In the matter of	Resource Management Act 1991
And	
In the matter of	Application for resource consent under sections 88 and 124 of the Act, in relation to the proposed reconsenting of the discharge of contaminants into air from fumigation at the Port of Tauranga. (RM19-0663)
By	**Genera Limited**
	Applicant

STATEMENT OF EVIDENCE OF KIERAN O'NEILL MURRAY
ON BEHALF OF THE APPLICANT
17 APRIL 2023

INTRODUCTION

1.   My full name is Kieran O'Neill Murray.

Qualifications and Experience

2.   I am an economist working primarily in the fields of economic analysis of public policy, regulation, markets, and competition analysis. I have served as an economic consultant on these matters in more than 15 countries.

3.   My expertise as an economist has been acknowledged by my appointment as an expert lay member of the New Zealand High Court under the Commerce Act 1986, and my appointment by the Governor General of Papua New Guinea as an International Arbitrator for appeals from the PNG Independent Consumer and Competition Commission.

4.   I am a Managing Director of Sapere Research Group, a firm I co-founded. Sapere is one of the largest expert services firms in Australasia, employing 70 specialist advisers, and a leader in providing independent economic, forensic accounting and public policy services.

5.   Serving as an expert economist, I have testified on more than 30 occasions. I have testified before Select Committees of New Zealand's House of Representatives, the High Court, the Environment Court, the Environmental Protection Authority, the Human Rights Tribunal, the Waitangi Tribunal, the New Zealand Commerce Commission, and the Energy Regulatory Commission of the Philippines. I have provided expert evidence and reports to the Australian Federal Court, the Australian Consumer and Competition Commission, the Australian Energy Market Commission, the Australian Energy Regulator, the (former) National Electricity Code Administrator in Australia, the Energy Market Authority in Singapore, and presented to the Federal Energy Regulatory Commission of the United States.

6.   Earlier in my career I served in public policy roles, including as an economic advisor to the Rt Hon Mike Moore (subsequently Director-General of the World Trade Organisation) during his term as Leader of the Opposition; a member of the Rt Hon James Bolger Prime Ministerial Task Force on Targeting Social Assistance; an economic advisor to the New Zealand Minister of

Finance, the Hon David Caygill, and as an economist at the New Zealand Treasury Department.

7.   I have considerable experience over several decades in preparing and evaluating social cost benefit estimates, including being engaged by The Treasury to review a sample of 50 cost-benefit assessments prepared by government departments and to offer recommendations to improve future policy analysis.

Scope of Evidence

8.   I have been engaged by Genera Ltd (Genera).

9.   My evidence assesses the economic costs and benefits that could result from conditions attached to granting resource consent to fumigate exports and imports at the Port of Tauranga.

10.   I do not assess environmental or health impacts as I am not qualified to comment on those effects.

11.   I list in Appendix A the materials I have reviewed in preparing my evidence. Where I rely on specific information, I cite the relevant document in my evidence.

Code of Conduct

12.   I have read the Expert Witness Code of Conduct set out in Section 9 of the Environment Court's Practice Note 2023 and I have complied with it when preparing this evidence. Other than when I state that I am relying on the advice of another person, this evidence is within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

APPROACH

13.   I understand Genera is in the process of renewing its resource consent which allow them to fumigate export and import cargo using methyl bromide, phosphine, and ethanedinitrile (EDN) at the Port of Tauranga. The renewed consent sought by Genera would allow it to undertake the following fumigation activites:

Table 1 Fumigation activites at the Port of Tauranga

Activity – fumigation of	MB	Phosphine	EDN
Ship holds	N	Y	N
Under sheets	Y	Y	Y (export logs and timber only)
Containers	Y	Y	Y (shipping containers for export logs and timber only)

14. A Section 42A report prepared for the Bay of Plenty Regional Council proposed resource consent conditions for the Hearing Commissioners to consider. I understand that Genera contends that the conditions proposed in the Section 42A report would remove the ability to undertake fumigation at the Port of Tauranga. I understand the recommendations in the Joint Witness Statement in Relation to Planning 20th – 25th March 2023 (JWS) would address a number of Genera's concerns. However, Genera remains concerned that some proposed conditions would not be commercially achievable, for example pressure testing (JWS, page 7 – 8).

15. If conditions are set that are not commercially achievable, or which increase costs to exporters and importers, all or some of the economic value resulting from fumigation activities at the Port of Tauranga would be lost. The conditions that will ultimately be imposed are not yet known. Hence, I am preparing my evidence when it is not known whether the conditions could be met only at higher cost and loss of efficiency to trade through the Port of Tauranga, or could not practically be met at all.

16. I therefore provide a range of estimates of the economic impact of fumigation conditions:

    (a) at the lower cost end of the range, I estimate the economic cost of the trade that would be lost if fumigation conditions raised the economic cost of trade through the Port of Tauranga;

    (b) at the top end of the range, I estimate the economic cost if the trade in logs and other products currently requiring fumigation were no longer feasible through the Port of Tauranga.

17. I focus my quantitative analysis on the impact on the export of logs, as I understand log fumigation is the most common fumigation activity at the Port of Tauranga and the Port is the largest log export port in New Zealand. I also consider, though in less depth, the impact on biosecurity.

$1 BILLION OF LOGS EXPORTED ANNUALY THROUGH PORT OF TAURANGA

18.   New Zealand exported $3.98 billion of logs in 2021. Just under a third of this value, $1.11 billion, was exported through Port of Tauranga (Forest Owners Association, 2022).

19.   A breakdown prepared by the Ministry of Primary Industries (MPI) shows the destination of logs exported from New Zealand, by volume and value. Table 2 shows that China takes around 87 % of log exports, while other countries, including South Korea, take 12 % of log exports. South Korea currently treats logs on arrival, and hence logs are rarely fumigated in New Zealand when exported to that market (accounting for less than a third of a percent of methyl bromide use).

Table 2 Annual volume and value of logs treated with methyl bromide, by destination (2021)

Country	All logs volume m3	Percent of log trade	MB Treated logs by volume	%MB use, by volume	Approximate export value of treated product ($NZ Million)
TOTAL	**22,648,682**	**100%**	**5,476,176**	**24%**	**$963**
China	19,720,062	87%	5,311,408	27%	$934
India	163,939	1%	163,939	100%	$29
Other countries	2,764,681	12%	829	0.03%	$0.1

Source: MPI, in its response to EPA re: methyl bromide information.

20.   In the analysis that follows, I assume that logs exported from the Port of Tauranga are exported in the same proportions to the countries identified by MPI. This assumption is consistent with the observation that, in 2021, about 81% of logs exported through the Port of Tauranga were fumigated, as shown in Table 3. All logs exported from New Zealand to China must be treated.

Table 3 Port of Tauranga log fumigations (Year to December 2021)

Treatment	Approx. m3 loaded	Treatment %
Logs fumigated 'in hold' with MB	175,797	3%
Logs fumigated with MB onshore for deck cargo	1,296,671	21%
Logs fumigated with phosphine	3,439,530	56%
Total fumigated volume	**4,911,998**	**81%**
Untreated or debarked	1,178,842	19%
Total	6,090,840	**100%**

Source: Sapere analysis

21.   I assume that there is approximately 5 million m³ of logs fumigated and exported through the Port of Tauranga to China[1]—I explain further below that my conclusions are not sensitive to this volume assumption.

22.   I understand from Genera that, since the EPA issued its 2021 decision on the continued use and conditions of methyl bromide for fumigation, there have been material changes to log fumigation practices at the Port of Tauranga. In particular, fumigation of logs with methyl bromide under sheets reduced from 1,671 log rows in 2021 to 174 log rows in 2022. Hence, logs exported from the Port of Tauranga to China must have been treated with alternative methods including phosphine and debarking.

23.   My understanding is that debarking is capacity-constrained and is not a practical alternative in the short to medium term for logs currently fumigated at the Port of Tauranga. The facilities required at the port to debark the volume of logs going to China would be too large. Debarking would also add additional handling charges.

24.   The bulk of the logs being exported from the Port of Tauranga to China must therefore be treated by applying phosphine in the ship's hold (I understand from submissions to the EPA that phosphine use on shore for the fumigation

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[1] I present volume measures using the Japanese Agricultural Standard (JAS), which is the method used in the New Zealand forestry sector since the 1980s. JAS is calculated using the small-end diameter and by assuming a rectangular solid shape with square rather than circular ends. For logs greater than 6m, a pre-determined standard allowance is applied for the increase in log diameter from the small end to the large end.

of logs for export is not practical[2]). If consent conditions meant it became impractical to fumigate these logs at the Port of Tauranga, as I understand Genera contends, then the export of logs to China from the Port may be infeasible (as the logs must be treated to enter China).

25. There is currently no alternative market for the approximately 5 million m³ of logs fumigated and exported through the Port of Tauranga to China.

26. There is no ready domestic market for the logs exported to China. Radiata pine forests in New Zealand are grown as either a pruned (direct sawlog) or structural regime. The tree "stem" is cut into a range of logs. The lower part of the tree is the most desirable—either pruned sawlog for appearance or high-density structural sawlog for framing timber. Log quality deteriorates up the tree stem and results in a mid-range category known as utility-grade logs or A and K-grade logs. It is these utility-grade logs that make up the bulk of the logs currently exported each year to China and India.

27. These utility-grade logs do not yield a high proportion of valuable clearwood (from a pruned log) or framing timber (from a high-density sawlog). Existing New Zealand saw mills cannot profitably process large volumes of K-grade logs as there is insufficient value recovery to justify the log price.[3] A recent study for the Ministry of Business, Innovation and Employment identified only one sawmill relying on utility grade timber—Sequal Lumber in Kawerau, which focuses on custom cutting timber to customer sizes as opposed to industry standard dimensions.[4]

28. In any event, there is limited capacity for New Zealand mills to absorb the volume of wood currently being exported to China. Ministry of Primary Industries data shows that the total input capacity of New Zealand sawmills in 2018 was 12.8 million cubic metres. Nor does it seem likely that there will be any substantial increase in New Zealand sawmill capacity to process a large volume of logs. The number of sawmills operating in New Zealand has diminished, as has the profitability of local mills.[5] Papers prepared for the

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[2] See Hammond, paragraph 102(b).

[3] Price series such as the Wood Matters publication produced by PF Olsen do not include at-mill prices for K, KI and KIS grades. This indicates that there is no New Zealand market for these grades.

[4] Ministry of Business, Innovation and Employment, Spotlight Paper, Can New Zealand be internationally competitive in selling sawn timber into the Chinese market? page 3.

[5] Ibid, page 17.

Ministry of Business, Innovation and Employment suggest that domestic opportunities are limited, and any new sawmill development today would require a major export market opportunity for the sawn timber based around lower-quality industrial K-grade logs.[6] Only the larger sawmills that have modern processing facilities in place are able to compete with the export market.[7] Many of New Zealand's sawmills have not invested in the technology required to be globally competitive.

29.   Nor could the logs be profitably transported to another port for treatment and shipment. From information submitted by STIMBR to the EPA (STIMBR, 2020), I understand that only Northport would be a potential alternative destination for large-scale log fumigation. However, the cost of transporting the logs to Northport for fumigation and export, as an alternative to the Port of Tauranga, would be uneconomic for most log producers.

30.   Log transport costs are in the order of \$0.20 - \$0.25/tonne/km.[8] The difference in road distance between Port of Tauranga and Northport is 356km via State Hwy 1. Hence, transporting logs to Northport by road may cost a log exporter an additional \$71 to \$89 per JAS m^3, leaving insufficient margin to cover other costs of harvest.[9] Export prices (FOB) for unpruned K, KI and KIS grade logs grades ranged from NZ\$95 to \$159 per JAS m^3 over 2022.[10]

31.   Hence, if the conditions ultimately imposed in a granted resource consent made it commercially infeasible to undertake fumigations at the Port of Tauranga, approximately 80 per cent of the current log exports would be at risk. That is, 80 per cent of \$1.11 billion, or \$888 million per annum, of exports might no longer be commercially feasible.

32.   According to one recent research report, around 57 % of the gross returns paid at the wharf gate for logs goes to contractors providing services for harvesting, roading, management, and cartage, etc (West, 2019). Hence, a

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[6] Forest Economic Advisors, Overview paper on key factors for consideration in attracting new investment to the sawmilling sector in New Zealand, Ministry for Business, Innovation, & Employment, page 3.

[7] ANZ Research AgriFocus, June 2020, page 17.

[8] Personal communication with forestry consultants.

[9] As a rough approximation, I convert JASm3 to tonne using a 1:1 ratio. In practice, the conversion has seasonal trends and varies between log grades, length and log quality.

[10] MPI log price series, observation of FOB log price data across the 2022 year available at: https://www.mpi.govt.nz/forestry/forest-industry-and-workforce/forestry-wood-processing-data/historic-indicative-new-zealand-radiata-pine-log-prices/.

rough approximation of the net economic loss from not fumigating logs at the Port of Taurang might be in the order of $381 million per annum (43% x $888m), or $2.8 billion over 10 years at a 6% discount rate.

33. Without a profitable market for large volumes of K-grade logs, forest owners may opt not to harvest the trees until profitability returns (which may be indefinitely). Alternatively, if the lower parts of the trunk can be harvested profitably, the forester may leave the K-grade material with the slash on the ground.

34. Hence, if the conditions ultimately imposed in a granted resource consent made it commercially infeasible to undertake fumigations at the Port of Tauranga, logs previously destined for a competitive export market would be diverted to waste on the ground or to a waiting pattern as mature trees. Either outcome would result in a very large reduction in economic welfare.

35. The potential economic loss is so large that the result holds regardless of variations in input assumptions—such as log export volumes, export log prices, road transport costs, harvest costs, or the discount rate.

COST IF CONDITIONS LIMIT EXPORT VOLUMES THROUGH PORT OF TAURANGA

Exporters and importers bear the increase in cost of trade

36. Estimating the economic loss if consent conditions mean higher cost and loss of efficiency to trade through the Port of Tauranga is more complex without specific details as to the anticipated consent terms. A consent condition might impose direct costs to meet the technical requirements, as well as indirect costs such as delays or additional handling of products. It is the total costs that matters for economic analysis. To illustrate the potential range of impacts, I estimate the economic cost should a consent condition increase the total cost of trade through the Port of Tauranga.

37. New Zealand exporters and importers are typically considered 'price takers' in international markets. That is, New Zealand exports and imports make up a reasonably small percentage of the total world supply or demand for a commodity. While our exporters have established relationships in some markets, and might meet a significant share of a particular customer's demand, their customers have alternatives. New Zealand exporters (and

importers) are therefore not of sufficient size to profitably raise (or lower) world prices.

38. In a traditional supply and demand diagram, New Zealand exporters face a horizontal demand curve, as represented in figure 1 below.

39. The unit cost of exporting increases with volume. For example, in relation to harvesting logs, there will be some trees on flat, easy to access land, close to the port; other trees will be on a steep gully in a remote location, etc. Foresters will harvest trees until the cost of harvest just equals the world price, represented at Q_1 on the diagram. It would be unprofitable to harvest more, and harvesting less would reduce profits.

Figure 1 Economic impact of raising cost of trade
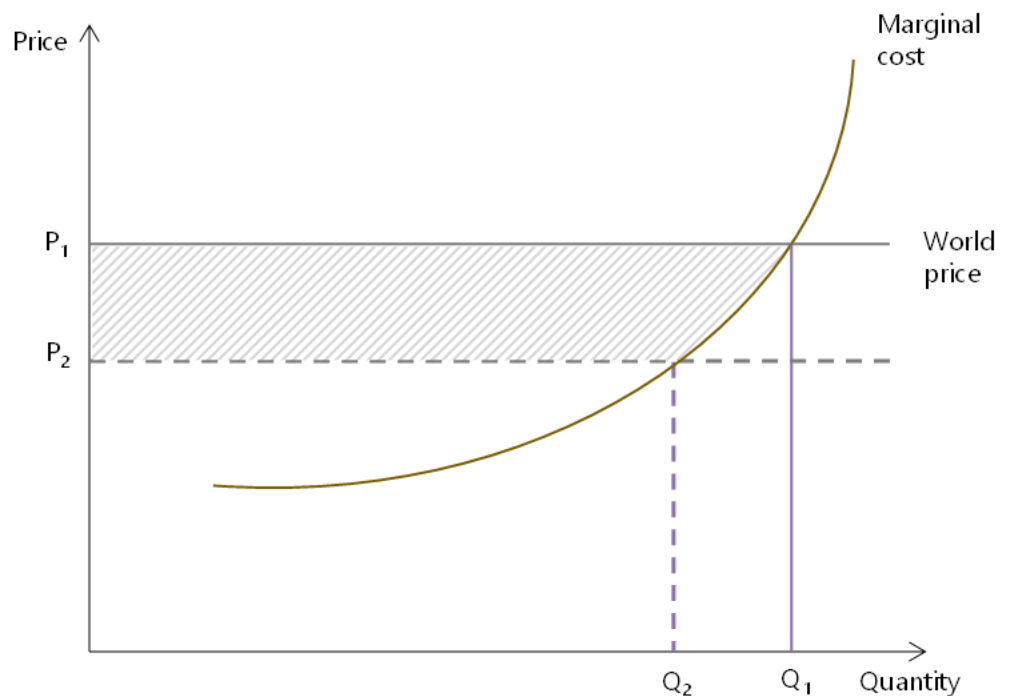
40. As price takers, exporters bear any increase in the total cost of exporting via the Port of Tauranga. Any additional cost reduces the effective price received by exporters; in figure 1 this reduction in price (as a result of the additional cost of export) is represented by the price falling to P_2.

41. The economic loss is therefore shown by the shaded area on the diagram; that is, the economic loss is the reduction in effective price (total increase in cost of trade) multiplied by the volume of ($P_1 - P_2 \times Q_2$) plus the economic

loss from goods no longer exported at the reduced effective price ($P_1 - P_2$ x $Q_1 - Q_2$ x 0.5, assuming a linear marginal cost curve for simplicity).

42. I set out below estimates of the economic loss if consent conditions were to increase the total cost of trade through Port of Tauranga by 5 %, 10 % and 15%.

Reduced export volumes

43. Economists refer to the responsiveness in quantity supplied to a change in price for a specific good (in this case, export logs) as the price elasticity of supply. Estimating the price elasticity of supply of log exports can be complex, as the estimate needs to control for the volume of plantations coming to maturity, exchange rate variations, and other factors that influence the supply of logs for export.

44. A careful study by Japanese and New Zealand economists estimated the elasticity of supply of New Zealand radiatia logs for export to East Asian countries over a period of 18 years.[11] They estimated a price elasticity of supply of 1.6;[12] that is, for each percentage point change in price, export volumes change by 1.6 percentage points. This study was completed some time ago (it was published in 2011); however, from a review of published literature it appears to still be the best study and I have found no basis for concluding that log exporters would now be more or less sensitive to price changes.

45. An estimate of price elasticity is a measure of the percentage change in volume divided by the percentage change in price. Hence, the equation can be reordered to calculate the change in volumes supplied for export for a given change in price.[13] Table 4 shows the reduction in log export volumes that could be expected if consent conditions reduced the effective price of exporting from the Port of Tauranga by 5 %, 10 %, or 15 % (assuming an initial volume of 5.0m[3], a mid-point export price of NZ$127 per JAS m[3], and an elasticity of supply of 1.6):

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[11] Tetsuya Michinaka; Satoshi Tachibana, James Turner, (2011) Econometric Analysis of Radiata pine log trade between New Zealand and East Asian Countries, JARQ 45(3), 327-336.

[12] Ibid, table 2.

[13] Price elasticity = percentage change in demand / percentage change in price. Therefore, price elasticity x percentage change in price = percentage change in demand.

Table 4 Reduction in volume of log exports

Decrease in price	5%	10%	15%
Price elasticity of supply	1.6	1.6	1.6
Reduction in quantity supplied	8%	16%	24%
New volume	4.6m³	4.2m³	3.8m³

Source: Sapere analysis

46. This reduction in effective export prices would translate directly into the capacity—in this case the income available to—communities and people to provide for their economic well-being. There is no offsetting cost reduction; New Zealand communities would be less well-off by an amount equal to the reduced price/increased export cost multiplied by the volume of logs sold. These figures are shown in Table 5:

Table 5 Reduction in community income from reduced export prices

Decrease in price	5%	10%	15%
New aggregate export volume m³	4.6m³	4.2m³	3.8m³
Effective price reduction per m³	$6.35	$12.70	$19.05
Annual loss in income	$29.2 million	$53.3 million	$72.3 million
Present value, 10 years, 6% discount rate[14]	$215 million	$393 million	$533 million

Source: Sapere analysis

47. Thus, the annual loss of income to New Zealand communities, were consent conditions to raise exporting costs by 5 % - 15 %, could be expected to range from around $29 million to $72 million. Over ten years, the present value of this loss in the capacity of communities and people to provide for their

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[14] 6% is NZ Treasury default rate for cost benefit analysis: https://treasury.govt.nz/information-and-services/state-sector-leadership/guidance/financial-reporting-policies-and-guidance/discount-rates

economic well-being would have a present value of between $ 215 million and $533 million.

48.   As the prices paid to domestic sawmillers reflects export prices, the price received for logs sold into the domestic market could also be expected to reduce because of the higher effective costs of exporting logs. I have treated this domestic price change as a transfer between New Zealand communities and therefore not a net benefit or cost—the well being of forest growers would be reduced and the well being of New Zealand wood processors improved by the price change.

Economic costs of reduced log exports

49.   In addition to reduced income from exported logs, the effective reduction in log prices would mean it would no longer be profitable to export between 8 % and 24 % (from Table 4) of the aggregate volume of logs previously exported from Port of Tauranga. The aggregate volume of fumigated logs is currently exported is about 5 million m³ (from Table 3). Hence, the volume of logs that would no longer be profitable to export is shown in Table 6:

Table 6 Annual volume of logs no longer exported from Port of Tauranga

Decrease in price	5%	10%	15%
Volume not exported m³	0.4 million	0.8 million	1.2 million

Source: Sapere analysis

50.   As the logs would have been exported at the higher export price, but become unprofitable if additional transport costs must be incurred, half the difference between these prices would reflect the margin that would have been available to communities and people to provide for their economic well-being, after meeting all costs of harvesting and processing.[15] These amounts are shown in Table 7 below:

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[15] This calculation assumes that havesting costs increase linearly.

Table 7 Annual income lost from communities because of reduced log exports from the Port of Tauranga

Decrease in price	5%	10%	15%
Volume not logged (from table 6)	0.4 million m³	0.8 million m³	1.2 million m³
Lost margin (from table 5)	$6.35	$12.70	$19.05
Annual income loss to communities	$1.2 million	$5.1 million	$11.4 million
Present value, 10 years, 6% discount rate	$9.3 million	$37.4 million	$84.1 million

Source: Sapere analysis

Thus, the economic loss from imposing consent conditions which have the effect of increasing costs to export logs via Port of Tauranga would be as summarised in Table 8:

Table 8: Economic cost of increasing cost of export PV 10 years

Increase in cost of trade	5%	10%	15%
Reduced return for exported logs	$215 million	$393 million	$533 million
Reduced log harvest	$9.3 million	$37.4 million	$84.1 million
Total	$224.3 million	$430.4 million	$617.1 million

REDUCED HOUSEHOLD INCOME IN THE FORESTRY SECTOR, AND ATTENDANT SOCIAL IMPACTS IN FORESTRY COMMUNITIES

51.   NZIER (2017) estimate a total of 12,410 full time equivalent employees (FTEs) are employed either directly in plantation forests or in forestry road transport and in transport support (that is, stevedores, marshallers, fumigations services, etc).[16] Te Uru Rakau estimate that these employees removed 33.1 million m³ of roundwood from planted forests in 2018, for both domestic and export markets.[17]

52.   Reduced logging of 0.4 million to 1.2 million m³ (Table 7), if conditions limit fumigation to phosphine in ship holds, would amount to 1.2 % to 3.6 % of the total amount of roundwood removed from planted production forests, with a mid-point of 2.4 %. If the entire trade in logs currently requiring fumigation were no longer feasible through the Port of Tauranga, the total amount of roundwood removed from planted production forests would be reduced by 15.1 %.

53.   Reduced logging would in turn mean fewer jobs in forestry.[18]

54.   I use the values from The New Zealand Treasury's CBAx Tool to estimate the economic impact from the loss of jobs.[19] The Treasury CBAx allows a consistent approach for analysts to estimate the economic benefits (or costs) of policy changes that result in additional (or loss of) jobs, including the impact on government revenues and benefits. The Treasury CBAx parameters allow for alternatives—a person losing a job will usually find alternative employment after a period of time—and opportunity cost—a person losing a job loses income but may gain some benefit from having more time for other activities.[20]

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[16] NZIER, (2017), *Plantation Forestry Statistics: Contribution of forestry to New Zealand*, page ii.

[17] Available at: https://www.teururakau.govt.nz/news-and-resources/open-data-and-forecasting/forestry/wood-processing/

[18] These job losses might not scale with the loss in logging due to economies of scale. Hence the estimates below, as with my other estimates, are intended to provide an understanding of the order of magnitude rather than precise estimates.

[19] Available at: https://treasury.govt.nz/information-and-services/state-sector-leadership/investment-management/plan-investment-choices/cost-benefit-analysis-including-public-sector-discount-rates/treasurys-cbax-tool

[20] The Treasury allow a 50 per cent reduction for each of these effects, so that economic value of the income loss to an individual losing a job is estimated at (50% x 50% =) 25% of their income prior to the job loss.

55. The CBAx model requires estimates of the wages earned by those who would lose their jobs. There is a mix of skills represented in forestry harvesting, road transport and support services. These are not low-skilled positions and NZIER (2017) describes a range of salaries.[21] Accordingly, I apply inputs related to annual incomes and impacts assuming the jobs lost are for a mid-skilled person, not in a professional role.

Table 9 NZ Treasury CBAx assumptions for economic impact of labour (millions)

Assumption/input	Value	CBAx description	Economic cost of 2.4 percent reduction in forestry jobs (mid-point of limited fumigation scenario)	Economic cost of 15.1 percent reduction in forestry jobs (no fumigation scenario)
Economic value of income for additional employment	$13,892 per FTE	25% of Average annual income - Level 4-6 certificate or diploma	$4.16 million	$26.04 million
Government revenues from additional employment	$3,840 per FTE	25% of Income tax and ACC levy: Average annual income – Level 4-6 certificate or diploma.	$1.15 million	$7.19 million
Jobseeker benefit decrease	$14,267 per FTE	Jobseeker Support - Single, 20 to 24 years, without childen	$4.27 million	$26.74 million
Total annual cost			**$9.50 million**	**$59.98 million**
Present value, 10 years, 6% discount rate			**$70.6 million**	**$441.5 million**

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[21] Op cit, page 43.

Social impacts relating to reduced harvest, not quantified

56.   There are many other costs that I have not quantified in these estimates. For instance, the Ministry for Primary Industries found that jobs and employment can have social benefits other than the direct monetary impacts.[22] The additional impacts affect not only the employee but also can have positive impacts on their children and the wider community. These benefits from employment include:

(a)   improved long-term employability;

(b)   improved health resulting in lower mortality, decreased morbidity and associated decreased health care use;

(c)   decreased substance abuse;

(d)   improved mental wellbeing;

(e)   improved health of children;

(f)   improved mental wellbeing of children;

(g)   improved future employability of children;

(h)   improved social contacts, connections and cohesion.

57.   While the social value of a job has been often discussed and studied, I am not aware of any studies that attempt to monetise these benefits. This is primarily due to the difficulty in assigning a value to impacts such as mental health outcomes, as well as estimating an accurate causal effect.

COST OF BIOSECURITY RISKS

58.   Plant pests and diseases comprise significant threats to horticulture, forestry and pastoral agriculture in New Zealand. The economic cost of a biosecurity event can be very large. Therefore, even a small increase in the risk of an event would result in a significant public detriment. The risk of an event could

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[22] See Ministry for Primary Industries, 2014, *The social value of a job*, MPI Information Paper No: 2014/24. Available from www.mpi.govt.nz

increase if imposed consent conditions reduced fumigation or resulted in additional handling of imports prior to fumigation.

59.   The extent of damage that could be incurred by pest threats varies significantly depending on the response implemented and the technologies available. Growers said in 2017 that the PSA outbreak cost the kiwifruit industry $800 million.[23] In 2014, the Royal Society of New Zealand estimated the costs associated with several other pests and diseases, with indicative costs shown in Table 10 below (Royal Society of New Zealand, 2014).

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[23] https://www.newshub.co.nz/home/new-zealand/2017/12/devastation-of-psa-still-felt-by-kiwifruit-growers.html

Table 10 Royal Society of New Zealand incursion cost estimates

Organism (Dates of programme)	Eradication cost (approx. $millions)	Estimated economic impact over 20 years ($millions)	Approximate averted costs (i.e. economic Impact less cost of eradication) ($millions)
White-Spotted Tussock Moth - (Orgyia thyellina) (1996 –1998)	$11	$23 - $158	$12 - $147
Gum Leaf Skeletoniser (Uraba lugens) (1997 – 1998)	$4	$90 - $127	$86 - $123
Painted Apple Moth (Teia anartoides) (1999 – 2006)	$58	$52 - $317	-$6 - $259
Fall Webworm (Hyphantria cunea) (2003 – 2006)	$6	$17 - $74	$11 - $68
Gum Leaf Skeletoniser (Uraba lugens) (2003)	$107*	$90 - $127	-$17 - $20*
Gypsy Moth (Lymantria dispar dispar) (2003 – 2005)	$6	$2 - $259[#]	-$4 - $253

Table 1: Costs and averted economic impacts from eradications of forest insect pests in New Zealand[17](*[18] #[19])

CONCLUSION

60. If conditions to fumigate at Port of Tauranga are set that are not commercially achievable, or which increase costs to exporters and importers, all or some of the economic value resulting from fumigation activities at the Port of Tauranga would be lost. As the conditions that will ultimately be imposed are not yet known I provide a range of estimates of the economic impact of fumigation conditions:
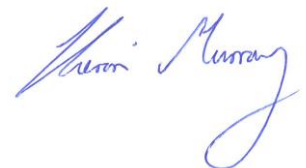
(a) at the lower end of the cost range, I estimate the economic cost of the trade that would be lost if fumigation conditions raised the economic cost of trade through the Port of Tauranga by 5 % to 15%.

(b) at the top end of the range, I estimate the economic cost if the trade in logs and other products currently requiring fumigation were no longer feasible through the Port of Tauranga.

61.   I focus my analysis on the impact on the export of logs, as I understand log fumigation is the most common fumigation activity at the Port of Tauranga and the Port is the largest log export port in New Zealand. I also consider, though in less depth, the impact on other trade and biosecurity

62.   I show that setting conditions that can not be met commercially would result in economic costs as summarised in Table 11:

Table 11. Economic costs over 10 years in today's dollars

	Economic cost if cost of trade increased by 5 % to 15 % PV over 10 years	Economic cost if fumigation no longer feasible at Port of Tauranga PV over 10 years
Loss of economic value of log exports	$224.3 to $616.1 million	$2.8 billion
Reduced household incomes	$70.6 million	$441.5 million
Total quantified impact	$294.9 to $686.7 million	$3.24 billion

63.   In addition, any increase in the risk of a biosecurity event would result in a significant public detriment. There would be further economic costs to importers and exporters of other products that I have not quantified.

KIERAN O'NEILL MURRAY
17 April 2023

Appendix A: Material reviewed

Affidavit to the EPA, Mr Hammond

ANZ-BusinessOutlook

ANZ Research AgriFocus, June 2020

APP203660_Final_Application_Form

EPA SUBMISSION127540_United-Fresh-NZ-Inc

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