maintenance costs or fuel consumption, for brevity this is excluded. Such benefits are addressed qualitatively in the report.
- The colours used in the following tables signal the change in metric being measured / reported They are however all linked to the same inputs.

[redacted] – One Way Export Supply Chain (Plant to Port Chalmers)

Transport Productivity Zone (Figure 7.1)	Status Quo Export Supply Chain			Export Supply Chain With Inland Port			Change (n)	Change (%)
	Palletised Goods	Containerised Goods	Total	Palletised Goods	Containerised Goods	Total		
Kilometers (One Way Factory to Port Chalmers)								
Open Highway Zone	97	-	97	92	-	92	- 5	-5%
Urban Area Zone	13	2	15	-	-	-	- 15	-100%
Rail Zone	-	-	-	-	28	28	28	0%
Total	**110**	**2**	**112**	**92**	**28**	**120**	**8**	**7%**
Share of Kilometers by Productivity Zone and Load Type								
Open Highway Zone	87%	0%	87%	77%	0%	77%		
Urban Area Zone	12%	2%	13%	0%	0%	0%		
Rail Zone	0%	0%	0%	0%	23%	23%		
Total	**98%**	**2%**	**100%**	**77%**	**23%**	**100%**		
Tonnes Lifted per Annum								
			50,000			50,000		
Tonnes Moved per Annum (Tonne km) (One Way Factory to Port Chalmers)								
Open Highway Zone	4,850,000	-	4,850,000	4,600,000	-	4,600,000	- 250,000	-5%
Urban Area Zone	650,000	100,000	750,000	-	-	-	- 750,000	-100%
Rail Zone	-	-	-	-	1,400,000	1,400,000	1,400,000	0%
Total	**5,500,000**	**100,000**	**5,600,000**	**4,600,000**	**1,400,000**	**6,000,000**	**400,000**	**7%**
Tonnes/Load by Vehicle Type								
Payload (Tonnes)	34	25		34	600			
Vehicle Type	Curtain Sider Truck	Container Skel Truck		Curtain Sider Truck	Shuttle Train			
Vehicle Kilometers Travelled per Annum (One Way Factory to Port Chalmers)								
Open Highway Zone	142,647	-	142,647	135,294	-	135,294	- 7,353	-5%
Urban Area Zone	19,118	4,000	23,118	-	-	-	- 23,118	-100%
Rail Zone	-	-	-	-	2,333	2,333	2,333	0%
Total	**161,765**	**4,000**	**165,765**	**135,294**	**2,333**	**137,627**	**- 28,137**	**-17%**
Indicative Transport Cost per Annum (s) (One Way Factory to Port Chalmers) **								
Open Highway Zone	$ 499,265	$ -	$ 499,265	$ 473,529	$ -	$ 473,529	- 25,735	-5%
Urban Area Zone	$ 82,206	$ 17,200	$ 99,406	$ -	$ -	$ -	- 99,406	-100%
Rail Zone	$ -	$ -	$ -	$ -	$ 308,000	$ 308,000	308,000	0%
Total	**$ 581,471**	**$ 17,200**	**$ 598,671**	**$ 473,529**	**$ 308,000**	**$ 781,529**	**$ 182,859**	**31%**
Vehicle Movements per Annum (One Way Factory to Port Chalmers)								
Open Highway Zone	1,471	-	1,471	1,471	-	1,471	-	0%
Urban Area Zone	1,471	2,000	3,471	-	-	-	- 3,471	-100%
Rail Zone	-	-	-	-	83	83	83	0%
Total *	**1,471**	**2,000**	**3,471**	**1,471**	**83**	**1,471**	**- 2,000**	**-58%**
Vehicle Travel Time - Hours per Annum (One Way Factory to Port Chalmers) (applies to transit time only) **								
Open Highway Zone	1,783	-	1,783	1,691	-	1,691	- 92	-5%
Urban Area Zone	722	151	873	-	-	-	- 873	-100%
Rail Zone	-	-	-	-	63	63	63	0%
Total	**2,505**	**151**	**2,656**	**1,691**	**63**	**1,754**	**- 903**	**-34%**
Indicative Transport Emissions (CO2-e Tonnes per Annum) (One Way Factory to Port Chalmers) **								
Open Highway Zone	509	-	509	483	-	483	- 26	-5%
Urban Area Zone	110	17	127	-	-	-	- 127	-100%
Rail Zone	-	-	-	-	38	38	38	0%
Total	**619**	**17**	**636**	**483**	**38**	**521**	**- 115**	**-18%**

Source: Savvy, Port Otago, Icon, Dynes Transport Group, MfE (for Emissions Factors).The change in vehicle type represents the warehouse packing stage of the supply chain.

** This total is not additive as it is the same truck moving through multiple zones. The total is the maximum only to reflect unique vechicles per trip.*

*** Refer assumptions listed in Section 7.3 and/or Appendix E.*

[redacted] - One Way Export Supply Chain (Plant to Port Chalmers)

Transport Productivity Zone (Figure 7.1)	Status Quo Export Supply Chain			Export Supply Chain With Inland Port			Change (n)	Change (%)
	Palletised Goods	Containerised Goods	Total	Palletised Goods	Containerised Goods	Total		
Kilometers (One Way Factory to Port Chalmers)								
Open Highway Zone	76	18	94	76	-	76	- 17	-18%
Urban Area Zone	-	15	15	-	-	-	- 15	-100%
Rail Zone	-	-	-	-	28	28	28	0%
Total	**76**	**32**	**108**	**76**	**28**	**104**	**-4**	**-4%**
Share of Kilometers by Productivity Zone and Load Type								
Open Highway Zone	70%	16%	86%	73%	0%	73%		
Urban Area Zone	0%	14%	14%	0%	0%	0%		
Rail Zone	0%	0%	0%	0%	27%	27%		
Total	**70%**	**30%**	**100%**	**73%**	**27%**	**100%**		
Tonnes Lifted per Annum								
			38,000			38,000		
Tonnes Moved per Annum (Tonne km) (One Way Factory to Port Chalmers)								
Open Highway Zone	2,888,000	668,800	3,556,800	2,899,400	-	2,899,400	- 657,400	-18%
Urban Area Zone	-	562,400	562,400	-	-	-	- 562,400	-100%
Rail Zone	-	-	-	-	1,064,000	1,064,000	1,064,000	0%
Total	**2,888,000**	**1,231,200**	**4,119,200**	**2,899,400**	**1,064,000**	**3,963,400**	**- 155,800**	**-4%**
Tonnes/Load by Vehicle Type								
Payload (Tonnes)	34	25		34	600			
Vehicle Type	Curtain Sider Truck	Container Skel Truck		Curtain Sider Truck	Shuttle Train			
Vehicle Kilometers Travelled per Annum (One Way Factory to Port Chalmers)								
Open Highway Zone	84,941	26,752	111,693	85,276	-	85,276	- 26,417	-24%
Urban Area Zone	-	22,496	22,496	-	-	-	- 22,496	-100%
Rail Zone	-	-	-	-	1,773	1,773	1,773	0%
Total	**84,941**	**49,248**	**134,189**	**85,276**	**1,773**	**87,050**	**- 47,139**	**-35%**
Indicative Transport Cost per Annum (One Way Factory to Port Chalmers) **								
Open Highway Zone	$ 297,294	$ 93,632	$ 390,926	$ 298,468	$ -	$ 298,468	- 92,458	-24%
Urban Area Zone	$ -	$ 96,733	$ 96,733	$ -	$ -	$ -	- 96,733	-100%
Rail Zone	$ -	$ -	$ -	$ -	$ 234,080	$ 234,080	234,080	0%
Total	**$ 297,294**	**$ 190,365**	**$ 487,659**	**$ 298,468**	**$ 234,080**	**$ 532,548**	**$ 44,889**	**9%**
Vehicle Movements per Annum (One Way Factory to Port Chalmers)								
Open Highway Zone	1,118	1,520	2,638	1,118	-	1,118	- 1,520	-58%
Urban Area Zone	-	1,520	1,520	-	-	-	- 1,520	-100%
Rail Zone	-	-	-	-	63	63	63	0%
Total *	**1,118**	**1,520**	**2,638**	**1,118**	**63**	**1,118**	**- 1,520**	**-58%**
Vehicle Travel Time Hours per Annum (One Way Factory to Port Chalmers) (applies to transit time only) **								
Open Highway Zone	1,062	334	1,396	1,066	-	1,066	- 330	-24%
Urban Area Zone	-	850	850	-	-	-	- 850	-100%
Rail Zone	-	-	-	-	48	48	48	0%
Total	**1,062**	**1,184**	**2,246**	**1,066**	**48**	**1,113**	**- 1,133**	**-50%**
Indicative Transport Emissions (CO2-e Tonnes per Annum) (One Way Factory to Port Chalmers) **								
Open Highway Zone	303	70	373	304	-	304	- 69	-18%
Urban Area Zone	-	95	95	-	-	-	- 95	-100%
Rail Zone	-	-	-	-	29	29	29	0%
Total	**303**	**165**	**468**	**304**	**29**	**333**	**- 135**	**-29%**

Source: Savvy, Port Otago, Icon, Dynes Transport Group, MfE (for Emissions Factors).The change in vehicle type represents the warehouse packing stage of the supply chain.

** This total is not additive as it is the same truck moving through multiple zones. The total is the maximum only to reflect unique vechicles per trip.*

*** Refer assumptions listed in Section 7.3 and/or Appendix E.*

[redacted] - One Way Export Supply Chain (Plant to Port Chalmers)

Transport Productivity Zone (Figure 7.1)	Status Quo Export Supply Chain			Export Supply Chain With Inland Port			Change (n)	Change (%)
	Palletised Goods	Containerised Goods	Total	Palletised Goods	Containerised Goods	Total		
Kilometers (One Way Factory to Port Chalmers)								
Open Highway Zone	205	18	223	206	-	206	- 17	-7%
Urban Area Zone	-	15	15	-	-	-	- 15	-100%
Rail Zone	-	-	-	-	28	28	28	0%
Total	**205**	**32**	**237**	**206**	**28**	**234**	**-3**	**-1%**
Share of Kilometers by Productivity Zone and Load Type								
Open Highway Zone	86%	7%	94%	88%	0%	88%		
Urban Area Zone	0%	6%	6%	0%	0%	0%		
Rail Zone	0%	0%	0%	0%	12%	12%		
Total	**86%**	**14%**	**100%**	**88%**	**12%**	**100%**		
Tonnes Lifted per Annum								
			3,000			3,000		
Tonnes Moved per Annum (Tonne km) (One Way Factory to Port Chalmers)								
Open Highway Zone	615,000	52,800	667,800	618,000	-	618,000	- 49,800	-7%
Urban Area Zone	-	44,400	44,400	-	-	-	- 44,400	-100%
Rail Zone	-	-	-	-	84,000	84,000	84,000	0%
Total	**615,000**	**97,200**	**712,200**	**618,000**	**84,000**	**702,000**	**- 10,200**	**-1%**
Tonnes/Load by Vehicle Type								
Payload (Tonnes)	34	25		34	600			
Vehicle Type	Curtain Sider Truck	Container Skel Truck		Curtain Sider Truck	Shuttle Train			
Vehicle Kilometers Travelled per Annum (One Way Factory to Port Chalmers)								
Open Highway Zone	18,088	2,112	20,200	18,176	-	18,176	- 2,024	-10%
Urban Area Zone	-	1,776	1,776	-	-	-	- 1,776	-100%
Rail Zone	-	-	-	-	140	140	140	0%
Total	**18,088**	**3,888**	**21,976**	**18,176**	**140**	**18,316**	**- 3,660**	**-17%**
Indicative Transport Cost per Annum (One Way Factory to Port Chalmers) **								
Open Highway Zone	$ 63,309	$ 7,392	$ 70,701	$ 63,618	$ -	$ 63,618	- 7,083	-10%
Urban Area Zone	$ -	$ 7,637	$ 7,637	$ -	$ -	$ -	- 7,637	-100%
Rail Zone	$ -	$ -	$ -	$ -	$ 18,480	$ 18,480	18,480	0%
Total	**$ 63,309**	**$ 15,029**	**$ 78,338**	**$ 63,618**	**$ 18,480**	**$ 82,098**	**$ 3,760**	**5%**
Vehicle Movements per Annum (One Way Factory to Port Chalmers)								
Open Highway Zone	88	120	208	88	-	88	- 120	-58%
Urban Area Zone	-	120	120	-	-	-	- 120	-100%
Rail Zone	-	-	-	-	5	5	5	0%
Total *	**88**	**120**	**208**	**88**	**5**	**88**	**- 120**	**-58%**
Vehicle Travel Time Hours per Annum (One Way Factory to Port Chalmers) (applies to transit time only) **								
Open Highway Zone	226	26	253	227	-	227	- 25	-10%
Urban Area Zone	-	67	67	-	-	-	- 67	-100%
Rail Zone	-	-	-	-	4	4	4	0%
Total	**226**	**93**	**320**	**227**	**4**	**231**	**- 89**	**-28%**
Indicative Transport Emissions (CO_2-e Tonnes per Annum) (One Way Factory to Port Chalmers) **								
Open Highway Zone	65	6	70	65	-	65	- 5	-7%
Urban Area Zone	-	7	7	-	-	-	- 7	-100%
Rail Zone	-	-	-	-	2	2	2	0%
Total	**65**	**13**	**78**	**65**	**2**	**67**	**- 10**	**-13%**

Source: Savvy, Port Otago, Icon, Dynes Transport Group, MfE (for Emissions Factors).The change in vehicle type represents the warehouse packing stage of the supply chain.

** This total is not additive as it is the same truck moving through multiple zones. The total is the maximum only to reflect unique vechicles per trip.*

*** Refer assumptions listed in Section 7.3 and/or Appendix E.*

[redacted] (Hypothetical One Way Export Supply Chain (Distribution Centre to Port Chalmers Only)

Transport Productivity Zone (Figure 7.1)	Supply Chain with Rail Siding (Status Quo)			Supply Chain if no Rail Siding (Conterfactual)			Change (n)	Change (%)
	Palletised Goods	Containerised Goods	Total	Palletised Goods	Containerised Goods	Total		
Kilometers (One Way Distribution Centre to Port Chalmers)								
Open Highway Zone		0	-		17	17	17	0%
Urban Area Zone		0	-		15	15	15	0%
Rail Zone		28	28		-	-	- 28	-100%
Total	**-**	**28**	**28**	**-**	**32**	**32**	**4**	**14%**
Share of Kilometers by Productivity Zone and Load Type								
Open Highway Zone	0%	0%	0%	0%	53%	53%		
Urban Area Zone	0%	0%	0%	0%	47%	47%		
Rail Zone	0%	100%	100%	0%	0%	0%		
Total	**0%**	**100%**	**100%**	**0%**	**100%**	**100%**		
Tonnes Lifted per Annum								
			175,000			175,000		
Tonnes Moved per Annum (Tonne km) (One Way Distribution Centre to Port Chalmers)								
Open Highway Zone	-	-	-	-	2,975,000	2,975,000	2,975,000	0%
Urban Area Zone	-	-	-	-	2,625,000	2,625,000	2,625,000	0%
Rail Zone	-	4,900,000	4,900,000	-	-	-	- 4,900,000	-100%
Total	**-**	**4,900,000**	**4,900,000**	**-**	**5,600,000**	**5,600,000**	**700,000**	**14%**
Tonnes/Load by Vehicle Type								
Payload (Tonnes)	34	600		34	25			
Vehicle Type	Curtain Sider Truck	Shuttle Train		Curtain Sider Truck	Container Skel Truck			
Vehicle Kilometers Travelled per Annum (One Way Distribution Centre to Port Chalmers)								
Open Highway Zone	-	-	-	-	119,000	119,000	119,000	0%
Urban Area Zone	-	-	-	-	105,000	105,000	105,000	0%
Rail Zone	-	8,167	8,167	-	-	-	- 8,167	-100%
Total	**-**	**8,167**	**8,167**	**-**	**224,000**	**224,000**	**215,833**	**2643%**
Indicative Transport Cost per Annum (One Way Distribution Centre to Port Chalmers) **								
Open Highway Zone	$ -	$ -	$ -	$ -	$ 416,500	$ 416,500	416,500	0%
Urban Area Zone	$ -	$ -	$ -	$ -	$ 451,500	$ 451,500	451,500	0%
Rail Zone	$ -	$ 1,078,000	$ 1,078,000	$ -	$ -	$ -	- 1,078,000	-100%
Total	**$ -**	**$ 1,078,000**	**$ 1,078,000**	**$ -**	**$ 868,000**	**$ 868,000**	**- 210,000**	**-19%**
Vehicle Movements per Annum (One Way Distribution Centre to Port Chalmers)								
Open Highway Zone	-	-	-	-	7,000	7,000	7,000	0%
Urban Area Zone	-	-	-	-	7,000	7,000	7,000	0%
Rail Zone	-	292	292	-	-	-	- 292	-100%
Total *	**-**	**292**	**292**	**-**	**7,000**	**7,000**	**6,708**	**2300%**
Vehicle Travel Time Hours per Annum (One Way Distribution Centre to Port Chalmers) (applies to transit time only) **								
Open Highway Zone	-	-	-	-	1,488	1,488	1,488	0%
Urban Area Zone	-	-	-	-	3,967	3,967	3,967	0%
Rail Zone	-	219	219	-	-	-	- 219	-100%
Total	**-**	**219**	**219**	**-**	**5,454**	**5,454**	**5,235**	**2393%**
Indicative Transport Emissions (CO2-e Tonnes per Annum) (One Way Distribution Centre to Port Chalmers) **								
Open Highway Zone	-	-	-	-	312	312	312	0%
Urban Area Zone	-	-	-	-	443	443	443	0%
Rail Zone	-	132	132	-	-	-	- 132	-100%
Total	**-**	**132**	**132**	**-**	**755**	**755**	**623**	**471%**

Source: Savvy, Port Otago, Icon, Dynes Transport Group, MfE (for Emissions Factors).

** This total is not additive as it is the same truck moving through multiple zones. The total is the maximum only to reflect unique vechicles per trip.*

*** Refer assumptions listed in Section 7.3 and/or Appendix E.*