

**BEFORE THE MANAWATŪ-WHANGANUI REGIONAL COUNCIL
INDEPENDENT HEARING PANEL**

IN THE MATTER of the Resource Management Act 1991 (“RMA” or “the Act”)

AND

IN THE MATTER of resource consent applications to **MANAWATŪ-WHANGANUI REGIONAL COUNCIL** by **WINSTONE PULP INTERNATIONAL LIMITED** to discharge up to 750m³/day of condensate wastewater, and land disturbance together with any ancillary diversion of water and discharge of sediment for the associated construction of a wetland (ATH-2010011593.03 and ATH-202609463.00).

**STATEMENT OF EVIDENCE OF MICHAEL PETER RYAN
DATED 29 SEPTEMBER 2026**

- 1. **SUMMARY OF EVIDENCE**
 - 1.1 Winstone Pulp International Limited (“**WPI**”) has operated at Karioi since 1978. The mechanical pulp mill was established because of its proximity to the Karioi Forest, access to then globally competitive electricity, and connection to the main trunk rail network. From the outset, its production was export-focused and contributed to New Zealand’s foreign exchange earnings. At the time operations ceased in September 2024, WPI employed approximately 150 staff at the Karioi site and a further 80–90 staff at the neighbouring Tangiwai Sawmill. A report commissioned by WPI calculated that the Karioi and Tangiwai operations contributed 9% of Ruapehu District’s annual GDP and 1.8% of the Manawatū-Whanganui Region’s annual GDP, and that approximately 96% of WPI’s direct workforce was based in Ruapehu District. WPI was therefore one of the most important employers in the district.
 - 1.2 WPI ceased operations in 2024 because the business was no longer economically viable. Since closure, WPI has been actively seeking a

purchaser for the Site who can repurpose it for future wood processing. Maintaining an appropriate consent framework is therefore important to preserving the site's productive potential and supporting future investment and employment.

- 1.3 The current application represents a substantial refinement of earlier proposals. It reduces the discharge sought to up to 750 m³ per day of condensate wastewater associated with the torrefaction process, removes the previous defoamer boom arrangement, and incorporates a wetland into the wastewater discharge path. The Proposal has been tailored to the requirements of the preferred potential purchaser and responds to consultation and submitter feedback, which better reflects the likely future use of the site.
- 1.4 WPI has endeavoured to engage and consult with iwi, its neighbours, and other potentially affected parties both during its operational life and following the closure of the pulp mill. Engagement has taken place through either attempted door knocking, face to face meetings, and invites to "town hall" meetings either direct via mail or public notices in local media.
- 1.5 WPI has a long-standing relationship with Ngāti Rangī, which includes a formal environmental agreement dating from 2009 and regular engagement on such matters. Since closure, WPI and the potential proposed purchaser have continued to brief this environmental working group, along with the wider Nga Waihua o Paerangi Trust board, regarding the Site's sale, proposed future use and resource consent process. WPI has also maintained an ongoing relationship with Te Korowai o Wainuiarua, where WPI meets with them on at least a biannual basis, alongside WSP as their environmental consultants. In addition, WPI has engaged with Te Rūnanga o Ngā Wairiki Ngāti Apa and Whangaehu Marae following their opposition to the earlier 4,000 m³ per day proposal. That engagement confirmed that those submitters were not opposed to economic development but were concerned to ensure that best practicable technology was used to minimise wastewater volumes and effects on the Whangaehu River.
- 1.6 WPI has also engaged with Federated Mountain Clubs of New Zealand, Ruahine White Water Club and an associated individual submitter, who opposed the earlier application. Following engagement on the current Proposal, those parties lodged neutral submissions on the current Proposal due to the change in discharge water chemical composition and flow volumes.

- 1.7 In my view, the consultation and engagement undertaken to date has helped identify the key concerns, particularly the need to minimise discharge volumes and effects on the Whangaehu River. WPI has been receptive to these concerns, which is reflected in the various amendments made to the application before the Panel.

2. **INTRODUCTION**

- 2.1 My name is Michael Peter Ryan. I am the CEO at Winstone Pulp International Limited (WPI).
- 2.2 This evidence has been prepared in respect of the resource consent applications by Winstone Pulp International Limited ("**WPI**" or "**the Applicant**") to consent the discharge of up to 750 m³/day of condensate wastewater associated with the proposed wood processing operations, in addition to consent for land disturbance together with any ancillary diversion of water and discharge of sediment associated with construction of the wetland ("**the Proposal**") at 1002 State Highway 49, Tangiwai ("**the Site**") under the Horizons Regional Council One Plan ("**One Plan**").
- 2.3 I have been the CEO of WPI since mid-2023 following a 2-year transition handover period from the previous CEO until he retired. I first joined WPI in June 1985 and have held numerous technical, production, and sales roles leading up to being appointed as CEO. Since 2007, I have been a part of WPI's senior lead team reporting directly to the CEO. My last role was the position of General Manager Sales, Marketing & Strategy, which I held from 2011 until being appointed CEO designate in 2021.
- 2.4 As CEO, I was responsible for setting the direction and strategy for the company as it moved forward and transitioned from the leadership of the former long-tenured CEO. Unfortunately, events in 2024 lead to the board's decision to cease operations in September of that year and place the sites up for sale, which made 250 employees redundant.

Purpose and scope of evidence

- 2.5 The purpose of my evidence is to provide an overview of WPI, and the key consultation undertaken to date regarding the Proposal.
- 2.6 Specifically, my evidence will cover:
- (a) A brief background to WPI and the Site (Section 3); and
 - (b) Engagement and consultation undertaken to date (Section 4);

2.7 I have read the following documentation:

- (a) The resource consent application prepared by Suhki Singh of Babbage Consultants Limited dated 30 April 2026 and associated technical memorandums;¹
- (b) Council's section 92 request dated 18 May 2026, and Babbage Consultants Limited's response dated 11 June 2026 and associated attachments;²
- (c) The submissions filed on the application;
- (d) The Applicant's memorandum dated 8 September 2026; and
- (e) Council's s 42A reports ("**s 42A Report**") prepared by Ms Fiona Morton and Mr Kerry Pearce dated 22 September 2026 and attachments.

3. **OVERVIEW OF WPI AND THE SITE**

3.1 WPI has operated a mechanical pulp mill on the Karioi site since 1978. The pulp mill was established on this site due to:

- (a) Its proximity to the then state-owned Karioi Forest;
- (b) The availability of the globally competitive electricity from the national grid at the time; and
- (c) Access to the main trunk rail network.

It formed part of the then Government of the day "think big projects".

3.2 From its start-up, 100% of the production from the mill was destined for export, adding to the country's vital foreign exchange earnings. At the time of closure, the pulp mill site was employing 150 staff, where all except for 6 in a small Auckland office were located at the Karioi site. A further 80 – 90 staff were employed at the companies neighbouring Tangiwai Sawmill which also ceased operations at the same time in September 2024.

1 Technical Memorandums 1-8.
2 Attachments 1-7.

- 3.3 A report commissioned by WPI and compiled by Savvy Consulting following the ceasing of the sites' operations calculated that:³
- (a) The sites contributed 9% of the Ruapehu Districts annual GDP and 1.8% of the Manawatu- Whanganui Region annual GDP.
 - (b) WPI's Karioi & Tangiwai operations provided substantial economic and employment benefits to both the Ruapehu District and the wider Manawatū-Whanganui region.
 - (c) The business was a major regional employer, with approximately 250 direct jobs, of which 96% of its direct workforce were in the Ruapehu District. This made WPI one of the most important employers in the district and a critical source of stable, skilled work in a rural economy with limited large-scale employment alternatives.
 - (d) In Ruapehu, WPI also played a significant role in sustaining the local manufacturing sector. The report shows the district had 369 manufacturing employees in 2023, and WPI's operations represented a major share of that employment base.
 - (e) WPI's presence helped anchor local industrial capability, support higher-value forestry processing, and provide career pathways for local workers and households.
- 3.4 The Site closed in the winter of 2024 due to the exceptional wholesale electricity spot prices experienced. Ultimately, the board made the decision to cease operations as they were no longer economically viable, based on:
- (a) The futures market pricing prediction for wholesale electricity for the next 3 years showing no long-term relief;
 - (b) The Government's advice that they were not looking to review the electricity market any time soon; and
 - (c) The future price predictions for the global sales price of wood pulp.
- 3.5 Since the closure of the sites, WPI has been actively looking for buyers of the Site, but acknowledges that it will not be sold to a buyer who would restart it as a pulp mill. In order to make the site attractive to buyers for potential repurposing, active consents are seen as a necessary component,

hence the application before the Panel. We note that several iterations of this application have been lodged with Council since March 2025 as follows:

- (a) The first being a simple extension of 5 years for the current consent, which at the time of the application was due to expire on 30 June 2025. The existing consent was reinstated and its expiry date extended to 30 December 2027 by a law change brought in by the government in December 2025.
- (b) Following that consent's lodgement and upon continued discussions with potential buyers and various interested parties, WPI amended the application to substantially reduce the discharge flow (a reduction of 23%) and remove the ability to apply a defoamer via a boom across the Whangaehu river. This application was publicly notified in October 2025, which was followed by a series of engagements held with parties who opposed this application.
- (c) This engagement and feedback, along with discussions with Horizons Regional Council Officers, led to further amendments of the application in April 2026, with the application being re-lodged and publicly notified in July 2026. The amendments included referring to a "torrefaction" process, reducing the maximum daily discharge flow rate from 4,000m³ per day to 750m³ per day, and clarifying the type of wastewater as being condensate from the proposed torrefaction process. In addition, following feedback obtained from the submissions, a wetland was incorporated into the wastewater discharge path design. This application has very much been "tailor made" to fit the requirements of the current preferred potential purchaser of the WPI Karioi Pulp Mill site. It is this potential purchaser whose plans for the Site can bring back to the district similar economic and employment opportunities as were present when WPI was in operation.

4. ENGAGEMENT AND CONSULTATION

- 4.1 WPI has over its operational life endeavoured to engage and consult with its neighbours and other potentially affected parties whenever a resource consent application has been applied for, or an upgrade to the mills was being planned. This engagement took place by either attempted door knocking, face to face meetings, and invites to "town hall" meetings either direct via mail or public notices in local media.

4.2 Further to that, WPI had established working environmental forums with the two closest iwi, being Ngāti Rangi and Uenuku. These forums took different forms:

- (a) One being a more formal structured process with Ngāti Rangi with quarterly meetings scheduled and working objectives and funding in place; and
- (b) The other somewhat on an adhoc basis with Uenuku, which took place with its appointed environmental consultants, WSP, and appointed members of Uenuku's leadership group. Meetings occurred on at least a biannual basis or when a significant event was occurring, such as renewal of an expiring consent. These all occurred prior to the signing of Uenuku's treaty settlement, which was post WPI's ceasing of operations. Engagements then took place with Uenuku's post settlement organisation, Te Korowai o Wainuiaruaona on a CEO to CEO meeting level, as required.

Ngāti Rangi

4.3 A formal working environmental agreement has been in place since 2009 with Ngāti Rangi and its post settlement body, Nga Waihua o Paerangi Trust. As discussed above, WPI would formally meet with Ngāti Rangi's environmental group on a quarterly basis to discuss issues of environmental concern, such as consent renewals, areas where we could co-operate on such as riparian planting of waterways, business case studies to establish a plant nursery, as well as on a more informal basis as required.

4.4 Meetings and engagement continued post the ceasing of WPI's operations. This has included:

- (a) Introductions were made to not only the Environmental Group, but presentations to the wider Nga Waihua o Paerangi Trust board and leadership groups by the potential purchaser and myself on 24th February 2026. This followed an earlier meeting with the Trust's CEO and the Chair, and the Ngāti Rangi Environmental Group on 16th February 2026, whom advised the wider board should be briefed on this regarding plans for the Site and associated timelines.
- (b) Invitations were extended to the Environmental Group to join, and were accepted, to attend the annual Horizons Regional Council Compliance Officers' annual audit checks at the Site on 26th March 2025.

- (c) When the submissions for the application were received, follow up meetings have been held on 17th September 2026, and where possible, feedback from these submissions have been taken onboard and items, such as the wetland, have been incorporated into the design as currently presented.
- (d) Regular communication to keep Ngāti Rangi informed has also occurred over the period from late 2024 until September 2026, via email and letter and in person communication when representatives met in each other offices, or at various events within the local community.

Te Korowai o Wainuiarua (formally Uenuku Charitable Trust)

- 4.5 Since approximately 2010, WPI has arranged meetings of a similar environmental focus on at least a biannual basis with Uenuku and their environmental consultants, WSP. Following the signing of their Treaty settlement and the establishment of Te Korowai o Wainuiarua in 2025, meetings or communication have occurred with the CEO. WPI has continued to keep Uenuku informed post WPI ceasing operations regarding the Site's sale and resource consent application process, through emails and phone calls from late 2025 and early 2026.

Te Rūnanga o Ngā Wairiki Ngāti Apa and Whangaehu Marae

- 4.6 Both of the above groups submitted independent submissions in opposition to the first publicly notified application, being for a discharge of 4000m³ per day of treated pulp mill wastewater. In response, WPI arranged a joint teams conference call on 21st April 2026 to allow a free exchange of concerns and understandings. The clear understanding and position provided from this engagement was that the submitters were not opposed to economic development, but wanted the best technology used to minimise the wastewater volume and the effect that any discharge may have on the river.

Federated Mountain Clubs of NZ and Ruahine White Water Club

- 4.7 Both of these groups, alongside an individual submitter associated with the Ruahine White water Club, were opposed to the first publicly notified application. Following the notification of this current application, a meeting was arranged with all parties on 4th August 2026 to discuss their concerns. Following this discussion, the parties decided to submit neutral submissions to this application based on the change and composition of the discharge flows. It was noted by the Federation Mountain Clubs of NZ how they had

appreciated the openness and level of engagement with them, and wished other corporates followed this example.

Michael Peter Ryan
29 September 2026

**APPENDIX A – SAVVY CONSULTING ECONOMIC ASSESSMENT OF THE
KARIOI PULP MILL**



savvy
CONSULTING

Economic Significance of the Karioi Pulpmill

Water Discharge Consent Application

Prepared for: Viridis Limited – March 2025 – Final



Formative

Economic Significance of the Karioi Pulpmill

Water Discharge Consent Application

Project Reference: VIR001.24

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Executive Summary

This report by Savvy Consulting and Formative Limited provides an assessment of the economic benefits provided by the operation of the Karioi Pulpmill, owned by Winstone Pulp International (“WPI”) who have closed the site and are planning to sell it.

The approach of this assessment has been to analyse the economic and social benefits that were delivered by WPI through its operations of the Pulpmill, and by association, the adjacent Tangiwai Sawmill in the year ending June 2024. This being the last full financial year of operation for the two mills (which are economically linked).

The analysis has examined the wider Pulp and Paper Manufacturing Industry in New Zealand and the Karioi Pulpmill in that context. Pulpmills have a unique combination of locational attributes that must be met in order to run efficiently and profitably, and these are especially critical to the Karioi Pulpmill given the distance of the Ruapehu District to the Napier Port for exporting. This distance constraint is the same reason that commercial and farm forestry in Ruapehu and neighbouring central North Island districts relied on the Pulpmill (and Tangiwai Sawmill) to be commercially viable. The mills had a synergistic relationship with the local forestry sector which adds to the strength of their combined economic role.

Examination of the operations of the Karioi Pulpmill revealed a diverse and wide-spread upstream supply chain. This ranged from chemical suppliers in Morrinsville to heavy construction services in Tauranga to logistics services in Napier and trucking services in Ruapehu District and a lot in between. The biggest inputs to production for the mills were forestry products and electricity. All 210,000 metric tonnes of final high-quality wood pulp produced per annum by the 250 staff spread across the Pulpmill and Sawmill (and a few remote roles) was exported to Asia.

Applying an Input-Output based methodology to model the total direct, indirect and induced economic impact of the Karioi Pulpmill (and by association the Tangiwai Sawmill), it was estimated that it directly sustained a minimum of \$40 million of GDP and 229 jobs in the Ruapehu District. Total employment at the mills accounted for 5% of all employment in the district and 68% of total manufacturing employment in Ruapehu. The mills combined were the second largest employer in the district (after the Defence Force).

Considering direct, indirect and induced impacts, the Pulpmill sustained a significant \$92 million of GDP per annum in the Manawatu-Wanganui Region (including 583 jobs). This impact increases to a national GDP contribution of \$279 million (and 1,883 jobs).¹

These economic effects are considered significant in absolute and relative terms. The social benefits generated by the mills are also considered to be significant.

In a community with an above average share of residents of Māori descent, the mills provided a large number of highly skilled, high-paid jobs for the local community, lifting the socio-economic status of the district over 50 years' of operation and at times, three generations of staff in the same family. WPI encouraged local school leavers to pursue tertiary education (through the provision of scholarships) and provided apprenticeships and work opportunities for local tertiary students each year. The Karioi Pulpmill and Tangiwai Sawmill were an integral part of the social and economic fabric of Ruapehu District.

Based on our assessment, we conclude that WPI's operations played a significant role in the district and wider region. The wholesale electricity price rises (the acute spike of August 2024 and the preceding year on year increases) that contributed to the closure of the Pulpmill (and therefore Sawmill) were equally unique circumstances driven by a complex combination of environmental, economic and regulatory factors.

To the extent that granting the wastewater discharge consent for a limited period of 5 years increases the likelihood of attracting a buyer for the Karioi Pulpmill (which we consider it would), we would support that outcome from an economic perspective. This is on the basis that the significant social and economic benefits generated by the mills in the year ending June 2024 are a strong indication of the likely scale and significance of the benefits that a new owner of the site(s) may be able to generate for the district and wider region over the long-term.

¹ Based on the year ending June 2024 but expressed in \$2023.

1 Introduction

Viridis Limited has contracted Savvy Consulting and Formative Limited to assess the economic contribution of the Winstone Pulp International (WPI) Karioi Pulpmill (“the Pulpmill”) to the Manawatu-Wanganui Region and local Ruapehu District. In addition, an assessment of the exceptional electricity prices that led to the closure of the Pulpmill in late 2024 is discussed. This report has been prepared to support WPI’s resource consent application to Horizons Regional Council to discharge treated effluent, stormwater and antifoam into the Whangaehu River for a limited 5 year period (noting that the existing consent expires on the 1st of July 2025).

1.1 Background

The Pulpmill has operated in the Ruapehu District next to the Karioi Forest since 1978. It is a significant and multi-faceted manufacturing operation that produces around 210,000 metric tonnes of pulp fibre for export, where it is then used to produce paperboard for packaging in China, Indonesia, India, Pakistan and elsewhere. The plant and associated facilities have evolved over the years as production and demand has shifted. Investments on the site in the last five years includes a new drum de-barker (costing \$5 million plus) and a new bale forming press (costing \$5 million plus). What exists on the site today represents a significant capital investment.² Further detail on the operation of the Pulpmill is discussed in Section 2.

Understanding the basics of the Pulpmill’s operation aids in articulating the Pulpmill’s upstream supply chain and therefore its direct and flow-on economic impacts.

Following a period of rapidly rising electricity costs, WPI made the very difficult decision to close the Pulpmill in September 2024. The focus of this report is not on the closure of the Pulpmill (although the role of electricity price rises in that closure is covered and considered relevant to the consent application), but rather, it focusses on the significant economic contribution that the Pulpmill made when fully operational.

The reason for this, is that WPI are looking to sell the site (and related assets) so that a new manufacturing business can establish on the site. A current discharge consent is considered essential to attract a buyer and therefore makes a valuable contribution to the sale process.

While the purchaser of the site may not necessarily be another pulpmill, based on the scale of the site and value of the plant/assets, any new business is likely to be a large scale, high-output operation. The economic impact of the WPI Pulpmill operation is therefore an indication of the economic impact a future operator of the site may generate. It is that future

² The total improvement value is commercially sensitive.

operator that will potentially make use of the resource consent being sought. Therefore, the positive economic effects facilitated by the resource consent are considered relevant to the overall assessment of effects for the consent application.

1.2 Approach

This report starts with a brief overview of the Pulp and Paper Manufacturing industry in New Zealand and the Karioi Pulpmill in that context. Key economic relationships between the Pulp and Paper Manufacturing industry and other industries are discussed. This is covered in Section 2 and explains a lot of the relevant economic linkages relevant to the Karioi Pulpmill.

Section 3 of the report summarises more specifically the operation of the Karioi Pulpmill. Key suppliers are identified and their role in the Pulpmill's supply chain is examined (including the critical link with the Tangiwai Sawmill). The socio-economic role of the Pulpmill within Ruapehu District is analysed, drawing on quantitative and qualitative data gained from communication/interviews with WPI. Brief analysis is provided on the contribution the Pulpmill makes to the manufacturing sector (and total economy) in Ruapehu District.

Section 4 contains the results of a more detailed economic impact assessment. This part of the report has been carried out using Formative's proprietary Economic Linkages Model (ELM). A detailed explanation of the ELM is contained in Appendix 1. The model uses actual data on New Zealand-based expenditure by WPI by sector and location across New Zealand for the financial year ending June 2024 (i.e. the Pulpmill's most recent financial year). This direct expenditure data is used to estimate not only the direct economic contribution of the Pulpmill in GDP and employment terms, but the indirect and induced economic impact. Combined, this total economic impact is expressed in GDP and employment terms.

Section 5 explores the rapid rise in electricity prices experienced by the Pulpmill. Consideration is given to electricity price trends over time, the cause of the price rises preceding the closure of the Pulpmill, and the significance of those price increases for the Pulpmill's financial viability.

Section 6 briefly summarises the significance of both the Pulpmill's socio-economic contribution when operational and the electricity price rises experienced in 2024. Conclusions are drawn on the indicative positive economic (and social) effects a new manufacturing operator on the Pulpmill site may bring to the Ruapehu District and wider Manawatu-Wanganui Region going forward.

2 Pulp & Paper Manufacturing Industry

2.1 New Zealand's Pulp & Paper Manufacturing Industry

The Pulp & Paper Manufacturing industry incorporates the manufacturing of wood fibres for use in a wide range of paper products and fibre-based building materials (like MDF) using raw materials, such as wood pulp, recycled paper, and other fibres. The New Zealand Pulp and Paper Manufacturing industry is a dynamic sector with a rich history and significant economic impact.

Many of the mills were developed around 50 years ago. Despite facing various challenges, including competition from manufacturers elsewhere in the world who benefit from lower production costs, the industry continues to adapt and evolve, contributing to both the domestic and international (export) markets. New Zealand's high quality pulp and paper products are in demand internationally, with strong export markets in Asia.

New Zealand's Pulp and Paper Manufacturing Industry has always comprised of a small number of big players with WPI, Pan Pac,³ and Oji Fibre Solutions (OjiFS) representing most of pulp and paper processing capacity in 2024. Some mills like WPI's Karioi Pulpmill produce just pulp, while other mills produce pulp and paper products. Historically more paper was manufactured in New Zealand, but more recently the paper manufacturing side of the industry has become more concentrated.

2.2 Industry Scale and Location

Table 2.1 contains statistics on the Pulp and Paper Manufacturing industry in New Zealand from the StatisticsNZ Business Demography dataset. It captures the 2023 year, and the changes in employment between 2018 and 2023. According to StatisticsNZ, there were a total of 26 businesses classified in the Pulp and Paper Manufacturing industry (spread over 15 territorial authorities), although the industry is dominated by 5 major mills that account for 84%

³ Pan Pac is owned by the Oji Group.

of total industry employment in 2023 (1,671 workers). Those major producers have average employment of 334 each.

It is important to note that this employment data may not include all employment on the mill sites as there may be other entities within the wider operations that are classified to other industries such as Sawmilling. This will differ for each business, depending on how their operations are structured and registered with the IRD. As the employment data does not include the February 2024 snapshot, there may have been further changes in employment since 2023 that have not been captured in Table 2.1.

Relevant to this report, the employment data for Ruapehu District in Table 2.1 (which relates to WPI's operations), excludes the Tangiwai Sawmill, which is classified separately, but effectively tied to the operation of the Karioi Pulpmill. This is discussed further in Section 3.

Table 2.1 – Pulp and Paper Manufacturing Industry in New Zealand, 2023

Territorial Authority	Business Count 2023	Employee Count 2023	Average Business Size 2023	2018-2023 Employee Count
Hastings District *	1	526	526	123
Kawerau District **	1	455	455	- 253
South Waikato District ***	1	403	403	- 25
Whakatane District ##	1	165	165	- 38
Ruapehu District****	1	123	123	- 38
Sub-Total Major Producers	5	1,671	334	- 231
Auckland #	6	226	38	123
Christchurch City	5	76	15	72
Other	10	27	3	27
Sub-Total Minor Producers	21	329	16	284
Total Industry	26	2,000	77	53

Pulp, Paper and Paperboard Manufacturing (ANZSIC C151000) includes the following primary activities: paper, newsprint, paperboard, paper pulp and wood pulp manufacturing.

** Pan Pac. ** Tasman (Ojifs). *** Kinleith (Ojifs). **** Karioi (WPI). # Includes Ojifs's Penrose paper recycling mill. ## WML Paperboard*

Source: StatisticsNZ Business Demography Dataset

Between 2018 and 2023, there has been a minor increase in total employment across the industry (53 additional employees). However, the major producers experienced a decrease in employment while the minor producers experienced an increase in employment. Of the major producers, only the PanPac mill in Hastings District increased employment over that period. The other major producers decreased employment by between 38-253 jobs. Although unable to be confirmed, some of those job losses are expected to be the result of increased efficiency/automation in the major mills while others may relate to economic stresses including global competition.

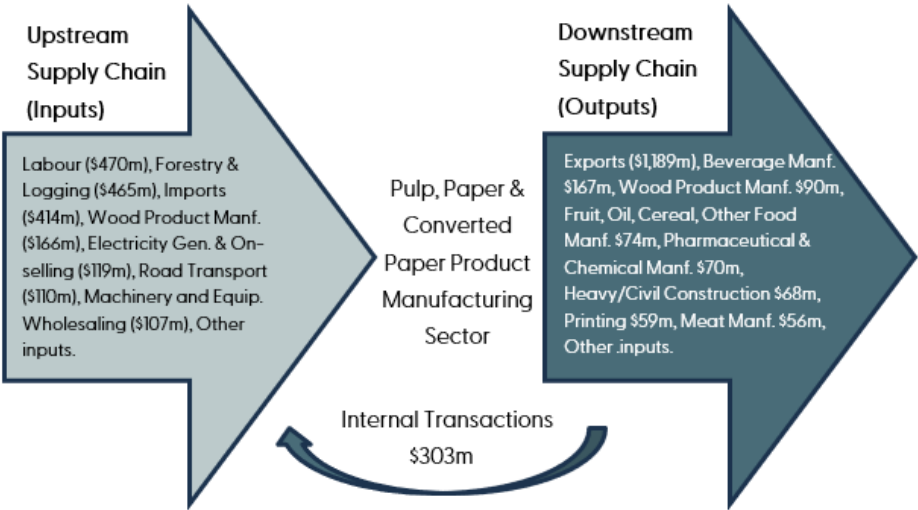
The five major producers in the Pulp and Paper Manufacturing industry are all based in the North Island. It is not a coincidence that 75% of New Zealand’s *Pinus radiata* forestry estate is also in the North Island.⁴ The importance of proximity to forestry for pulpmills is discussed further below. The three main players in pulp fibre production (WPI, OjiFS and PanPac located in Ruapehu District, Kawerau and South Waikato districts, and Hastings District respectively) combined had total employment of just over 1,500 workers (75% of the total Pulp and Paper Manufacturing industry).⁵ The combined gross output of just the WPI operations, Kinleith Mill and Pan Pac Mill was circa \$960 million (2023/2024).⁶

According the StatisticsNZ National Accounts (year ending March 2020), the total Pulp, Paper and Converted Paper Product Manufacturing sector produced \$1.6 billion worth of pulp, paper and paperboard, \$1.3 billion worth of other paperboard products, and \$230 million worth of wood.⁷

2.3 Sectoral Relationships

Figure 2.1 provides an overview of the key purchase and sale patterns of the total Pulp, Paper & Converted Paper Product Manufacturing sector in New Zealand based on the StatisticsNZ National Accounts Inter-Industry Transaction Table (YE March 2020).⁸

Figure 2.1 – Key Upstream and Downstream Supply Chains YE March 2020 – Total New Zealand Sector



⁴ Source: National Exotic Forestry Description 2022.
⁵ Excludes the Tangiwhai Sawmill employment.
⁶ Government Briefing Paper, 28 August 2024, prepared by OjiFS, Pan Pac and WPI.
⁷ Basic prices.
⁸ Noting this is broader than just the Pulpmill industry.

When looking at the downstream supply chain (i.e. who the sector sells to), 58% of the outputs were purchased by a wide range of New Zealand-based sectors. These are related to demand for product packaging, construction, food and beverage services, printing, and more. Many of New Zealand's key export sectors are highly dependent on the outputs of the Pulp, Paper and Converted Paper Products Manufacturing sector.

Approximately \$303 million of total sector output is purchased by the sector itself – this reflects (mainly) the pulpmills selling pulp to the paper product mills (with both captured in the same sector). A significant 36% of annual output from the sector was sold directly overseas as exports. In the year ending March 2020, the export value was \$1.19 billion – the 17th highest export sector by value (out of 109 sectors).

The upstream supply chain (inputs to production) includes \$470 million paid in wages and salaries across New Zealand, followed by \$465 million purchased directly from the Forestry and Logging sector, and a further \$166 million purchased from the Wood Product Manufacturing sector (includes sawmilling and wood chipping). A further \$119 million was purchased from the Electricity Generation and On-selling sector (the 5th highest cost for the industry as a whole in 2020, and at that time, making up an average of 4.4% of total costs on goods and services (including imports) that year).⁹ Being an average, the major producers are expect to have had a higher share of total costs being from the Electricity Generation sector and vice versa for the smaller producers. Total energy costs (including LPG) for the major players in the pulp and paper industry were estimated at around 13–20% of total production costs in 2019. This is discussed further in Section 5. Transport services and machinery are also big expenses for the sector.

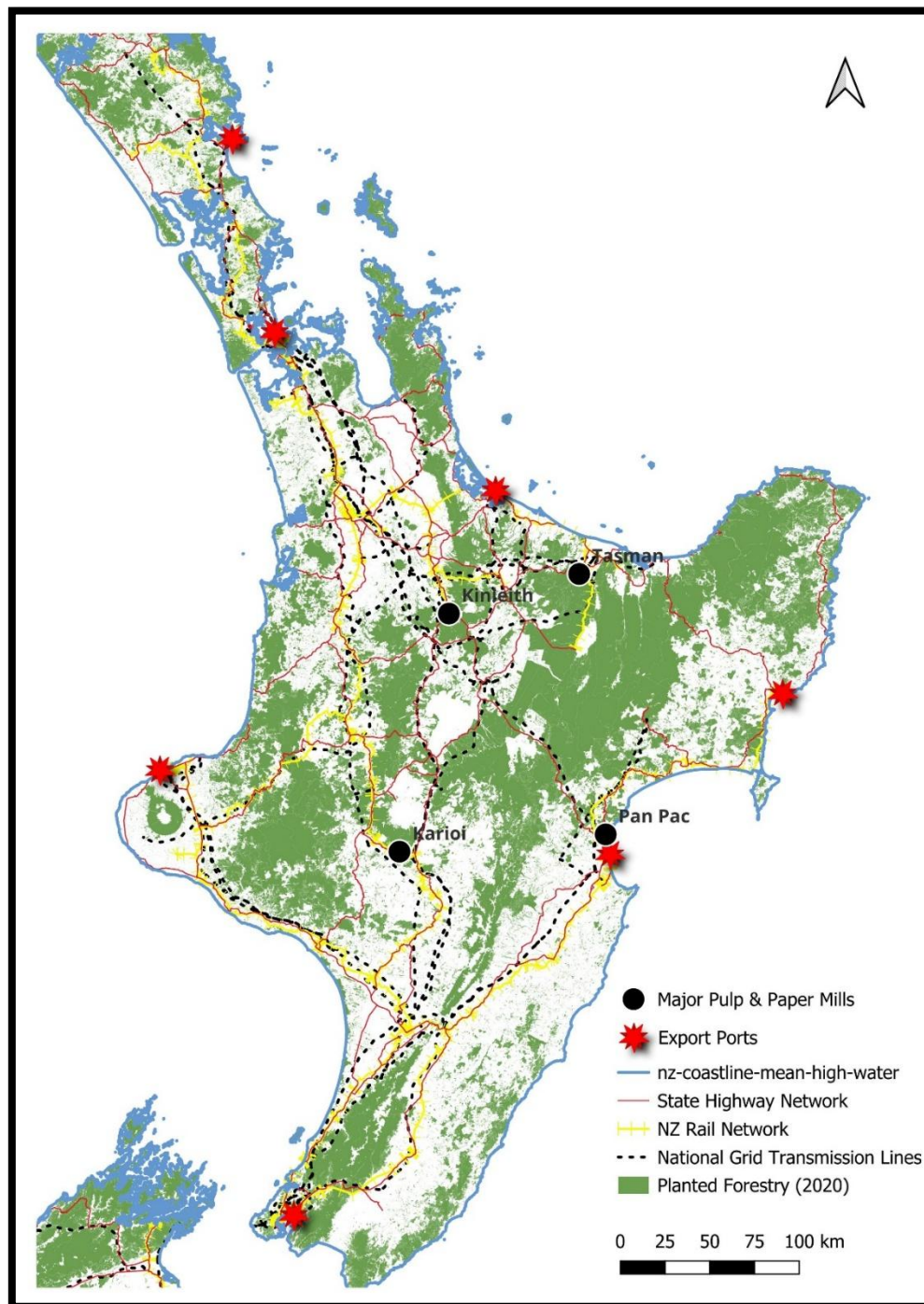
With large amounts of forestry wood and electricity needed in the production of wood pulp/fibre, and substantial volumes going to export, the location of pulpmills is strongly governed by proximity to commercial forests, National Grid infrastructure, the rail network (sidings) and export container ports. Being too far from any of these sectors would impact on the viability of the Pulpmill industry.

Figure 2.2 shows the location of the main Pulpmill players in the North Island – Karioi, Kinleith, Tasman and Pan Pac. All but the Pan Pac mill in Whirinaki are serviced by rail (Pan Pac has a location close to its export port so has a relatively short distance for truck freight). All are located on the State Highway network, and all are close to significant commercial forestry areas. Pan Pac, Tasman and Kinleith are relatively closer to a major export port (Napier and Tauranga) than the Karioi mill (which uses Napier Port), meaning that transport (rail) costs are

⁹ A further \$40m was paid to the Electricity Transmission and Distribution industry, bringing total electricity costs to 6% on average in 2020, and a further \$48m was paid to the Gas and Water Supply industry (contributing to total energy costs).

likely to make up a relatively higher share of total production costs compared to the other mills (per tonne). WPI and Pan Pac together represent around 65,000–75,000 TEU¹⁰ or roughly 35% of Napier Port’s container volumes. OjiFS’s Kinleith and Tasman mills export 600,000 tonnes through the port at Tauranga each year.

Figure 2.2 – Major Pulpmills in the North Island Including Forestry Resource and Infrastructure

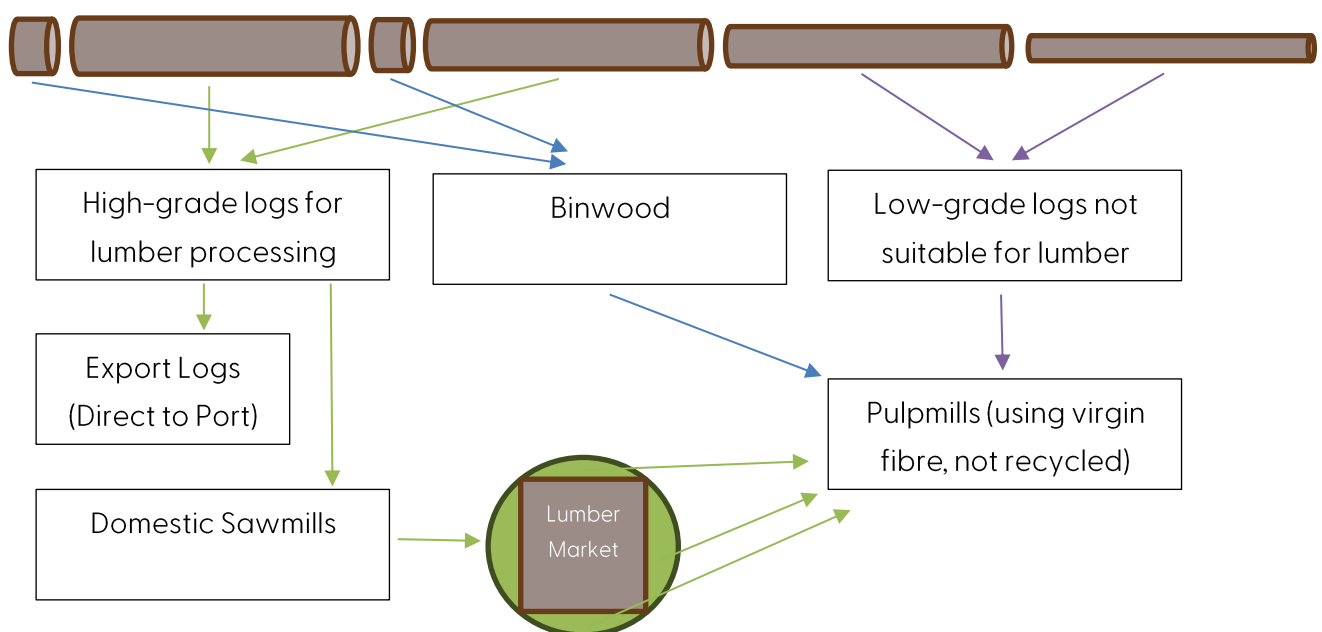


¹⁰ Twenty Foot Equivalent shipping containers.

2.3.1 Co-Location of Forests, Pulpmills and Sawmills

Pulpmills play an important role of consuming forestry products that would otherwise be wasted (in the current market at least).¹¹ By purchasing wood that is not suitable for lumber (as well as the by-product of lumber processing), the pulp industry provides critical financial support for the commercial forestry industry in New Zealand. It provides a stream of revenue from harvested trees that is needed to help make the growing and harvesting of commercial forests economically viable. This is summarised in Figure 2.3.

Figure 2.3 – Maximum Utilisation (Revenue Stream) of a Harvested Pine Tree



When pine trees are harvested, the bottom half of the tree is cut into high-grade logs – ideally cut into two logs (with the length depending on the final market). That leaves the top half of each harvested tree (low-grade log wood) needing to find a market (Figure 2.3). As freighting bulk forestry products is costly, distance to market is a critical factor. When the price of low-grade log wood is relatively low but the freight costs are still high, buyers of low-grade log wood, and binwood¹², need to be nearby – else it is uneconomic to transport. If the distance is too far, it's not cost effective, and foresters would be better off leaving it in the forest.

The location drivers of sawmills are very similar to pulp mills – with proximity to forests, state highways, rail infrastructure, national grid infrastructure (particularly if kiln drying) and ports (if

¹¹ As the wood pellet market develops in New Zealand (as an alternative and renewable fuel source of process heat), this may increase the demand for forestry waste following harvest and high grade log production.

¹² Binwood is a residue of the logging process – it includes salvageable wood from skid sites in harvested forests and includes any wastage from trimming logs to the desired export or sawmill length.

processing for export) all critical. As a third of any log is wasted in lumber processing (Figure 2.3), there is significant wastage of purchased logs if a use cannot be found for this residue. Without a market for this, sawmills would be uneconomic to operate. Pulpmills can use the wastage of sawmills if the transport costs are low. It is for this reason that pulpmills and sawmills are often co-located (and often co-owned). In 2024, 16 sawmills across the country relied on pulpmills to support their economic viability.

The forestry, sawmilling, and pulp and paper sectors are therefore inter-connected through supply chains. Pulpmills underpin the economic viability of the forestry and sawmilling sectors. The major pulpmills process millions of tonnes of logs and other fibre every year, including creating a value stream for sawmill chips and binwood (forestry offcuts) that would otherwise likely remain on the sawmill or forest floor. For example, in a typical year:¹³

- OjiFS's Kinleith site processes 1.3 million tonnes of pulp logs and over 500,000 tonnes of sawmill chip and binwood (forestry offcuts)
- Pan Pac's pulp mill processed 300,000 tonnes of pulp logs, 300,000 tonnes of sawmill chip, and 50,000 tonnes of binwood (forestry offcuts), and
- WPI's Karioi pulp mill processed 600,000 tonnes of logs and 65,000–70,000 tonnes of binwood (forestry offcuts).

¹³ Government Briefing Paper, 28 August 2024, prepared by OjiFS, Pan Pac and WPI.

3 Karioi Pulpmill and Tangiwai Sawmill Operations

3.1 Overview of Operations

The Karioi Pulpmill is located on 40.6 hectares of freehold land, adjacent to the Karioi Forest on State Highway 49 between the towns of Waiouru and Ohakune (Figure 3.1). The Pulpmill has been progressively upgraded and expanded since its original commissioning in late 1978. It produces short fibre pulp (specifically Advanced Board pulp for use in the Asian paperboard market). The mill has capacity to produce 210,000–230,000 metric tonnes of pulp fibre a year.

Apart from the main Pulpmill, Woodroom and Administration buildings, the site has several outbuildings including, a production consumables warehouse, roll shop, motor bulk store, training room, staff gym, forestry office, forestry fire station, stores building, contractor lunchroom, wastewater treatment plant (WWTP) laboratory, electrical and mechanical workshops, hydraulic workshop and a fabrication shop. The Pulpmill is designed to operate 24/7.

Like the other major players in the pulp and paper industry, the Karioi Pulpmill is co-located (by a short distance) with the Tangiwai Sawmill. Both are owned by WPI and operate synergistically. Tangiwai Sawmill is the fourth largest Sawmill in New Zealand. The Pulpmill generates 53% of the revenue of the Sawmill by taking residue (waste) from the lumber processing operations. Without that revenue, the Sawmill would not be able to generate sufficient income to be viable.¹⁴

As Ruapehu District is a long distance by rail or road to an export log port or the next nearest sawmill, the Pulpmill (which purchases bin wood and low-grade log wood) and the Sawmill (which purchases high-grade log wood) is vital to the local commercial and small scale (woodlot) forestry sector in and near the district. This is because the cost of transport to Napier Port or another more distant sawmill (i.e. Taupo is 140km away) would make harvesting those forests/woodlots uneconomic for many smaller forestry growers. Together the mills provide a local market for the harvested resource, thereby sustaining plantation forestry in the region and allowing foresters to maximise the value from their land. Only for larger commercial foresters in the area is it economic to export their high-grade logs.

¹⁴ It is for this reason that the Tangiwai Sawmill closed when the Karioi Pulpmill closed.

Figure 3.1 – Aerial View of Karioi Pulpmill and Tangiwai Sawmill

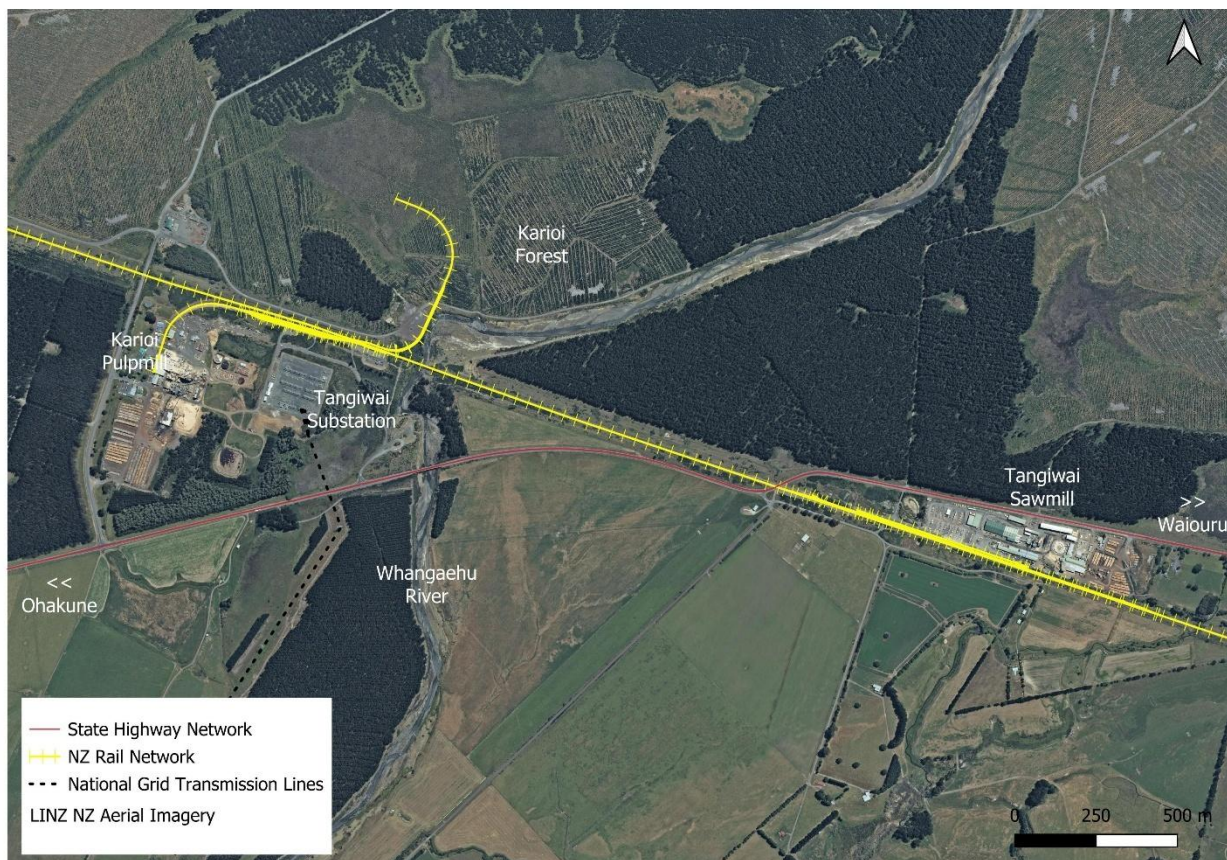
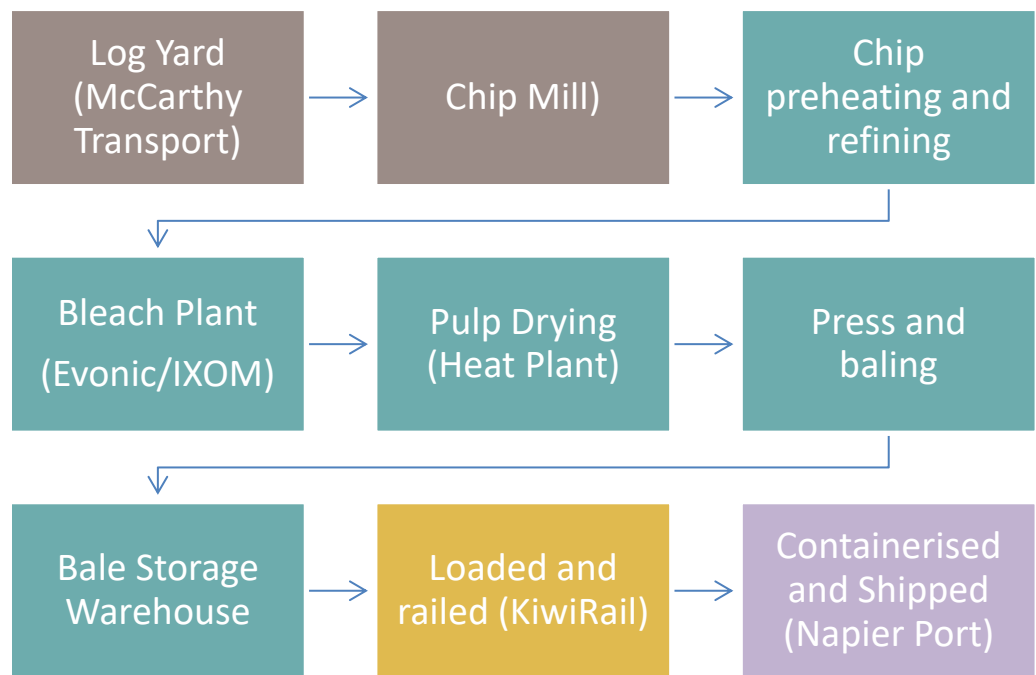


Figure 3.2 provides a very simple summary of the manufacturing process at the Karioi Pulpmill. Where relevant, external suppliers that are integral to production and contracted by WPI are identified (in brackets).

The Pulpmill includes a log yard where low-grade logs and binwood are brought from surrounding harvested forests by McCarthy Transport. McCarthy Transport is a large trucking operation not wholly dependent on WPI for its revenue. They did however invest in specialist binwood trucks as part of their contract with WPI. McCarthy Transport also bring the waste wood from the Tangiwai Sawmill to the Pulpmill.

The wood is then turned into chips. McCarthy Transport are also contracted to operate the logyard at the pulpmill site. In total, the Pulpmill & Sawmill sites sustained 15 workers from McCarthy Transport. The wood chip then enters the Pulpmill proper where it undergoes a heating and refining stage. The product moves to the bleach plant where it is treated with a number of chemicals (including hydrogen peroxide). The bleached pulp then moves through the drying process before being compressed and baled. Baled product is stored in an onsite warehouse from which it is loaded onto curtain-sider rail carriages, five days a week.

Figure 3.2 – Simple Summary of Key Steps in the Karioi Pulpmill Production Process



KiwiRail deliver the baled product (via Palmerston North) to Napier Port. WPI is responsible for one of only two scheduled trains per day on the East Coast rail line from Palmerston North to Napier, meaning that they play an important role in generating a return on KiwiRail’s investment in this part of the rail network.

In their role as a third party logistics service provider, Napier Port pack the bales of pulp fibre into containers, sort out any customs requirements, and move the containers to the port’s container terminal to await shipping.

3.1.1 Energy and Water Supply and Waste Management

The wood pulp production process is particularly energy intensive. The demands are so high, that electricity to the site is via the National Grid – with the exit point being the Tangiwai Substation adjoining the Pulpmill (Figure 3.1). WPI is one of the few direct industrial participants in the electricity market. 11KV power is distributed to the Pulpmill water intake and the Tangiwai Sawmill via overhead transmission conductors. These and some additional transformers are owned and maintained by The Lines Company.

Waste energy is recovered throughout the manufacturing process to minimise energy costs. The Pulpmill includes a bio-waste heat plant. The plant also relies on LPG to power the burners for the dryers (the site includes a 50 tonne LPG storage tank).

The Pulpmill takes water from a bore on site and from a stream 4km away (by consent). It discharges stormwater and treated wastewater via consents (the discharge to the Whangaehu River being the subject of this current consent application).

Ash waste from the site and sludge from the WWTP are blended and transported to a nearby worm farm run by MyNoke.¹⁵ There, worms reduce the volume by about 65% to create a valuable soil conditioner – vermicast – sold to garden centres and the agricultural sector.

3.1.2 Staffing

When operational, the Pulpmill runs a 5 shift, 10 person/shift roster and the Wood Room runs a 2 shift, 3 person/shift roster. A small team handles the weekday train loading and general cleaning tasks. Production trainees are in place to supplement as required. A production management team (including shift supervisors) provide oversight. Other roles within the Pulpmill include jobs at the mechanical workshop, electrical workshop, warehouse and in the planning and scheduling team. There are also area manager roles and a range of jobs for specialist engineers. The Pulpmill includes an onsite laboratory for quality management (which has a team of 5 staff).

Table 3.1 – Direct Annual Employment by Location

Location Rank	Location (District, Region, Part Region)	Direct Employment (YE June 2024)	Share of Employment
1	Ruapehu District	229	91.6%
2	Auckland	6	2.4%
3	Manawatu-Wanganui (Rest of Region) *	4	1.6%
4	Taupo District	3	1.2%
5	Western Bay of Plenty District	3	1.2%
6	Rotorua District	2	0.8%
7	Hawkes Bay (Region)	1	0.4%
8	Tauranga City	1	0.4%
9	Christchurch City	1	0.4%
Total Direct Employment (Jobs)		250	100.0%

Source: WPINZ (YE June 2024). Out of a possible 40 locations (regions) in the ELM.

* Region excluding Ruapehu District and Palmerston North City.

Table 3.1 puts the combined direct employment of the Karioi Pulpmill and Tangiwai Sawmill ‘on the ground’ by place of residence. The employment is significant. Out of a total 250 employed in the year ending June 2024, 229 or 91.6% of those lived ‘locally’ to the mills in Ruapehu District. The significance of these jobs within the district is discussed below in Section 3.2. A further 4 employees (1.6%) reside in the Rest of Manawatu-Wanganui Region (excluding

¹⁵ <https://www.mynoke.co.nz/>

Ruapehu and Palmerston North). These jobs are assumed to be based at the mills (but requiring a longer commute). The remaining 17 jobs (6.8%) are not based at the mills. They are spread between Auckland and the central North Island, with one role supported in Christchurch City (these could be considered remote workers).

WPI have supplied their total expenditure on wages and salaries for the two mills for the year ending June 2024. Dividing the wages and salaries expenditure¹⁶ by a total of 250 staff indicates an average annual income paid by the mills of \$112,700 (gross). Actual annual wages and salaries will be spread above and below this average based on staff members occupation and experience. However, to put that into perspective, the average personal income in the Ruapehu District in the year ending March 2024 was \$67,607 and the average for total New Zealand was \$78,731.

3.1.3 Upstream Supply Chain Summary

WPI directly supports a range of local and non-local goods and services providers through their operations at the Karioi Pulpmill and Tangiwai Sawmill. Key supply agreements are in place with:

- Local forestry companies/growers,
- McCarthy Transport (log yard and chip mill operations),
- Enel X (interruptible load),¹⁷
- Mercury (electricity hedges),
- The Lines Co (ancillary electricity infrastructure),
- IXOM (all chemicals apart from Peroxide),
- Evonik (Peroxide). WPI and Pan Pac are the two largest customers of Evonik, a Morrinsville-based manufacturer of hydrogen peroxide, together taking around 45% each of their product.
- Ongas (LPG supply), and

¹⁶ Excluding employer KiwiSaver contributions.

¹⁷ Enel X is a leading provider of demand response solutions, using loads in ancillary services to maintain grid stability and security. Enel X automatically reduces capacity across one hundred industrial sites (including the Karioi Pulpmill) when there is an under-frequency event on the national grid. Participating companies earn money by helping the grid manage these events. At times, WPI is asked to shut down some of the plant to help reduce demand on the National Grid.

- KiwiRail (pulp Transport).

The dollar value of these up-stream purchases is discussed further in Section 4.

3.2 Economic Role in Ruapehu District

3.2.1 Contribution to Employment

In 2023, Ruapehu District had an estimated 5,404 employees working in 1,867 businesses according to the StatisticsNZ Business Demography dataset. Including estimated working proprietors, total employment that year was approximately 6,451. Table 3.2 shows the breakdown of Ruapehu District's employee count by broad industry. It shows that employment in the district grew by 170 jobs (3%) since 2018.

Table 3.2 – Employee Count in Ruapehu District by 1 Digit ANZSIC Industry

	Employee Count 2023	Share of Total Employee Count	Growth in Employee Count 2018-2023 (n)	Growth in Employee Count 2018-2023 (%)
Agriculture, Forestry and Fishing	932	17%	71	-7%
Mining	3	0%	8	-72%
Manufacturing	369	7%	62	20%
Electricity, Gas, Water and Waste Services	37	1%	17	-31%
Construction	550	10%	164	43%
Wholesale Trade	76	1%	5	-6%
Retail Trade	481	9%	29	7%
Accommodation and Food Services	600	11%	59	-9%
Transport, Postal and Warehousing	82	2%	38	-32%
Information Media and Telecommunications	13	0%	1	-5%
Financial and Insurance Services	26	0%	4	-12%
Rental, Hiring and Real Estate Services	62	1%	0	0%
Professional, Scientific and Technical Services	153	3%	14	10%
Administrative and Support Services	97	2%	5	6%
Public Administration and Safety	715	13%	21	3%
Education and Training	513	9%	27	5%
Health Care and Social Assistance	339	6%	28	9%
Arts and Recreation Services	197	4%	6	-3%
Other Services	158	3%	28	21%
Total Industries	5,404	100%	170	3%

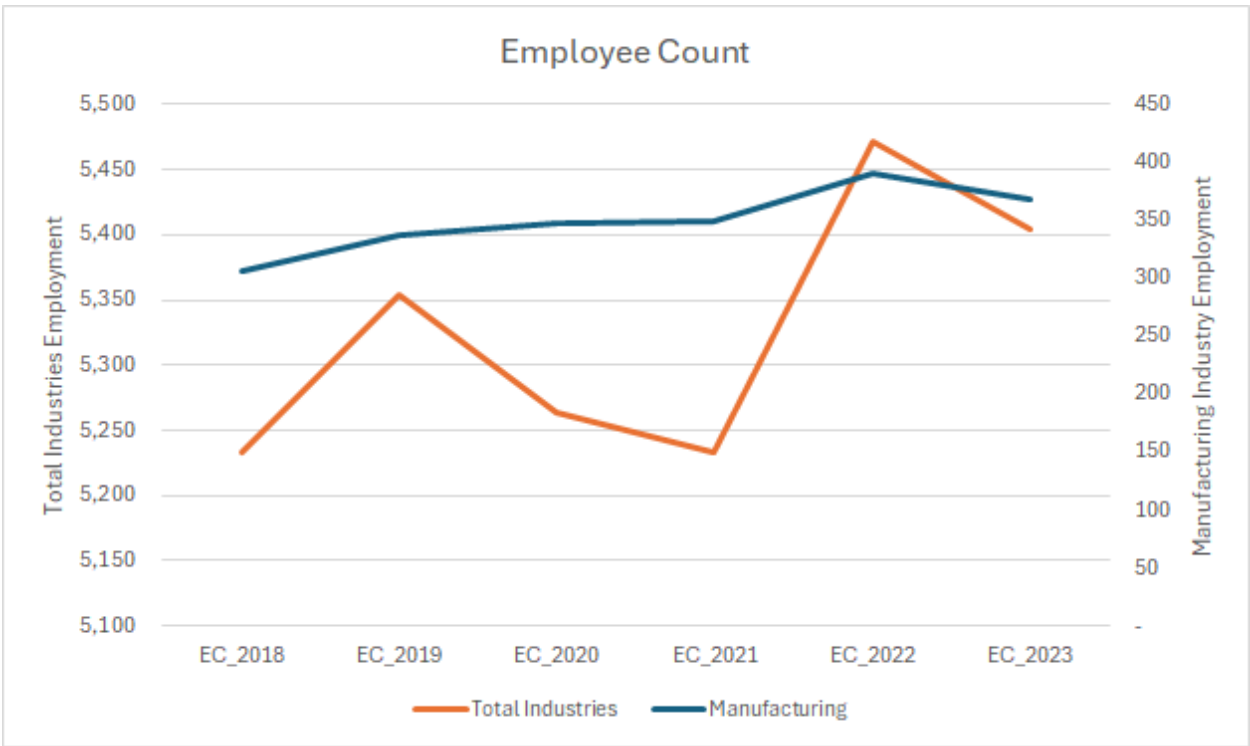
Source: Statistics NZ Business Demography Dataset.

The largest employment sector is Agriculture and Forestry (17%). This is followed by Public Administration and Safety (13%), which includes the Defence Force activity. Accommodation and Food Services, Construction, Retail, and Education are other key employment industries for the district. Manufacturing (which is the industry containing the Karioi Pulpmill and

Tangiwai Sawmill) makes up 7% of total employment in the district (369 total employed in 2023). It grew by an above average 20% since 2018 (growth of 62 additional jobs).

Figure 3.3 shows the annual trend in the employee count for the district, showing total employment over all industries combined and in just the Manufacturing Industry (separate axes). As noted above, the data is based on a snapshot of employment in February each year. In February 2020, total employment had a moderate drop, with Covid-19 causing a further decline in 2021. Employment significantly improved in 2022 (to a new peak since 2018) but had a slight decline again in 2023. Unlike the wider economy, the Manufacturing industry has been a constant and steady employer for the district.

Figure 3.3 – Ruapehu District Employment – Total vs Manufacturing Industry



As discussed above, the Karioi Pulpmill and Tangiwai Sawmill had combined employment of 250 staff in 2024.¹⁸ Assuming that this same number of people were employed in 2023, this means that WPI employed a significant 68% of those working in the Manufacturing industry in the Ruapehu District. Compared with total district employment in 2023, the combined mills accounted for 5% of all employees.

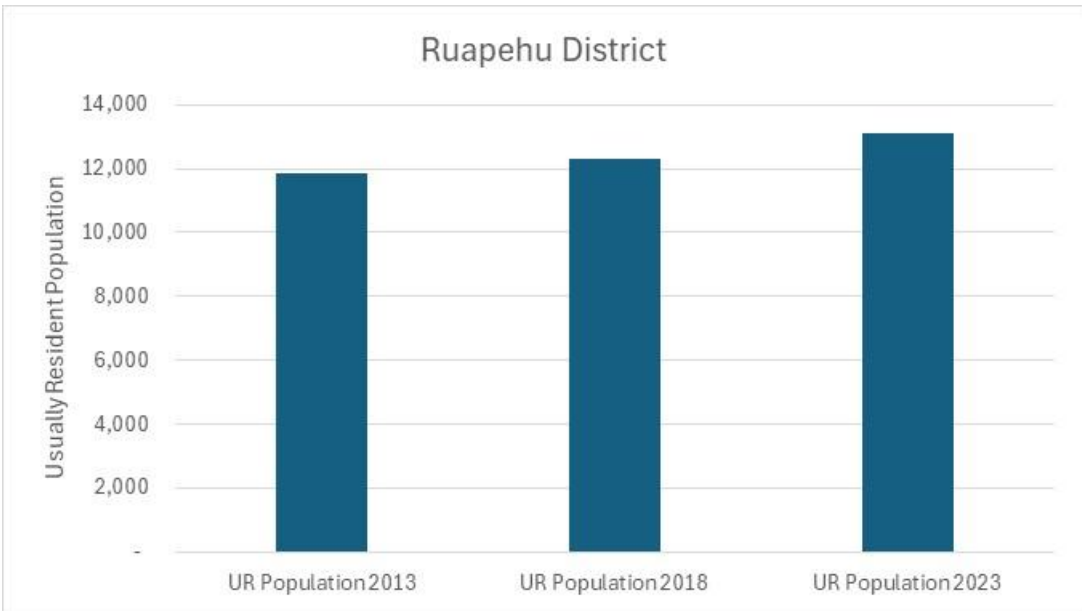
¹⁸ While 233 of the total staff of 250 is physically based at the mills, it is appropriate to use the full 250 employee count when comparing against Business Demography data. This is because the data ties employment to the address of the registered business. As such, remote workers are included in the territorial authority (or other statistics unit) of the business entity.

WPI was the second largest employer in Ruapehu District after the Defence Force. The only other large employers were the hospital, supermarkets and secondary school and these employed significantly less than WPI.

3.2.2 Socio-Economic Contribution

The total usually resident population of Ruapehu District was 13,095 at the time of the 2023 Census. This was an increase of 786 people or 6.4% since the 2018 census. This growth rate was above the average regional population growth rate (5.3%) but similar to the national average population growth rate (6.3%) based on the same Census data.

Figure 3.4 – Ruapehu District Usually Resident Population by Census Year



Of the total population in the district, 5,979 identified themselves within the Māori ethnic group. This was 45.7% of the total population (although noting that individuals completing census forms are able identify with one or more ethnic groups and are counted in each group). However, when comparing the ethnic profile of the total Manawatu-Wanganui Region (25.1% identify as Māori), the share identifying as Māori in Ruapehu District is significant.

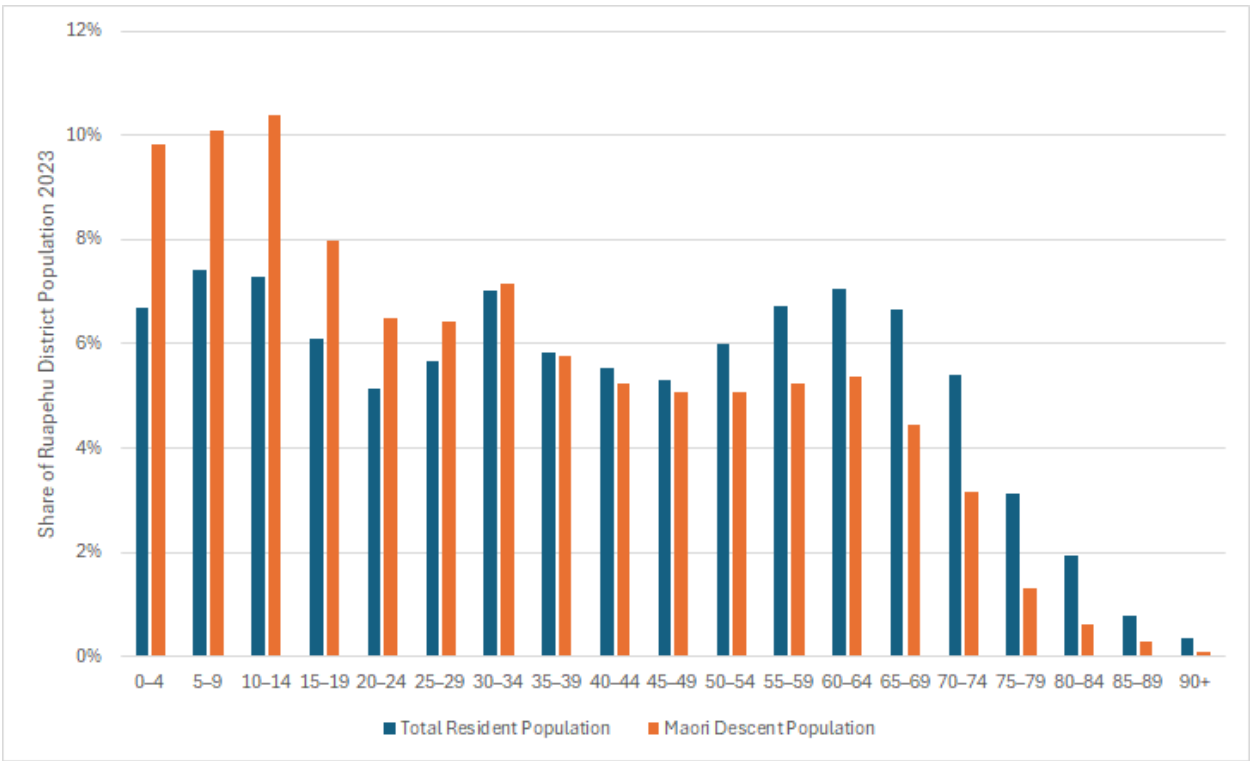
In the year ending March 2023, 8.5% of those Ruapehu District residents that identified as Māori, and that were employed, were working in the Manufacturing Industry. That was a total of 189 workers. While this data does not confirm whether those jobs are also located within Ruapehu District, and while not everyone employed in the Manufacturing Industry in Ruapehu District (discussed above) is necessarily a resident of the district, if both outcomes applied, then residents that identified as Māori would account for around half of the Manufacturing Industry workforce in the district in 2023.

While WPI are unable to provide an ethnic breakdown of their staff, based on statistical probability, it follows that a significant share of those employed by the mills are likely of Māori ethnicity.

The census also captured data on whether residents were of Māori descent. This data does not double count residents. In Ruapehu District, 47.4% of the usually resident population were known to be of Māori descent (a total of 6,204 residents).¹⁹

Figure 3.5 shows the age profile of the population at the time of the Census 2023. It compares the total population and the population with Māori descent. Ruapehu District has an above average share of its population aged 0-14 years (compared to the national average) and a below average share of its population aged 65+. These shares are 21% and 18% respectively. These relativities (against the national average) are consistent with districts that have a higher share of Māori and/or Polynesian ethnicities. That leaves the ‘working age’ population (15-65 years) at 60% of the total population in 2023 (slightly below the national average).

Figure 3.5 – Age Profile of the Ruapehu District Population and Population with Māori Descent 2023 (Percentage)



¹⁹ Based on census 2023 data, 3,471 people in New Zealand are affiliated with Ngāti Rangī, and 11.3% of them (392) live in Ruapehu District. This indicates that Ngāti Rangī account for 6% of the total population with Māori descent living in Ruapehu District at the time of the census. <https://tewhata.io/>

Figure 3.5 also compares the age profile of district residents with Māori descent. Compared to a total share of 47% of the total population, this part of the community accounts for a disproportionately high share of the population that is 0-14 years (67% of the total population in that age group) and a lower share of the population aged 65+ (26% of that age group). However, the share that is working age is consistent with the share of the population overall (and equates to 3,708 residents). This means that of the total resident population that is aged 15-64 years (working age), those with Māori descent accounted for nearly half (47%) in 2023.

This census data shows that in Ruapehu district, Māori make up a significant share of the total community and the local workforce (including the Manufacturing workforce). While the availability and security of jobs in the district is important for the social wellbeing of the total district workforce, it is also of key importance to the Māori community, particularly with a large cohort of young Māori coming through.

The role of the Karioi Pulpmill and Tangiwai Sawmill in the district's employment goes beyond just providing skilled jobs in the manufacturing industry and above average incomes. Before the mills came along, there were few employment options in the district – with most jobs either for the Railway Corporation or in farming. The establishment of the mills back in 1978 provided a significant number of new jobs opportunities for what was otherwise a low-skilled local workforce.

Those workers were trained and got to work with a range of higher-skilled workers (engineers, electricians, managers etc). Based on feedback from WPI, this opportunity and exposure meant that those first generation workers at the mills encouraged their children to pursue higher education training. Overtime, the local community has taken on more and more of the higher-skilled jobs at the mills, with many of the workers employed in 2024 the 3rd generation in their families employed at the mills. The mills have therefore had a significant intergenerational impact on the social fabric and wellbeing of Ruapehu District.²⁰

WPI has (as a good corporate citizen) facilitated the improved socio-economic status of the local community through a number of other initiatives. These have included around \$15,000 per annum in tertiary education scholarships in fields relevant to the mills. These have been provided to local secondary schools. They have also provided work experience placements and holiday jobs each year to tertiary students (with around \$60,000 of wages paid per annum to tertiary students). WPI have also provided apprenticeship opportunities to the local community.

²⁰ The significance of the mills to the local community is evident in the multitude of media articles that came out after the mills closed.

In summary, the presence of the Karioi Pulpmill and Tangiwai Sawmill supported 5% of all jobs in the district in 2023 and 68% of all manufacturing industry jobs. WPI was the second biggest employer in the district. Out of a total staff count of 250, it employs an estimated 229 residents of Ruapehu District and a small number within commuting distance outside the district. Indicatively around half of the jobs at the mills may have been for workers with Māori ethnicity or descent. The mills have made a significant contribution to the social capital of the Ruapehu District over the course of five decades of operation.

4 Economic Contribution

This section provides a summary of the annual direct expenditure of the Karioi Pulpmill and Tangiwai Sawmill in the local and wider economy for the financial year ending June 2024. As the two mills are explicable linked, it is relevant to treat them as a combined economic unit. WPI have kindly supplied detailed data of their expenditure that year (covering both mills), which has allowed for an accurate and fine-grained insight to the direct operational footprint of the mills (when fully operational).

The direct expenditure data, combined with the data on direct employment of the Karioi Pulpmill and Tangiwai Sawmill discussed in Section 3, forms the inputs to the Economic Linkages Model (ELM) relied on for this report. The ELM is based on a sub-national, multi-regional input-output (MRIO) table that allows the direct and flow-on (indirect and induced) economic contribution of the combined mills to be quantified (by sector and location across the country).

The ELM has been developed to quantify and measure the economic activity of the mills, and the flows of money and goods within the New Zealand economy at a sector and sub-national level. The ELM records the interactions and relationships between actors in the economy, including businesses, households, government, exporters, and importers. At its essence, the interactions in the model describe how each sector responds to changes in the economy, which ripple out to influence a range of other outcomes (e.g. household decisions).

The ELM measures the economy using a range of standard economic metrics, which includes gross output, GDP, value added, employment, incomes, consumption, tax, and trade. Economic contributions for this report are focussed on GDP and employment contributions sustained by that direct expenditure. Appendix 1 provides further technical information about the ELM, including the definitions for direct, indirect and induced economic impacts discussed further below.

4.1 Direct Expenditure

WPI have supplied a breakdown of the actual combined operational and capital expenditure of the Karioi Pulpmill and Tangiwai Sawmill for the year ending June 2024. Many of key suppliers of the mills have been discussed above in Section 3.1. This annual snapshot is considered representative of recent trading years, albeit that capital expenditure tends to fluctuate more than operational expenditure year on year.²¹ Data has been supplied in

²¹ It is also noted that in the YE June 2024, electricity prices were already higher than previous years.

accordance with a matrix of 109 possible sectors and 40 possible locations that make up total New Zealand. This matrix aligns with the framework of the ELM (i.e. is the format necessary to run data through the ELM).

As discussed in Section 3, the Karioi Pulpmill and Tangiwai Sawmill are (when combined) the second largest employer in Ruapehu District and are expected to still constitute a very large scale business in the context of the Manawatu-Wanganui Region economy.²² The direct annual expenditure of the mills included:

- \$195.6 million on goods and services (intermediate inputs to production) from New Zealand based businesses (excluding GST);
- just over \$10.5 million on imported goods;²³ and
- just under \$30 million in wages, salaries and KiwiSaver contributions.

Table 4.1 provides a summary of the mills' direct expenditure in New Zealand based businesses by sector. In total, the mills' direct expenditure is spread across 54 of the possible 109 sectors that make up the New Zealand economy (according to the level of detail contained in the ELM). They are therefore supporting a diverse range of businesses. The top 12 sectors receiving expenditure from the mills are listed, with the remaining sectors combined. The top 12 sectors account for 94% of the total annual expenditure.

The industry accounting for the greatest direct expenditure (cost) is, unsurprisingly, the Forestry and Logging sector which is the source of the wood/fibre needed for paper and converted paper product manufacturing (in addition to the residual wood waste from the Sawmill).²⁴ This industry captures 30% of the mills' annual expenditure (nearly \$60 million).

²² Not measured in the scope of this report.

²³ It is noted that imports represent a loss of expenditure from the New Zealand economy (leakage) and so are disregarded from economic impact modelling and are not discussed further here.

²⁴ As this section considers the direct expenditure of the mills combined, transactions between the two entities are excluded.

Table 4.1 – Direct Annual Expenditure on NZ Goods and Services by Industry (\$m, Excluding GST)

Industry Rank	Industry Name	Expenditure Excluding GST (YE June 2024)	Share of Expenditure
1	Forestry and logging	\$ 59.2	30%
2	Electricity generation and on-selling	\$ 39.0	20%
3	Basic chemical and basic polymer manufacturing	\$ 21.7	11%
4	Water transport	\$ 16.1	8%
5	Road transport	\$ 10.4	5%
6	Rail transport	\$ 10.4	5%
7	Heavy and civil engineering construction	\$ 9.0	5%
8	Health and general insurance	\$ 4.2	2%
9	Electricity transmission and distribution	\$ 3.9	2%
10	Transport support services	\$ 3.4	2%
11	Auxiliary finance and insurance services	\$ 3.3	2%
12	Basic material wholesaling	\$ 3.2	2%
13-54	All Other Industries Combined	\$ 11.8	6%
Total New Zealand Based Industries		\$ 195.6	100%

Source: WPINZ. Dollars of the day (YE June 2024). Out of a possible 109 industries in the ELM.

Electricity Generation and On-selling is the second biggest expense at 20% of the total spend on New Zealand based goods and services or \$39 million in the year ending June 2024. When expenditure with the Electricity Transmission and Distribution industry (ranked 9th) is included, total electricity costs reach just under \$43 million for the year (22% of the total). The third ranked industry by expenditure is Basic Chemical and Basic Polymer Manufacturing (the other key ingredient to the production of paper and converted paper products discussed previously). Transport industries account for a combined 19% of annual expenditure to move raw goods to the mills, operate the chipmill, and move manufactured products around New Zealand, including to the main export seaport (Napier). When Transport Support Services are included, this increases to 21% of total expenditure on New Zealand based goods and services (\$40.3 million).

Figure 4.1 shows that 98% of all expenditure on New Zealand goods and services occurs with businesses based in the North Island (at nearly \$192 million). South Island expenditure (around \$4 million) is primarily related to Electricity Generation and On-Selling (where one of the generators selling wholesale electricity to the mills is registered).

Figure 4.1 – Direct Annual Expenditure on NZ Goods and Services by North/South Island (\$m, Excluding GST)

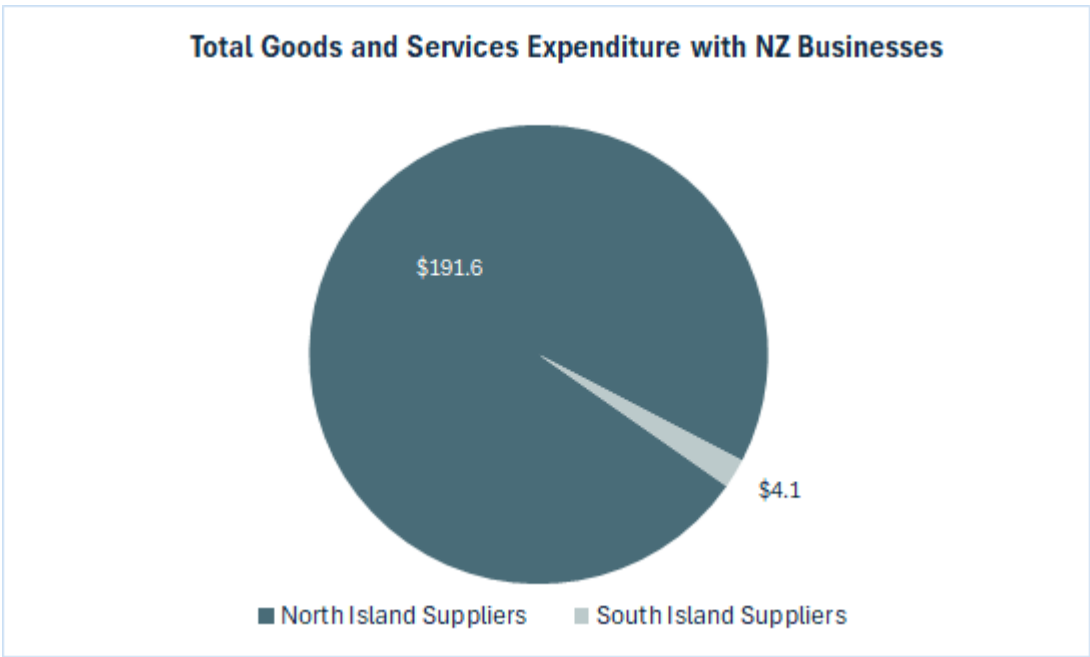


Table 4.2 shows the breakdown of direct expenditure on New Zealand goods and services by location. As noted, and explained further in Appendix 1, the locations are a combination of districts, regions or part regions (i.e. when one or more economically significant districts are able to be isolated,²⁵ the ‘rest of region’ is aggregated). In total, there are 40 possible locations across the county and the mills’ direct expenditure is spread across 25 of those.

Key metropolitan cities (particularly Auckland and Wellington) feature strongly in the expenditure profile because some large companies that operate across multiple regions are registered to addresses in those cities. Auckland based businesses capture 27% of the mills’ annual expenditure (just over \$52 million) and Wellington based businesses capture 21% (just over \$40 million). However, a significant \$50.2 million (26% of the total) is spent with businesses operating in Ruapehu District.

A further 7% of expenditure occurs in the Rest of Manawatu–Wanganui Region (excluding Palmerston North), and 2% is directed at businesses in Palmerston North. In total, 35% of the mills’ expenditure on goods and services in New Zealand occurs within the Manawatu–Wanganui Region (just under \$69 million per annum).

²⁵ Ruapehu District is not a location in the ELM and is combined with Rest of Manawatu–Wanganui Region (with Palmerston North separated and making up the remainder of the region). Ruapehu District has been isolated for the purposes of the Direct Expenditure sub-section only.

Table 4.2 – Direct Annual Expenditure on NZ Goods and Services by Location (\$m, Excluding GST)

Location Rank	Location (District, Region, Part Region)	Expenditure Excluding GST (YE June 2024)	Share of Expenditure
1	Auckland	\$ 52.5	27%
2	Ruapehu District	\$ 50.2	26%
3	Wellington City	\$ 40.1	21%
4	Manawatu-Wanganui (Rest of Region) *	\$ 13.8	7%
5	Rest of Waikato (Rest of Region) **	\$ 10.9	6%
6	Hawkes Bay (Region)	\$ 9.3	5%
7	Palmerston North City	\$ 4.8	2%
8	South Canterbury	\$ 3.6	2%
9	Taupo District	\$ 2.6	1%
10	Wairarapa	\$ 2.3	1%
11	Rotorua District	\$ 1.2	1%
12	Tauranga City	\$ 1.1	1%
13-25	All Other Locations Combined	\$ 3.3	2%
Total New Zealand Based Expenditure on Goods and Services		\$ 195.6	100%

Source: WPINZ. Dollars of the day (YE June 2024). Out of a possible 40 locations (regions) in the ELM.

* Region excluding Ruapehu District and Palmerston North City.

** Region excluding Hamilton City, Waikato District, Waipa District, Matamata-Piako District, Taupo District.

The supply of forestry products largely (but not entirely) explains why Hawke's Bay, Taupo, and Wairarapa are in the top 12 locations of the mill's expenditure. Goods and services provided to the mills from Tauranga City are varied, but include Heavy and Civil Construction Services, some Fabricated Metal Manufacturing and Water Transport services. In total, the mills' direct expenditure is widespread across (mostly) the North Island. The top 12 locations account for 98% of the total, although the top three locations account for 73% of total spend.

4.2 Total Economic Contribution

The combined direct expenditure that is generated by the Karioi Pulpmill and Tangiwai Sawmill, including wages and salaries paid directly to 250 workers, flows through upstream supply chains, which results in additional economic activity (gross output) in supporting sectors,²⁶ and additional employment. These are the indirect and induced impacts of the mills.

Direct expenditure discussed above must be deflated to match the base year of the ELM (year ending June 2023) before the direct, indirect and induced impacts can be calculated. This is done using the Producers Price Index at a sector level. The resulting economic impacts are

²⁶ And the supporting sectors of those sectors etc.

expressed in year ending June 2023 dollars and employment equivalents.²⁷ The results are not re-inflated in accordance with best practice. Appendix 1 sets out the full detail of key steps applied in the ELM.

Table 4.4 summarises the total direct, indirect and induced annual GDP and employment economic impacts sustained throughout the New Zealand economy by the mills. For clarity, the ELM is unable to distinguish Ruapehu District due to its overall small economic output, and it is grouped with the 'Rest of Manawatu-Wanganui Region' for the purposes of Table 4.4.

The mills directly contributed an estimated \$₂₀₂₃40 million in GDP in its last full financial year of trading which, while recorded as being in the Rest of Manawatu-Wanganui Region, is attributed to the Ruapehu District on account of the location of the mills. As discussed above, the mills also directly sustained 250 jobs in the wider economy (but mainly in the Ruapehu District).

Table 4.3 – Direct, Indirect and Induced GDP and Employment Impacts by Location (\$m)

	Direct	Indirect	Induced	Total Impact
Gross Domestic Product (GDP) \$₂₀₂₃ millions				
Palmerston North City	\$ -	\$ 5	\$ 4	\$ 9
Rest of Manawatu-Wanganui Region	\$ 40	\$ 35	\$ 8	\$ 83
Total Manawatu-Wanganui Region	\$ 40	\$ 40	\$ 12	\$ 92
Rest of North Island	\$ -	\$ 108	\$ 57	\$ 165
South Island	\$ -	\$ 11	\$ 11	\$ 22
Total New Zealand	\$ 40	\$ 159	\$ 80	\$ 279
Total Employment (Jobs) 2023 Equivalents				
Palmerston North City	-	38	33	71
Rest of Manawatu-Wanganui Region	233	205	74	512
Total Manawatu-Wanganui Region	233	243	108	583
Rest of North Island	16	731	407	1,155
South Island	1	59	85	145
Total New Zealand	250	1,033	600	1,883

Source: WPINZ, Savvy, Formative.

The indirect economic impacts reflect the sum of GDP and employment sustained across all businesses that helped meet the demand generated by the mills' expenditure – as that demand flowed through upstream supply chains. These include the suppliers like McCarthy's Transport, Evonic and IXOM, KiwiRail, Napier Port etc discussed in Section 3. In total, the mills indirectly contributed to \$₂₀₂₃159 million in GDP across a broad range of sectors and sustained a further 1,033 annual jobs in the economy (Table 4.4). The wages, salaries and dividends paid out to those 1,033 indirectly sustained jobs, and the 250 directly employed staff, stimulated an additional \$80 million in GDP (and a further 600 annual jobs) through household spending in

²⁷ Employment equates to employment year equivalents.

the economy (also known as the induced effect, Table 4.4). This too is across a broad range of sectors and locations (with households spending locally and throughout New Zealand when they shop and travel domestically).

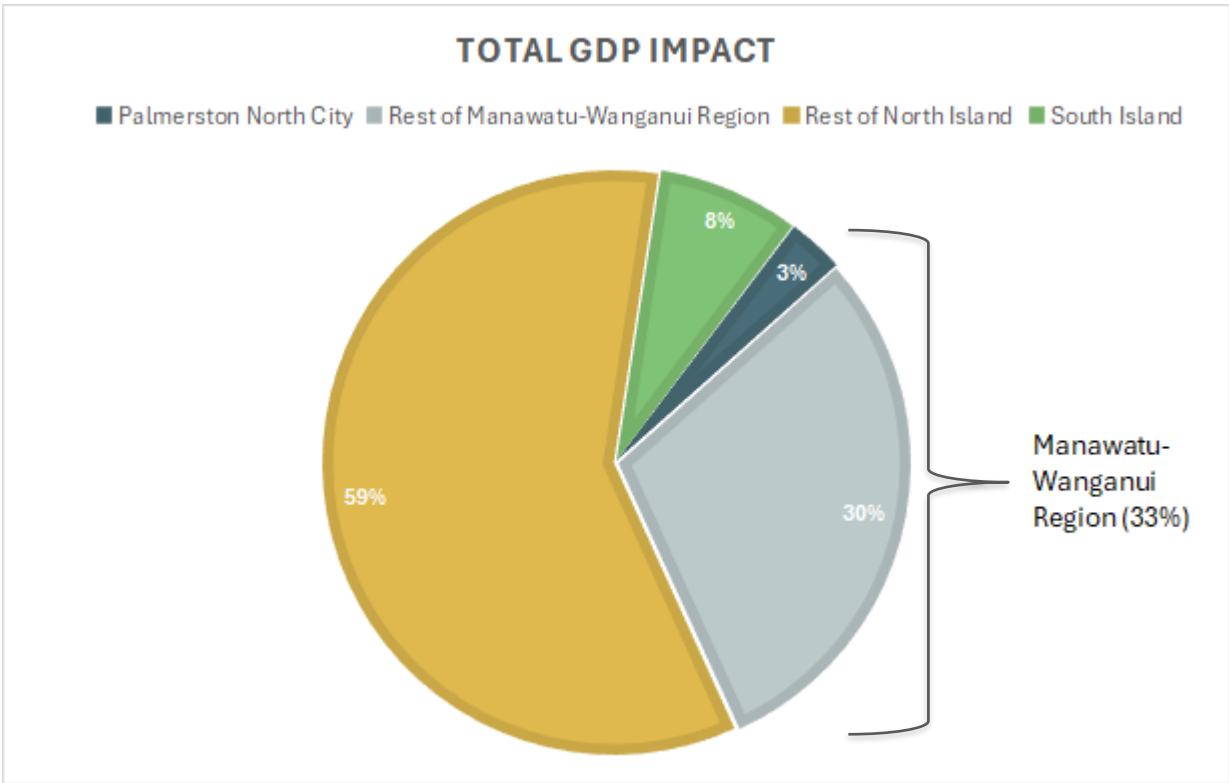
When direct, indirect and induced economic impacts are combined, the mills’ annual contribution to GDP and employment in New Zealand totals an estimated \$₂₀₂₃279 million and 1,883 jobs. Figures 4.2 and 4.3 show that in total, only a minor amount of GDP sustained by the mills accrues to Palmerston North City (\$₂₀₂₃9 million or 3% of the total), but a substantial share (30% or \$₂₀₂₃83 million) accrues to the Rest of Manawatu-Wanganui Region (and namely the Ruapehu District in so far as direct and induced GDP is concerned). Combined, 33% of total GDP (\$₂₀₂₃92 million) and 31% of total employment (583 jobs) sustained by the mills occurs in the Manawatu-Wanganui Region.

Figure 4.2 – Direct, Indirect and Induced GDP Impacts by Location (\$m)



The largest economic contribution sustained by the mills accrues to the Rest of North Island. This area accounts for 59% of total GDP (\$₂₀₂₃165 million) and 61% of total employment (1,155 jobs). The South Island economy is also impacted by the mills, with 8% of the total GDP and employment contribution of the mills once indirect and induced effects are accounted for.

Figure 4.3 – Share of Total GDP Economic Impact by Location



A total GDP impact of \$₂₀₂₃279 million for the combined Karioi Pulpmill and Tangiwai Sawmill is broadly consistent with similar research that was carried out on the economic impact of the larger Pan Pac mill in Hastings District. That study (by Berl) estimated a total GDP impact of \$541 million in 2020.²⁸

To put the WPI mills’ total economic impact in context (including close to \$80 million in GDP likely to be concentrated in the Ruapehu District), the total GDP of the Ruapehu District in 2023 was \$897 million²⁹ and the total GDP of the Manawatu-Wanganui Region in 2023 was \$15.29 billion. This suggests that the mills supported around 9% of Ruapehu District’s annual GDP and 1.8% of regional GDP.

²⁸ As quoted on Pan Pac’s Website <https://www.panpac.co.nz/about/> - actual report is not a public document. Pan Pac’s operations at that site are much larger than WPI’s (with the study recording 833 full time equivalent staff, compared to 250 at the Ruapehu mills).

²⁹ Source: Infometrics Regional Economic Profile – Ruapehu District 2024 [Regional Economic Profile | Ruapehu District | Economic growth](#)

5 Electricity Prices

5.1 Energy Supply to the Mills

Pulp and paper processing is very energy intensive. Though energy is used throughout the process of manufacturing pulp and paper, some operations can be self-sufficient for thermal (heat) and electrical energy. These are mainly the chemical pulp mills, where one of the by-products of circular manufacturing and the recovery of chemicals, is abundant energy. Other facilities are however less self-sufficient, but still energy intensive. This is the case for the WPI Pulpmill, which uses energy to produce a 'mechanical' pulp and has limited thermal and even less electrical energy outputs.³⁰

Facilities like the Karioi Pulpmill are essentially stand-alone energy-sinks and are far more vulnerable to energy price rises than other pulp and paper mills. Couple that with the vulnerabilities created from selling into global commodity markets where 'the price is the price', there is also no opportunity to pass on higher energy costs to customers.

According to WPI, tens of millions of dollars' worth of capital expenditure has been invested over the years to improve production and energy efficiency at the Pulpmill. "The team's hard work has seen us significantly improve production capacity, while at the same time reducing our energy use by 20-30% for every tonne produced" (Mike Ryan, CEO of WPI). This is typical of all the major players as consumption of electricity by the total Wood, Pulp, Paper and Printing sector had been decreasing steadily according to data collected by the Ministry of Business, Innovation and Employment (MBIE), including a 28.3% reduction between 2022 and 2023.³¹

Despite that, the Karioi Pulpmill (and to a much lesser extent the Tangiwai Sawmill) is still a big consumer of whole electricity. As noted, this has required a direct connection to the National Grid (via the Tangiwai Substation). For the YE June 2024, WPI's energy costs are broken down in Table 5.1. The \$3.9 million spent on Electricity Transmission and Distribution is the lines charge per annum and is effectively a fixed cost. This accounts for 9% of total energy costs.

LPG is purchased at wholesale rates and based on the quantum required (and the lower costs per MWh), this makes up a negligible share of total energy costs. The biggest component is the wholesale electricity purchased from the Electricity Generation and On-selling Sector. At

³⁰ <https://industryedge.com.au/how-is-nzs-energy-crisis-impacting-the-pulp-paper-and-packaging-industry/>

³¹ Source: MBIE, Annual electricity generation and consumption by industry (GWh). Consumption based on actual sales.

\$39 million in the YE June 2024, this variable cost accounted for 91% of WPI’s total annual energy costs.

Table 5.1 – WPI Energy Costs YE June 2024 by Sector

Sector	Cost Type	Total Spend in Financial Year (\$m) Excluding GST	Share Total Energy Costs
Electricity transmission and distribution	Fixed	\$ 3.9	9%
Electricity generation and on-selling	Variable	\$ 39.0	91%
Gas supply	Variable	\$ 0.1	0.3%
Total Energy Costs		\$ 43.0	100%

Source: WPI (YE June 2024)

WPI purchase their electricity from the wholesale electricity market. The company has always had a historic policy of maintaining a high level of energy price hedging. The hedge market provides transparent and robust forward (future) price signals and enables participants in that market to help manage the risk of increases and volatility in wholesale electricity spot prices.³² WPI were 50% hedged against price volatility in late 2024, meaning that 50% of electricity consumption was exposed to the whole spot prices and 50% was negotiated at lower rate, but still changing over time depending on the nature of the contracts entered.

5.2 Recent Trends in Electricity Wholesale Prices

The key then is the wholesale electricity prices as this impacts WPI directly and indirectly through their market futures (hedging) contracts. Figure 5.1 shows annual average whole electricity prices paid by the Wood, Pulp, Paper and Printing Sector since 1998 through to March 2024. Between 1998 and 2017, the price per Mega Watt Hour (MWh) has hovered around \$80. WPI have stated that at this price point and below, operating the Pulpmill is economical, but above this price, it becomes increasingly difficult for WPI to absorb the additional costs. Figure 5.1 shows a steady trend in rising wholesale prices since 2017 to reach an annual average of \$192/MWh in the year ending March 2024.

Figure 5.2 shows a more detailed picture of wholesale electricity prices from the 1st of March 2024 onwards (i.e. from where data in Figure 5.1 ends).³³ This graph shows daily volatility. Between March and the beginning of August 2024, the price per MWh had steadily increased from \$200 (approximately) to close to \$450 (an increase of \$250/MWh or 125% in just five months). What happened next was exceptional. The wholesale price spiked to over \$800/MWh, with these exceptionally high prices sustained for a portion of August. When

³² [Hedge market | Electricity Authority](#)

³³ Source: Electricity Authority.

averaged over the whole of August, the cost was around \$500/MWh – still well above the price for which it is economic to operate the Pulpmill.

Figure 5.1 – Annual Average Wholesale Energy Prices (Actual Sales YE March), Wood, Pulp, Paper and Printing Sector

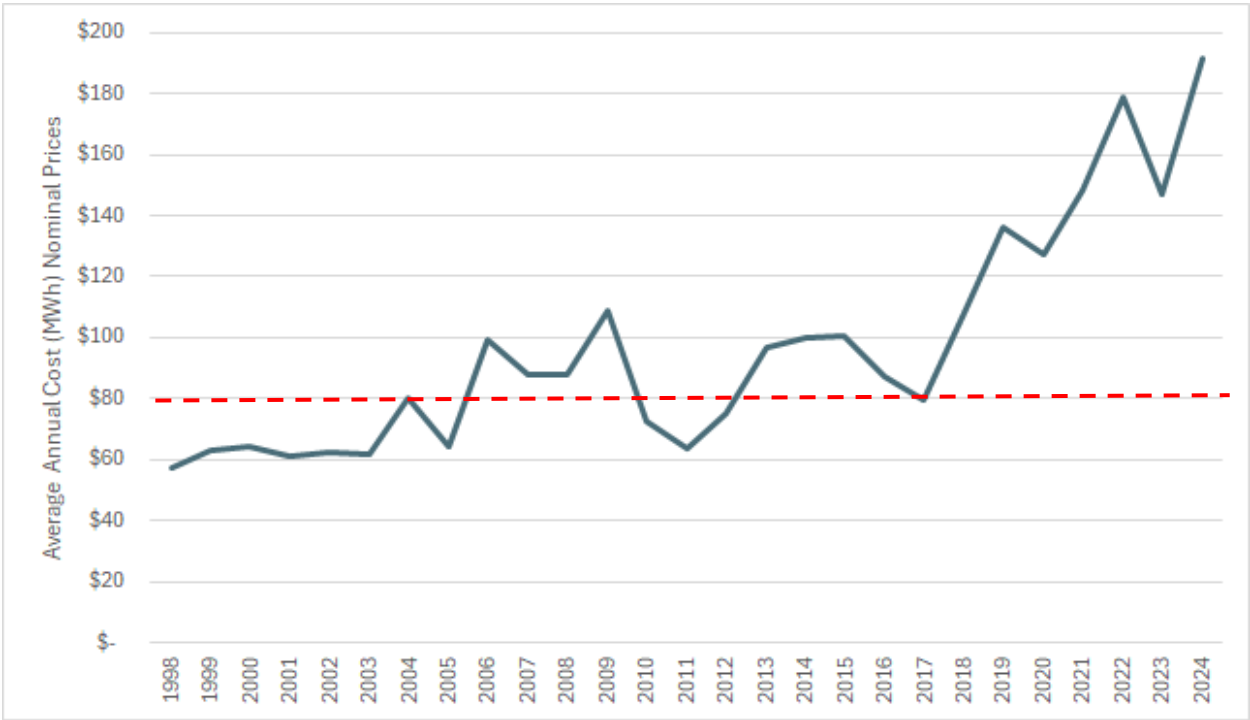


Figure 5.2 – Wholesale Electricity Prices (as Measured at the Tangiwai Substation) Since 1st March 2024 (\$/MWh)

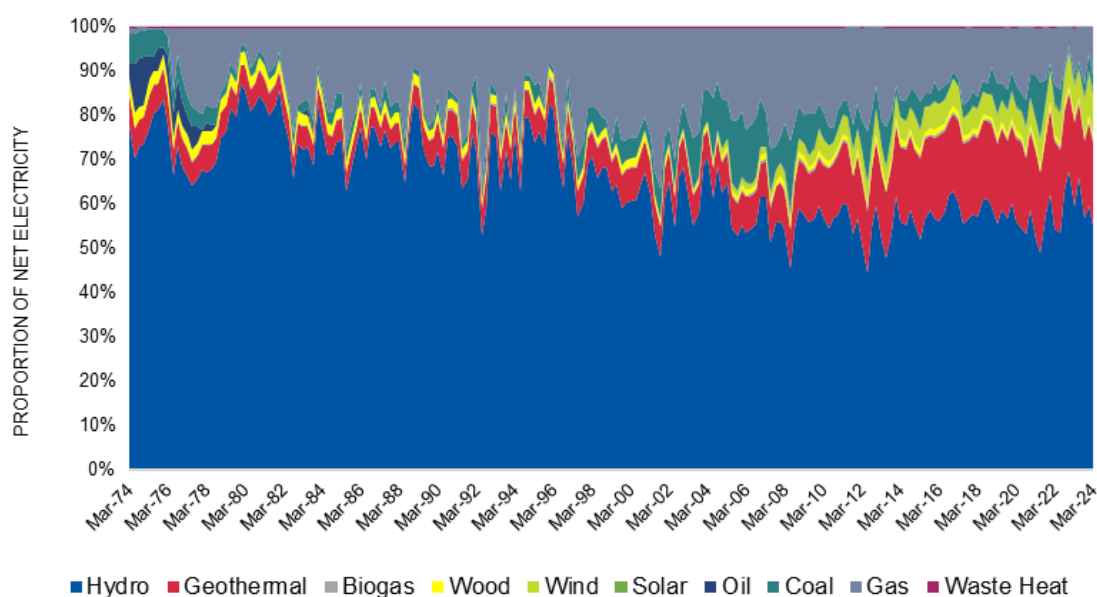


The acute spike in wholesale energy prices in August 2024 was caused by low lake levels at South Island hydro dams. Hydro generation (measured in GWh) was 16.6% down in September 2024 compared to September 2023.

While the energy sector has diversified (particularly since the droughts of 2008), the continued reliance on hydro has left the whole market vulnerable (Figure 5.3). Despite the drought

leading up to August 2024, hydro generation still contributed more than 55% of New Zealand's electricity in the March quarter. To balance supply when renewable electricity generation drops off for various reasons (droughts, for instance), a shift to gas would be one way to moderate price peaks and help replace capacity according to IndustryEdge. That can no longer occur in New Zealand because it does not have sufficient gas (the gas contribution to electricity production decreased significantly since 2008 while renewable sources grew) and its fields are reportedly expected to halve again over the next few years.³⁴

Figure 5.3 – New Zealand Electricity Production by Type: March Quarter 1974–2024



As the South Island hydro lake levels recovered in late August, the wholesale prices dropped (Figure 5.2). However, according to a range of market commentators, the general trend in rising wholesale electricity prices in New Zealand (Figure 5.1) has been driven by a combination of reliance on hydro power, low natural gas supply, insufficient supply-side investment over the preceding years, and rising electricity demand. These issues were significantly exacerbated by the government's anti-investment policy settings (that significantly undermined investment in fuel supply) and market failure (potential issues with barriers to entry and electricity market structure incentives slowing delivery of consented new generation build).³⁵

These factors have converged to create an extraordinary and sustained energy price situation that is putting immense pressure on New Zealand's industrial sector.

³⁴ Ibid.

³⁵ Source: [How is NZ's energy crisis impacting the pulp, paper and packaging industry? - IndustryEdge](#)

The Government has moved with urgency to address the long-term drivers of the problem, including unwinding a suite of anti-investment policy setting, enabling gas imports, and investigating regulatory settings. However, the main players of the pulpmill industry consider that these solutions will take 2-4 years to normalise energy costs.³⁶

5.3 Implications for the Mills

While the acute spike in prices was over by September 2024, and low prices prevailed until December (now rising again), the spike in prices was the final tipping point for WPI after a prolonged period of exposure to rising wholesale electricity costs. As a trade-exposed sector, WPI could not increase export prices (to recover the additional energy costs) and remain competitive in the global market. Across the main pulpmill players, energy costs as a percentage of the cost of goods sold increased from 13-20% in 2019 to well over 30%³⁷.

In the absence of any short-term 'bridging' solutions for industry offered by central government (which were requested), the Karioi Pulpmill and Tangiwai Sawmill was forced to close.

Even with hedging (with suppliers carefully monitoring wholesale energy prices that are updated every 30 minutes to try and purchase bulk volumes of electricity during any dips in price), the steady increase in the wholesale spot prices means that hedging prices also rise over time. Since 2021 hedging products for gas and electricity have risen considerably in price to reflect the new expected averages, meaning they only serve to lock in uncommercial energy costs. WPI have stated that as these arrangements have come up for renewal, the cost of replacing them has been unaffordable.

³⁶ Government Briefing Paper, 28 August 2024, prepared by OjiFS, Pan Pac and WPI.

³⁷ <https://www.nzherald.co.nz/whanganui-chronicle/news/operations-paused-at-ruapehus-karioi-pulpmill-and-tangiwai-sawmill-as-energy-costs-bite/5HN24F6VPNFPJHCT43EC3JQWMY/>

6 Conclusions

6.1 Significant Socio-Economic Contribution

The Karioi Pulpmill's demand for fibre underpinned the economic viability of commercial and farm scale forestry in the surrounding area by providing a revenue stream for low-grade logs and binwood to help offset harvest and other forestry costs. It also underpinned the economic viability of the Tangiwai Sawmill by providing a revenue stream for the lumber processing residues. The dependencies between the Pulpmill and Sawmill makes them effectively a single economic entity.

The mills were, individually and in combination, significant employers in the Ruapehu District and directly sustained significant economic activity locally, regionally and at the national level. A broad range of businesses – local and non-local – supplied goods and services to the mills. They in turn demanded goods and services from their suppliers (to meet WPI's demand) and so forth up the supply chain. Those flows of economic activity sustained employment, as did the spending by those wage and salary earners that was attributable to WPI's direct expenditure. In total, the mills directly contributed \$40 million in GDP in the Ruapehu District, increasing to \$92 million in the Manawatu-Wanganui Region and \$279 million across total New Zealand when direct, indirect and induced economic impacts are included.

The mills played a significant social role in Ruapehu District. It provided a large number of highly-skilled and well paid jobs to the local workforce – lifting the socio-economic status of the local community (including the large Māori community) over several generations. The scale of the businesses enabled WPI to fund tertiary education scholarships to local high schools and facilitate work experience opportunities for tertiary students as well as apprenticeships.

6.2 Exceptional Electricity Prices

The Karioi Pulpmill is an energy-intensive operation that is vulnerable to the volatility of the wholesale electricity market. While trading in the electricity futures market – hedging the risks of spot price rises, wholesale electricity prices have been steadily rising (notably since 2017) which has put significant pressure on the large scale manufacturing industry.

Electricity Generation and On-selling was the mill's second biggest expense in the year ending June 2024 – accounting for 20% of the total spend on New Zealand based goods and services or \$39 million. The prolonged price rises, combined with the exceptional increases in the

wholesale electricity price in August 2024 (which saw the cost rise to nearly \$800/MWh) and the inability to recover costs from pulp customers and remain competitive in the global market meant that operations were no longer commercially feasible.

A notable consequence of the rising electricity costs at the Pulpmill leading up to its closure in September 2024 was that WPI's planned capital expenditure to improve wastewater treatment on-site became unaffordable. As further diversification and competition in the electricity generation market unfolds in the next 2-4 years, it is anticipated that sustained lower wholesale electricity prices might be possible in New Zealand. Therefore, the opportunity to invest in further wastewater treatment at the Pulpmill may be commercially feasible for a new owner of the site. The limited duration of the discharge consent sought for renewal reflects that potential outcome.

6.3 The Facilitated Economic Benefits of the Discharge Consent

The significant economic and social benefits generated by the Karioi Pulpmill and Tangiwai Pulpmill are indicative of the scale and significance of economic and social benefits that the next owner and operator of the site(s) may bring to Ruapehu District and the Manawatu-Wanganui Region. Like the WPI operations, those significant socio-economic benefits may be long-term, and inter-generational.

Selling the Pulpmill site with a five year wastewater discharge consent in place increases the chance of a new owner being able to commence the same or similar operation without delay. That in itself increases the attractiveness of the site(s) to potential buyers. Therefore, the environmental effects of the discharge to Whangaehu River should, in our view, be considered alongside the significant economic and social benefits that the consent may facilitate.

Appendix 1 – Economic Linkages Model

The Economic Linkages Model (ELM) is a proprietary model that has been developed by Formative Limited to quantify and measure the economic activity and relationships within the New Zealand economy. In summary, the ELM measures the flows of money and goods through the economy, at a sector and subnational level.

The model records the interactions and relationships between actors in the economy, including businesses, households, government, exporters, and importers. At its essence, the interactions in the model describe how each industry responds to changes in the economy, which ripples out to influence a range of other outcomes (e.g. household decisions).

The ELM measures the economy using a range of standard economic metrics, which includes gross output³⁸, GDP³⁹, value added, employment⁴⁰, incomes⁴¹, consumption⁴², tax⁴³, and trade. The model uses a subnational Input-Output Table that has been regionalised by Formative. This appendix outlines the nature of the Input-Output table, the underlying assumptions within the ELM and the key modelling steps.

Input-Output Table

Input-Output (IO) models are quantitative economic tools used to analyse the interdependencies between different sectors of an economy⁴⁴. IO models provide a detailed framework that captures how the output of one industry serves as an input for another. Essentially, they map the flow of goods and services in an economy, illustrating how changes in one sector can ripple through to affect others.⁴⁵

At the core of an IO model is the IO table, a matrix representation where each row and column correspond to an industry or sector. The entries in the table show the monetary value of transactions between sectors—how much each industry purchases from and sells to every other industry. This allows for the examination of both direct and indirect economic impacts.

³⁸ Similar to company revenue.

³⁹ There is a key difference between GDP and value added. The value added of a sector is measured net of taxes (for instance GST) and subsidies on products. In the GDP in the national accounts for New Zealand product taxes (minus subsidies) are recorded for the economy as a whole and are included as part of the value added.

⁴⁰ Formative uses the BED measure of Total Employment Count (TEC) which includes both the employee count and working proprietors.

⁴¹ Includes salaries, wages and profits.

⁴² Including household and government.

⁴³ Including income taxes, GST, government transfers and subsidies.

⁴⁴ Leontief, W. (1936). Quantitative Input and Output Relations in the Economic System of the United States. *The Review of Economic Statistics*, 18(3), 105–125

⁴⁵ Miller, R. E., & Blair, P. D. (2009). *Input-Output Analysis: Foundations and Extensions* (2nd ed.). Cambridge University Press.

For instance, an increase in demand for dairy products not only boosts production in the dairy farming industry but also increases demand in related industries like animal feed production, veterinary services, equipment manufacturing, and transportation. This interconnectedness illustrates how a change in one sector can ripple through the economy, affecting multiple industries and contributing to overall economic growth.

Furthermore, IO models can be extended to capture economic interactions across different regions through Multi-Regional Input-Output (MRIO) tables. While conventional IO models focus on the interdependencies of industries within a single region (i.e. the total country), MRIO models map the flow of goods and services between industries both within and across multiple regions. This comprehensive approach allows for the analysis of how economic activities in one region can influence and be influenced by activities in other regions, acknowledging the interconnectedness of modern economies.

In MRIO models, each region is represented with its own set of industries, and the model includes detailed data on inter-regional trade flows. This structure enables analysts to examine the intra-regional transactions (activities within a region) and the inter-regional transactions (trade between regions). For example, an increase in dairy production in one region can lead to increased demand for agricultural equipment produced in another region, illustrating how regional economies are linked through supply chains.

The primary structural difference between MRIO and single-region IO models lies in their scope and complexity. A single-region IO model focuses on the economic transactions within one region, most often a national economy, considering industries' inputs and outputs and the final demand within the national economy. Imports from sub regions typically aggregated and not detailed in terms of their origin, which can limit the analysis of inter-regional dependencies.

In contrast, an MRIO model disaggregates a national IO (NIO) model into multiple regions, each with its own industries, and explicitly models the trade flows between these regions. This results in a more complex, block matrix structure where each block represents the transactions between industries in one region with industries in the same or another region. The MRIO model's structure allows for a detailed examination of how changes in one region's economy can affect other regions, providing insights into regional spillover effects, supply chain vulnerabilities, and the distribution of economic impacts across different areas.

While an IO model has been developed and released by Statistics New Zealand which captures the structure of the national economy as of March 2020, there is no official MRIO table for New Zealand.

Therefore, a Subnational Input-Output Table (SIOT) has been developed by Formative to provide detail on the economic linkages between sectors and geographies within New Zealand. The table has been defined to include 109 industries, 7 final demand sectors (including, households, non-profit organisations and the public sector) and 40 geographies.

The 109 industries have been defined using standard industry classification (ANZSIC06), and are consistent with the industries used in the Statistics New Zealand NIO. The 40 geographies have been defined according to either territorial or regional authority boundaries, with more disaggregation provided where there is more economic activity (e.g. upper North Island) and aggregation where there is less economic activity (e.g. West Coast of the South Island).

The SIOT has a base year of 2023. All transactions in the table are in 2023 dollars, and all economic impacts (for instance GDP, gross output, consumption, taxes) are also in 2023 dollars. The SIOT is based on a 2020 NIO table released by Statistics New Zealand which has been converted to a 2023 base year using Statistics New Zealand national account data for 2023⁴⁶

The NIO table has been regionalised using a hybrid approach. The hybrid approach of combining survey and non-survey (i.e. modelled) methods to regionalise an IO table which is considered the gold standard when an official SIOT is not available. The survey data sources used in generation of the SIOT include a range of customised datasets that Formative have purchased and developed:

Total Employment: Formative maintains a detailed database of employment, by geographies and industry (Business Employment Database – BED), which records the total employment in each of 506 ANZSIC06 industry classes and for Statistics New Zealand’s Statistical Areas, including both employees and working proprietors.⁴⁷

Electronic Card Transactions: Formative has purchased detailed electronic card transaction data from MarketView, which records the origin and destination of four retail and services spend types by the 40 geographies.⁴⁸

Subnational Economic Data: a range of information that provides valuable insight into the scale of economic activity that is located within each geography. This includes regional GDP, Gross Output and household income.

⁴⁶ This includes gross output by sector, and national subsidies, exports, imports, change in inventories, gross fixed capital formation, consumption spending (includes households, local and central government and non-profit expenditure), compensation of employees, taxes, consumption of fixed capital and operating surplus.

⁴⁷ Formative (2021) Business and Employment Database – Employment Count, Working Proprietors, Total Employment.

⁴⁸ MarketView (2021) Card transaction data – four spend types and 40 geographies for the 2019 calendar year.

The above datasets have been combined along with non-survey regionalisation techniques to allocate the national economic activity into each of the geographies. The key method used to accomplish this is the Industry-Specific Flegg's Location Quotient (SFLQ)⁴⁹. This method employs location quotients (LQ) to understand the specialisations and structure of regional economies compared to the national economy. The use of LQ's has been known to understate the amount of regional trade, however the SFLQ approach combats this by allowing for industry specific rates of cross hauling (where regions both import and export a product or service).

This approach has been shown to create accurate estimations of regional multipliers and outperform other non-survey approaches⁵⁰. The SFLQ method was supplemented by a gravity model to help inform regional flows. The SIOT has been calibrated to better match the relationships in the NIO table and has been balanced using an iterative proportional fitting procedure to ensure that the table reflects regional gross out and input. The resulting SIOT table provides a modelled estimate of the relationships within the economy. This means that the economic linkages between sector-geography combinations as of 2023 are captured in the SIOT.

The ELM uses the SIOT to estimate the potential economic activity that can be expected from changes in the economy. All economic models apply assumptions because an economy and community is too complex to replicate exactly in a mathematical system. The structure of the ELM utilises the following assumptions:

- Leontief production function, which assume linear relationships between the production and inputs. This means change in the output for an industry will translate into a proportional change in demands for inputs.
- No supply constraints, which assumes that businesses can source sufficient resources (labour, capital, land, etc) to meet new demands.
- Constant returns to scale, which means that there are no economics of scale or diminishing returns in the model.

⁴⁹ Julia Kowalewski (2015) Regionalization of National Input–Output Tables: Empirical Evidence on the Use of the FLQ Formula, *Regional Studies*, 49:2, 240–250.

⁵⁰ Anthony T. Flegg, Leonardo J. Mastronardi & Carlos A. Romero (2016) Evaluating the FLQ and AFLQ formulae for estimating regional input coefficients: empirical evidence for the province of Córdoba, Argentina, *Economic Systems Research*, 28:1, 21–37.; Zhao, X., Choi, SG. On the regionalization of input–output tables with an industry-specific location quotient. *Ann Reg Sci* 54, 901–926 (2015).

- Static prices, which assumes that prices remain at 2023 values. The model does not account for substitution effect or dynamic feedback from changes in demand and prices.

Key Modelling Steps

The first step in the ELM is to establish the direct economic activity that will be generated or influenced by the proposed policy, investment, or activity. This estimation of the direct economic activity is generally conducted using financial information or developed via a first principles understanding of how businesses or households may change their behaviour or be impacted as a result of the proposed policy, investment or activity.

The next step is to map this activity into the 109 economic sectors and 40 geographies. In most cases the direct economic activity will occur across a range of economic sectors, commonly this can be drawn from either operational or capital budgets. Similarly, in most cases the direct economic activity will accrue across multiple geographies. Therefore, the activity must be mapped to each geography to ensure that the modelling reflects likely patterns of activity.

Finally, the mapped activity is then fed into the ELM which measures the additional economic activity that can be expected to occur within the economy as a result of the new activity. In summary, other businesses and households in the community will respond to the changes in the economy.

There are three types of economic impact the ELM calculates, direct, indirect, and induced:

- Direct impacts are the initial changes in the economy due to an economic shock (often new expenditure). The direct GDP effect is calculated based on the value of the shock and the direct employment effect is the number of jobs created by the shock itself.
- Indirect impacts arise as the firms that initially change their output as a result of an economic shock (i.e. the direct effects), purchase required inputs from their supply chain. These business-to-business transaction changes are known as the indirect impacts.
- Induced impacts flow from the direct and indirect impacts which generate wages, salaries, and profits for the households. The changed household incomes will generate more spending on goods and services. This household-to-business interaction is called induced activity.

The ELM quantifies the economic activity in each geography and sector, which includes the direct, indirect, and induced activity. The associated employment impacts are calculated

assuming constant productivity – that is, each sector-geography combination produces the same amount of output per employee.