

Statement of Evidence

OF

DR GANESH NANA (AKA GANESH RAJARAM AHIRAO)

FOR

TE KAAHUI O RAURU,

TE RŪNANGA O NGĀTI RUANUI,

AND

TE KOROWAI O NGĀRUAHINE

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INTRODUCTION

Qualifications and experience

1. My full name is Ganesh Nana, but I am also known as Ganesh Rajaram Ahirao.
2. I was awarded a doctorate in economics in 2000 from Victoria University of Wellington (VUW) for my thesis “A Multi-Industry Computable General Equilibrium with Dynamic Investor and Consumer Behaviour.”
3. I have 45 years of professional experience in economic research and advice.
4. My last full-time position was as Chair of the Productivity Commission Te Kōmihana Whai Hua o Aotearoa from January 2021 until its disestablishment in February 2024.
5. Prior to that position I worked for Business and Economic Research Limited (BERL) for 22 years, originally as Senior Economist, then Chief Economist, and then Research Director. I completed and/or oversaw research projects and studies on regional development, Te Ōhanga Māori, and the impact of economic policy proposals, while also commenting on wider economic trends, issues, and debates.
6. During the earlier parts of my career, I was employed
 - a. in various positions (tutor, researcher, and lecturer) by VUW
 - b. as a consulting economist at Oxford Economic Forecasting, England
 - c. in the House of Commons operating the UK Treasury economic model and the IMF Multimod economic model.
7. My specialist area of expertise originated in computable general equilibrium (CGE) modelling, having participated in the development of the first CGE model of the New Zealand economy while I was a

Research Officer at the Research Project on Economic Planning at the Economics Department of VUW during the 1980s. This expertise included input-output modelling and subsequent multiplier model analysis that I also applied extensively to regional development and Māori economy work during employment at BERL.

8. During my career I also developed expertise in macroeconomic policy and analysis including fiscal and monetary policy effects and impacts on opportunities in regional development and the Māori economic sphere.
9. Currently, I undertake voluntary work including
 - a. a one-half day per week shift at Whakamaru Wellington City Mission, in their Social Supermarket
 - b. Board positions on the following charitable or not-for-profit organisations
 - i. The New Zealand Drug Foundation Te Puna Whakaiti Pāmamae Kai Whakapiri
 - ii. Kaibosh Food Rescue
 - iii. Nuku Ora (The Wellington Regional Sports Trust)
 - iv. ActionStation Aotearoa

Code of Conduct

10. I confirm that I have read the Code of Conduct for expert witnesses contained in the Environment Court of New Zealand Practice Note 2025 and that I have complied with it when preparing my evidence. Other than when I state that I am relying on the advice of another person, this evidence is entirely 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.

Scope of evidence

11. I have been asked to

- a. provide analysis of, and comment on, the “Economic Effects” set out in Section 5.2 of the Trans-Tasman Resources – Taranaki VTM Project Fast-Track Act Application and the accompanying NZIER report containing the “input-output multiplier” model and analysis contained in the Application Appendices
- b. summarise existing economic activity in the local and regional areas¹, with particular connection to Te Ōhanga Māori and to potential economic effects from the VTM project
- c. discuss the potential Total Economic Value (TEV) of the Application and, in particular, its relationship to the “multiplier model” analysis.

12. I have been provided the following documents

- a. Trans-Tasman Resources Ltd, *Taranaki VTM Project*, Fast-Track Act Application, 15 April 2025.
- b. NZIER, *Economic impact assessment of TTRL’s Taranaki VTM Iron Sands Project*, Report to Trans-Tasman Resources Limited, 12 March 2025.
- c. Draft evidence of: Christopher Fleming and Andrew Buckwell, *Evidence commissioned by K Kiwis Against Seabed Mining (KASM), Greenpeace Aotearoa Inc., and Concerned Communities of Taranaki and Manawatu Against Seabed Mining*, Griffith Business School, Griffith University, Queensland, Australia.

¹ In line with that used in the NZIER analysis, the local area is defined as the Whanganui and South Taranaki Districts, while the regional area is defined as the Taranaki Region plus the Whanganui District.

d. Draft evidence of: *Te Ohu Kaimoana, Response to the Taranaki VTM Project – Fast Track Approvals Application*, September 2025.

13. I list in the References section additional documents and reports I have referred to and/or consider relevant to my evidence.

SUMMARY

14. In summary, I would advise significant caution is exercised when viewing the economic effects presented by the multiplier model analysis given the considerable limitations of the perspectives embedded within such a model.
15. The multiplier model analysis presented in the NZIER report is substantially appropriate for assessing the economics effects of relatively small infrastructure or development projects.
16. However, to assess projects that are promoted as having significant regional or national benefits would require further modelling in order to alleviate the restrictive assumptions and caveats that underpin the multiplier model framework.
17. At best, the multiplier model findings provide a starting point for the estimated **gross** economic effect of a project.
18. I also note there are several components of detail and interpretation presented in the NZIER report that need to be addressed. These components are outlined in paragraphs 32 to 37 below.
19. The findings of a positive gross economic impact are neither surprising nor unexpected given the model construction and the perspective embedded in such multiplier analysis.
20. Further, there are numerous assumptions and caveats that critically underpin these findings, which are – as expected – well stated in the section 2.2 of the NZIER report. It should also be noted that this model is inherently restricted to a *produce and spend* perspective on economic

activity. That is, producing and spending on anything will result in economic effects that are inferred as positive benefits.

21. Noticeably, the critical assumptions and caveats are omitted in the presentation contained in Section 5.2 of the Application. The narrative in that Section proceeds to convey the impression of a large positive impact on the local, regional, and national economy.
22. In the absence of these critical caveats and assumptions, Section 5.2 of the application attempts to present a significantly positive picture of the economic impact. Without allowing for the caveats and assumptions, the positive picture portrayed there is almost certainly overstated.
23. Importantly, these impacts (whether overstated or not) can only be viewed as **gross** economic effects. These **gross** effects should serve as a foundation for subsequent calculations or estimations of the **net** economic effects.
24. Further, after 35 years and on completion of the Project, **it is difficult to clearly envision a positive legacy** – as would be expected for an infrastructure and development project yielding significant regional or national benefits – in terms of business, employment, or income opportunities, or a more balanced economic structure, for the local area or the Region.
25. Note, even after allowing for the assumptions and caveats, any consequential net economic effects should properly go beyond the *produce and spend* foundation. At the very least, the *use* and *non-use* value of resources should be addressed – ideally within a Total Economic Value (TEV) framing.
26. However, I note that even TEV framing – and its use within benefit-cost analysis (BCA) modelling – may also be restricted through the required monetisation of all values. In particular, the valuation of resources that are considered by some as being of existential importance (for example

a living tīpuna, such as a maunga or an awa) is difficult to incorporate within such a monetised calculation.

27. These observations reinforce my advice that the *Economic Effects* assessed by the multiplier model and presented in Section 5.2 can only be considered **illustrative** of the **gross** economic impact. Considerable adjustments are required to reach any assessment that could be properly viewed as the **net** economic impact.
28. Importantly, whether such a **net** economic impact would be found to be positive or negative (that is, whether there are indeed **net** economic **benefits** from the proposed Project) – despite the arguments presented in Section 5.2 – remains considerably moot.

MULTIPLIER MODEL ANALYSIS

Comments on NZIER Report

29. The multiplier model analysis presented in the NZIER report is substantially appropriate, although there are several components of detail and interpretation that should ideally be rectified. An outline of these elements is provided in paragraphs 32 to 37 below.
30. Nevertheless, the findings of positive economic impact are neither surprising nor unexpected given the model construction and the perspective embedded in such multiplier analysis.
 - a. Multiplier models are predicated on – and inherently restricted to – a *produce and spend* perspective on economic activity.
 - b. And by definition, any producing and spending (irrespective of what or of on what) will result in multiplied further production and spending.
 - c. In essence a multiplier of greater than one is guaranteed given the assumptions embedded in the model construction.

- d. Positive multiplied production and spending impacts are accompanied by positive employment impacts.
 - e. These impacts are inferred to be positive benefits.
31. Consequently, there are numerous assumptions and caveats that underpin the findings of positive economic impact. These are well stated, as expected, in the section 2.2. However, an explanation of the effects or impacts of these caveats on the findings is absent.
- a. The assumptions that there are no (relative) price changes, arising from an assumption of no production supply constraints – which are standard and widely accepted and understood for input-output multiplier analysis² – should be at the forefront of any discussion as to the net economic impact.
 - i. It is important to note that these assumptions are critical in driving the findings of a positive **gross** economic impact.
 - ii. An assumption of no production supply constraints depicts a situation where the aggregate supply curves facing the district, region, and nation are horizontal.
 - iii. A horizontal supply curve is at one end of a spectrum of plausible supply curves, where at the other end of the spectrum is a vertical supply curve.
 - iv. The steeper the supply curve, the less is the multiplier, and the greater is the difference between **gross** and **net** economic impact.
 - b. In particular, should there be production supply constraints – either in terms of direct (specialist) labour requirements and/or of indirect supply chain product requirements – changes in relative prices will

² Refer also to paragraphs 38 to 41.

likely reduce the quantum of the **gross** impacts calculated by the multiplier model.

- i. For example, where a project spend is imposed on an economy at close to full employment of productive labour and capital there are plausible scenarios where the bidding away of such resources from existing uses can result in multipliers of less than one.
- ii. A similar result may be expected where there is restricted or constrained access to specialist expertise and other input requirements.
- c. An additional assumption remains implicit in the analysis presented. That is, a positive economic *impact* on GDP is equivalent to economic *benefit*. This reflects an arguably narrow perspective on the objectives of economic activity. This is discussed in paragraphs 63 below.

32. The export earnings discussion in Section 4 of the report **is egregiously incorrect** when stating

“The value of New Zealand’s exports in the year to June 2024 totalled about \$66 billion”.

Indeed, that paragraph contains **errors and distortions of facts for it to be substantively misleading**. It should be deleted and/or ignored.

- a. The \$66 billion figure ignores export revenue from services, of the order of \$30 billion.
- b. Statistics New Zealand Tatauranga Aotearoa nominal GDP data estimates total export revenue for the year to June 2024 at \$99 billion; while trade balance of payments data estimates goods

export value at \$69 billion and services export value at \$30 billion, also totalling \$99 billion.³

- c. This gross understatement of the nation's total export value has the effect of grossly overstating the importance of the potential contribution of VTM exports.
 - i. Potential VTM export revenue of \$854 million would comprise approximately **0.9 percent** (not the stated 1.3 percent) of New Zealand's total export revenue for the year to June 2024.
 - ii. Combined with iron and steel, the potential \$1.69 billion of exports would represent approximately **1.7 percent**, significantly below the claimed 2.6 percent, of total exports.
 - iii. Accounting for top services export categories of: *tourism* (\$13,322 million); *education* (3,852 million); *telecommunications, computer, and information services* (1,898 million); *charges for the use of intellectual property nei*⁴ (1,761 million); *technical etc, other business services nei* (1,193 million) puts potential VTM export revenue of \$854 million (at best)⁵ 16th on a table of New Zealand's top export earners.
 - d. Consequently, Table 14 (in Section 4) purportedly listing New Zealand's principal exports (along with potential VTM's contribution) **is similarly substantively misleading and should also be deleted and/or ignored.**
33. It should be made clear that contributions from royalty and tax payments (sections 4 and 5) **are NOT totally in addition** to the calculated impact on GDP, as described earlier in Section 3.

³ Statistics New Zealand Tatauranga Aotearoa INFOS data series *SNEQ.** and *BOPQ.** The discrepancy between the totals (\$96bn and \$99bn) result from conceptual accounting differences between National Accounts and Balance of Payments Trade Accounts valuations.

⁴ Not elsewhere included.

⁵ Noting any such table is somewhat arbitrary, given the degree to which categories can be separated or, alternatively, combined.

34. Further, the statement in section 2.3.6 **is misleading**.

“Our calculations of the additional economic contribution of the Project, in terms of export earnings, royalties and taxes...”

In particular, the word *additional* requires qualification and/or further clarification. There is **a significant risk of double-counting** the same economic effects if *additional* is interpreted as being in addition to the multiplier model calculated impacts on GDP.

- a. Note that royalties and indirect taxes are captured as part of the value-added component of the income GDP measure. That is, the income GDP measure comprises wages plus profits plus indirect taxes less subsidies.
- b. ‘Standard’ multiplier models assume (for simplicity) that indirect taxes are subsumed as a component of profits, and that the economic impact of royalties and taxes can be captured within the “induced” component arising out of the marginal propensity to consume (MPC) out of profit income⁶.
- c. Should the MPC (of Government) out of royalty income be noticeably different from that out of profit income, then that should be captured within the coefficients of the multiplier model itself. It is unclear how (or to what extent) this is captured in the multiplier model results provided.
- i. Such clarification is required to justify the assertion in the Application (section 2.3.4) under the heading of *Royalties and Taxes*:

This revenue goes into the Crown’s account and will likely be part of government expenditure, generating further employment, and is a component of GDP.

⁶ The marginal propensity to consume (MPC) specifies the proportion of additional income that is spent by the recipients of that income.

- d. Similarly, the *additional* economic impact of export earnings needs to be qualified. The proportion of these earnings that remain in the country and the proportion that is a leakage (in the form of payments to productive factors that are overseas owned) is critical in this calculation. It is unclear how (or whether) this component has been captured by the multiplier model impacts⁷.
35. The data in the tables for employment adopt a mixture of measures between headcounts of employees and full-time equivalent (FTEs) labour employment.
- a. The definition of employees *excludes* business or enterprise owners and employers not receiving a salary or a wage⁸. Further, the headcount measure does not adjust for the part-time or full-time status of employees⁹.
 - b. The FTE measure *includes* all labour employed and also adjusts for the part-time and full-time status of those in employment¹⁰.
36. This mixture of measures has the potential to create confusion, especially where one measure (employee headcounts for region-wide employment) is being used to provide context for the other measure (the broader employment effects of the project in terms of FTEs).
- a. this confusion is particularly evident in section 5.2.3.3 of the Application where Tables 5.5, 5.6, and 5.7 list the employment impact incorrectly as “FTEs”, where they are clearly and correctly

⁷ The discrepancy between the export earnings figure and the total GDP impact is a clear reflection of the reduced impact of the project activities on the local, regional, and national economy through the leakage of exports to net factor payments overseas. The quantum of this leakage - export revenue that is effectively a return to productive factors owned abroad – is required to clarify any *additional* economic effect of the VTM export receipts.

⁸ For example, a self-employed business owner-operator taking earnings out of profits would not be counted as an employee; but is counted as being in employment.

⁹ For example, one half-time employee and one full-time employee is measured as a headcount of two employees.

¹⁰ For example, one half-time person and one full-time person is measured as an FTE of 1.5.

labelled as “headcount” in the NZIER report. Further, the FTE numbers are stated in the narrative as “people”.

37. Similar to 35 above, data in tables for local and regional GDP and employment provide a mixture of numbers for the year to March 2023 (GDP) and for February 2024 (headcount employment numbers). Again, there is a potential for confusion as this difference is not clearly noted.

A side note on Computable General Equilibrium (CGE) modelling

38. A CGE modelling approach is conceptually an improvement on the multiplier modelling approach in that it removes the need to assume no productive resource constraints (a horizontal supply curve). Consequently, a CGE modelling approach can capture impacts subsequent to price changes that reflect the existence of such constraints.
39. In addition, a CGE model can also capture (depending on sophistication of model) impacts on other economic measures of interest (for example, exports, imports, current account trade balance, income distribution, supporting infrastructure and other investment requirements). This is in stark contrast to the multiplier model that is restricted to measuring impacts on GDP and employment.
40. However, in practice, CGE modelling of economic impact remains wedded to GDP as the primary barometer of economic value.
41. Further, the greater complexity of a CGE model can be seen as a *black box*, making its findings – at times – relatively difficult to convey.

Comments on Section 5.2 of TTR Application

42. Noticeably, the critical assumptions and caveats contained in the NZIER report are essentially omitted in the presentation contained in Section 5.2. Consequently, Section 5.2 presents a significantly positive and overstated picture of the economic impact.

43. The narrative in Section 5.2 proceeds to convey a large positive impact on the local, regional, and national economy. In the absence of acknowledgement of the caveats and assumptions, these impacts can only be viewed as **gross** economic effects – which should serve as a foundation for subsequent calculations or estimations of **net** economic effects (which appear to be absent from Section 5.2).
44. Consequently, there is **a significant contradiction** between the presentation provided in Section 5.2 and in that conveyed by the assessment of economic impacts using a multiplier model described in the NZIER report.
- a. It cannot be claimed (or inferred) that the project will result in *large* economic impacts to the local, regional, or national area while also adhering to the assumptions and caveats that underpin the calculated economic impacts (that is, horizontal aggregate supply curves).
 - b. Alternatively, for the caveats and assumptions to hold – and so for the calculated multiplier impacts to be a valid representation of impact – the project must necessarily be relatively *small*.
 - i. Such small projects can therefore be assessed to cause little or noticeable impacts on other agents and enterprises in the industry and connected sectors /supply chain and neighbouring areas and regions and so leave relative prices unchanged.
 - ii. Such small projects can be similarly assessed to cause little or noticeable impacts that may result in production supply constraints and so changes in the prices of capital and labour resources.
 - c. The introduction of a *large* project to a locality, region, or nation, would – by definition of being *large* – not adhere to the caveats and assumptions of the multiplier model. Consequently, the **net**

economic effect of such a project would certainly be less than the effectively **gross** estimates arising from a multiplier model.

45. For both the one-off set-up and ongoing operations of the Project, the effects appear concentrated in the Region, but outside of the South Taranaki and Whanganui Districts. This leaves only the New Plymouth and Stratford Districts experiencing the bulk of the gross economic and multiplier effects. By implication, knowing the composition and capacity of economic activity in both areas¹¹, suggests the gross economic and multiplier effects are set to be concentrated in New Plymouth.
 - a. This indicates the gross economic and multiplier effects of the Project risk bypassing the South Taranaki and Whanganui Districts.
 - b. In particular, 18 percent of the direct GDP effect is felt in the local area, while 80 percent is felt across the remainder of the region. Alternatively, 29 percent of the headcount employment effect is felt in the local area, while 70 percent is felt across the remainder of the region.
 - c. For total effect, 14 percent of the GDP effect is felt locally, while 70 percent is felt across the remainder of the region; while the figures for headcount employment are 16 percent and 66 percent, respectively.
46. The assertions under the *Employment* sub-heading (page 128) within the *Social Benefits* section of the Application are difficult to reconcile with the above multiplier findings.
 - a. The workers are expected to reside across a large geographical area (and so limit the strain on local infrastructure), but at the same time it is stated that

¹¹ Statistics New Zealand Tatauranga Aotearoa 2023 Census puts total employment in Stratford District at 5,163 – of which 918 is in *primary* and 546 in *primary processing* sectors. Total employment in New Plymouth District was recorded at 44,421.

... the wages largely expected to be spent in the local area.

- b. From the multiplier model results, an estimated 170 headcount employment is directly and indirectly generated by the Project in the local area. This then induces an additional \$15 million in gross spending in the local area¹².
- c. The implied average spending per person (headcount) of \$88,490 appears to be on the high side; relative to the 2024 household disposable income at a mean average of \$83,170 for Manawatū/Whanganui region and a median of \$71,046¹³, or to the 2023 average household expenditure for the North Island outside of Auckland and Wellington of \$72,505¹⁴.
- d. To attempt a reconciliation would require information on the proportion of the induced effect that arises from employment income and how much from profit surplus distributed locally, estimated marginal propensity to consume from such additional income, and coefficients to translate headcount to FTE to household numbers.
- e. Critical in the above reconciliation would be some incorporation of the expected *fly-in-fly-out* / *drive-in-drive-out* component of the workforce. While the headcount of 170 direct and indirect employment will be recorded as being in the local area, their offshore location alongside the expectation that

“... the workers could reside across a large geographical area.”

suggests that a proportion of their spending (hence their *induced* impact) would accrue beyond the local area.

¹² This is calculated using the figures in Table 9 of the NZIER report, (reprinted in Table 5.7 of the Application), where gross spending is equivalent to *Output*. Further, the *Induced* component is calculated as the difference between the *Direct+Indirect+Induced* impact and the *Direct+Indirect* figures.

¹³ Statistics New Zealand Tatauranga Aotearoa Household Economic Survey 2024.

¹⁴ Statistics New Zealand Tatauranga Aotearoa Household Economic Survey 2023 (note expenditure is only collected every 3 years by this survey).

- f. It is unclear whether (or how) the *fly-in-fly-out / drive-in-drive-out* component of the workforce is captured with the multiplier model impacts and, in particular, in assessing the local area induced impacts.
 - g. These factors reinforce initial observations that the gross economic and multiplier effects are more than likely to bypass the local area of the South Taranaki and Whanganui Districts.
47. While outside my direct area of specialist expertise, I observe that the broader Social Benefits summarised in the Application would also be at risk of by-passing the South Taranaki and Whanganui Districts given the assessed concentration of multiplier impacts alongside the use of a *fly-in-fly-out / drive-in-drive-out* workforce.
- a. I would also observe that a proportion of the listed Social Benefits appear associated with employment impacts that are already captured within the multiplier model economic impacts. Consequently, I also caution against the **risk of the double-counting of benefits**.

THE DISTRICT AND REGIONAL ECONOMY

48. As described in the NZIER report (section 2.1), the Taranaki/Whanganui region economy represented approximately 6.5 percent of national GDP in the year to March 2023. Within this region the South Taranaki and Whanganui Districts combined to represent approximately 2.7 percent of the nation's GDP.
49. The BERL/MBIE Te Ōhanga Māori report estimates an asset base for the Māori economy valued in 2023 at \$125.8 billion across Aotearoa. For Te Tai Hauāuru rohe¹⁵, this asset base was estimated at \$11.29

¹⁵ An area broadly spanning the Taranaki and Manawatū-Whanganui Regions. Further disaggregation by area of this data was not available in the BERL/MBIE report.

billion (9% of the total), including \$5.05 billion in primary industries and 2.45 billion in the public and professional services sector.

50. Iwi organisations and entities in the District and Region are at various stages of their development along pre- and post-settlement spectra. Similarly, Māori Trusts and Incorporations in the District and Region are at various stages of development and growth consistent with objectives and strategies spanning inter-generational horizons¹⁶.
 - a. The sector spread of the above asset base suggests – broadly similar to that for Māori economic activity across Aotearoa – a concentration in land-based primary industries alongside delivery of a range of professional and public services (for example, legal, accounting, health, education, and social services).
51. While unable to provide GDP and FTE numbers, Census data provides a level of sector and regional detail that supplements the above.
52. Census 2023 data reported¹⁷
 - a. The Region's employment at 85,575 people, or 3.3 percent of the nation's total. Of this number, 17,400 identified as Māori, or over 20 percent of the Region's total.
 - b. The District's employment at 35,991 people or 1.4 percent of the nation's total. Of this number, 9,000 identified as Māori, or over 25 percent of the District's total.
 - c. The sector breakdown of these numbers are illustrated in Figure 1 and Figure 2 below. The categorisation of sectors is appended in Table 1 .

¹⁶ For example, Te Runanga o Ngati Ruanui Trust, Te Kaahui o Rauru, Te Korowai o Ngaruahine, Parininihi ki Waitotara Incorporation, Ātihu-Whanganui Incorporation, Ngā Tāngata Tiaki o Whanganui.

¹⁷ For simplicity and to ease comparison, the following adopts the District and Region definitions as per the NZIER report. That is, *District* refers to the combined Whanganui and South Taranaki Districts areas, while *Region* refers to Taranaki Region together with the Whanganui District.

- d. The Region's employment was concentrated in the *other services* sector, a 34 percent proportion, similar to that for the nation. However, the proportion in *primary* and *primary processing* (8.6 and 7.4 percent, respectively) sectors was noticeably higher than that for the nation (5.1 percent and 3.8 percent). Similarly, there was a higher proportion of employment in the *other manufacturing and utilities* sector in the Region compared to the nation (6.8 percent and 6.2 percent, respectively).

Figure 1 Total employment by sector in the District and the Region

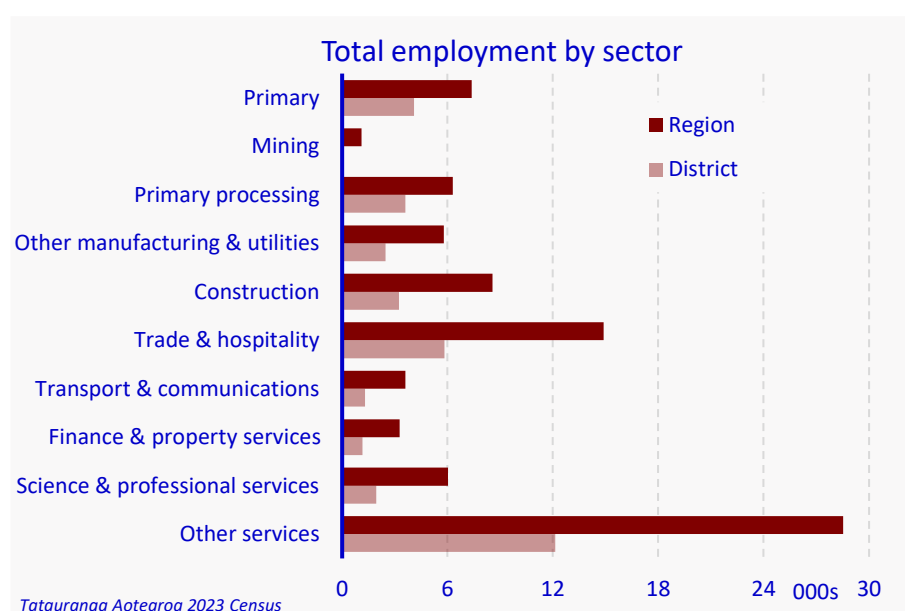
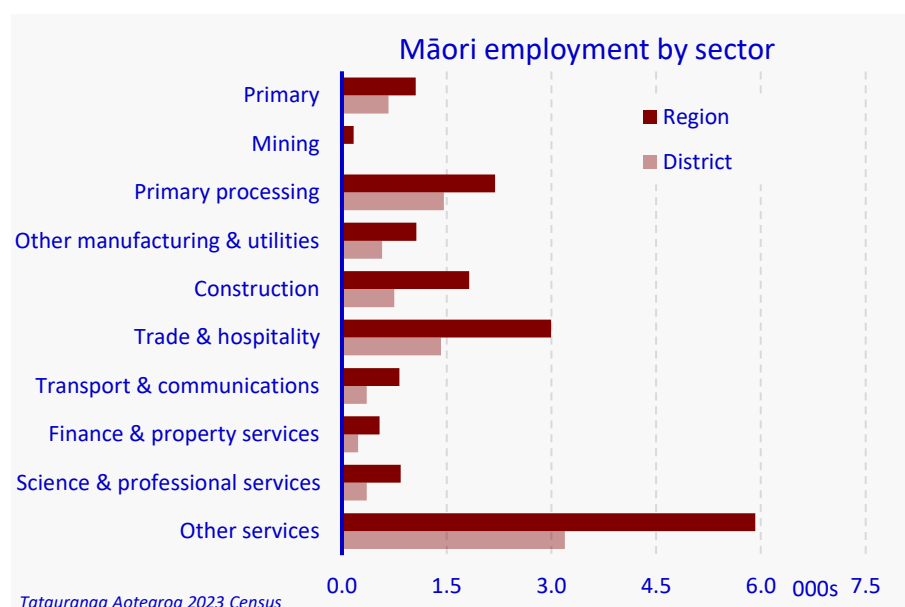


Figure 2 Māori employment by sector in the District and the Region



- e. Employment of Māori was also dominated by the *other services* sector. In contrast, there was relatively less employment of Māori in *finance and property* and *science and professional services* sectors (3.1 and 4.8 percent, respectively) compared with that for the nation (5.4 and 9.9 percent).
 - f. The proportional spread for employment of Māori in the District is similar, with the notable exception of the 1,461 people recorded in the *primary processing* sector – over 16 percent of the total employment of 9,000 Māori in the District.
53. Broadly speaking the District and Region are, unsurprisingly skewed towards *primary* and *primary processing* sectors, with a slightly larger skew towards these activities in Te Ōhanga Māori.
54. Census data also show that median personal incomes in the District and Region are lower than those across the nation. This distinction is further pronounced for Māori. These data align with the distribution of employment, and the relatively less importance of the high-paying *finance and property* and *professional services* sectors in these areas.
55. Importantly, the Project sees multiplier effects across the District, Region, and national economies – although these appear concentrated in the non-District component of the Region. The sector breakdown of this Region suggests little direct linkages to existing activity.
- a. Consequently, sustainable economic impact for local communities to benefit from the Project would require considerable investment in foundation workforce and business development in the area.
 - b. In a similar vein, Māori economy and business activity is also at risk of being bypassed by this Project in the absence of targeted investments.
56. Further, the delivery of infrastructure or development projects remains unclear as a result of this Project

- a. Significant linkages with local area businesses and activity appears lacking, while the use of *fly-in-fly-out* / *drive-in-drive-out* workforce appears at odds with providing skills and training and employment opportunities for the local community.
- b. A positive down-stream ‘legacy’ impact from the Project – as would be implied for an infrastructure or development project – is difficult to observe. Curiously, the establishment of a facility to provide technical and marine skills-based training is listed under “Social impacts”.
- c. Consequently, after 35 years and on completion of the Project, it is difficult to clearly envision a positive legacy in terms of business, employment, or income opportunities, or a more balanced economic structure, for the local area or the Region.

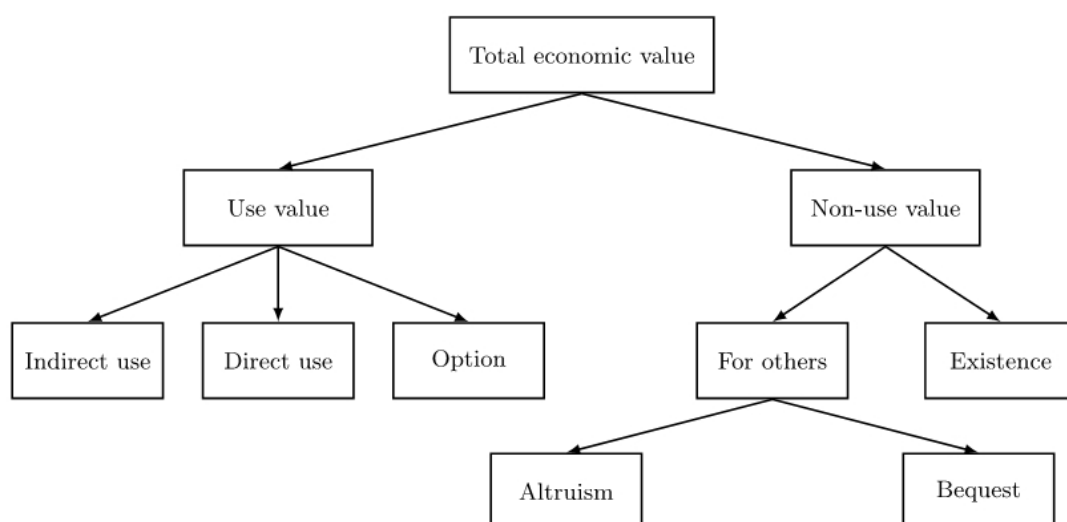
TOTAL ECONOMIC VALUE

- 57. In moving from **gross** economic effects to **net** economic effects, there are considerable adjustments to be captured. As noted earlier, multiplier model effects would need to be modified to allow for potential resource supply shortages and consequent relative price changes. However, this remains a narrow perspective on economy – driven by an objective to produce and spend.
- 58. Consequently, such adjustments – using, perhaps, a CGE modelling approach – would still leave us within a narrow *produce and spend* perspective on economic activity. In a similar vein, the narrowness and limitations of GDP in reflecting prosperity or wellbeing are well traversed in the economic literature. In particular, potential costs associated with impacts on natural eco-systems are not captured by this *produce and spend* perspective – unless such costs are **explicitly internalised** in production and spending decisions.
- 59. Further, both multiplier and CGE analysis remain in a perspective that, for a resource (or asset) to provide value, that resource must be put to

use. Alternatively, a resource that is left idle (or not being used) is not providing value.

60. The importance of *sustainable* natural resource use is becoming increasingly prominent in economic research and deliberations. These considerations are actively broadening perspectives on *value* for economic purposes, as well as heightening the importance of objectives (outside of GDP growth) for economic activity.
61. Total Economic Value (TEV) recognises broader perspectives (or definitions) of *value*, acknowledging economic activity may include using and/or not using resources (or assets). Further, an object, good, or service may be of *value* (or provide value) even if it is not being *used*.
62. Roskrue et al provide an illustration of the TEV framework, itself modified from a 2006 OECD paper, which is replicated as Figure 3.

Figure 3 Components of Total Economic Value



63. The components of TEV explicitly recognise distinctions in value from using and not using a resource.
64. **Use value** is the value derived from actively using a resource (or an asset) or an ecosystem.

- a. Direct use value: The value of consuming the resource directly, such as harvesting timber from a forest for use in constructing buildings.
 - b. Indirect use value: The value of benefits from using, **but not consuming**, the resource; for example, value from swimming in a river¹⁸, or value provided by using walking or biking trails in a forest.
 - c. Option value: The value of keeping a resource available for potential future uses, even though it is not being used now.
65. **Non-use value** is value derived from resources (assets) or eco-systems that are not directly used.
- a. Existence value: The value associated with a person knowing that a resource or asset, through its very existence, contributes to that person's wellbeing. For example, the value derived from the knowledge of the very existence of a forest or an animal species, or taonga such as a maunga or an awa.
 - b. Altruistic value: The component of non-use value associated with the knowledge that the resource or asset, through its very existence, contributes to the wellbeing of others.
 - c. Bequest value: The value associated with preserving a resource in order for it to be passed to future generations.
66. This TEV framing provides a foundation to extend Benefit-Cost Analysis (BCA) modelling to more comprehensive Social BCA¹⁹. Such a framing ensures that in moving from economic *effects* to *benefits*, there is acknowledgement that the value of a resource need not only accrue to individuals through the resource itself being used.

¹⁸ The strict categorisation of components can vary across interpretations. Some view non-consumptive uses by oneself as a direct benefit, while non-consumptive uses by others are seen as indirect benefits.

¹⁹ As noted in the evidence of Fleming and Buckwell.

67. A TEV is another attempt, when combined with Social BCA modelling pursued, to ensure all potential costs of the use of resources are indeed internalised.
68. While the framing of TEV is ideal for application to natural resource and ecosystem assets, it can also be useful in the valuation of both tangible and intangible assets and taonga – such as property, language, culture, and knowledge.
69. Roskrug et al and Dell et al pursue these considerations – building on the seminal work of Professor Mānuka Hēnare – in extending economic understanding beyond the narrow ‘produce and spend’ multiplier model. In particular, the importance of natural resources and taonga *in and of themselves* should not be understated, or worse ignored.
70. While there are significant advantages of a TEV framework, it is also restrictive when used with Social BCA through the required monetisation of all values. As noted by many²⁰, there are a range of well-established valuation methods to monetise the value of assets not involved in market transactions. These include willingness to pay and willingness to accept proxies for value.
71. The need to monetise these TEV values implies (or assumes) the presence of a ‘trade-off’. That is, an individual (or community) is willing to ‘give up’ some resource or asset in exchange for another resource or asset (implicitly, of equivalent value).
72. Estimating proxies through survey methods risks understating values as *willingness to pay* or *willingness to accept* can be mis-interpreted by some as *ability to pay* or *ability to accept*. As a result, the valuation of assets can be influenced – and incorporate an inherently downward bias – by the financial income or wealth of individuals or communities.
 - a. A reflection of the risk of downward bias was reflected in the recent revision of the Value of a Statistical Life (VoSL)

²⁰ Including Roskrug *et al*, and Fleming and Buckwell.

incorporated in the Treasury Cost-Benefit Assessment model. This revision saw the estimated VoSL for use in the model increase from \$4.9 million per life to \$14.8 million per life²¹.

73. However, where resources are considered as being of existential importance (for example, a living tīpuna, such as a maunga or an awa), the presence of a trade-off is not a valid assumption. Consequently, the inability to monetise the value of some resources is a shortcoming that remains in a Social BCA calculation.
74. This shortcoming should not be ignored, even though it may not be quantifiable, as the existence of such resources remain relevant in any assessment of net economic benefit when framed properly within TEV concepts.

CONCLUDING COMMENTS

75. The Economic Effects assessed by the multiplier model and presented in Section 5.2 of the application are undoubtedly **illustrative** of the **gross** economic impact. They fall short of any assessment of **net** economic impact, even when viewed from a *produce and spend* perspective on economic activity and objectives.
76. Section 5.2 of the application and the accompanying NZIER study **contribute little to inform a Total Economic Value perspective**. A valuation of resources from the perspective of their uses, as well as their existence, is absent in the analysis.
77. The **lack of a convincingly positive legacy** – as would be expected for an infrastructure and development project yielding significant regional or national benefits – in terms of business, employment, or income opportunities, or a more balanced economic structure, is similarly absent from the analysis.

²¹ <https://www.treasury.govt.nz/publications/guide/archive-cbax-material> and <https://www.nzta.govt.nz/assets/resources/research/reports/698/698-monetised-benefits-and-costs-manual-mbcm-parameter-values.pdf>.

78. Consequently, Section 5.2 and the NZIER study **should not be used** as providing sufficient evidence of significant regional or national benefits arising from the *Taranaki VTM Project*.

REFERENCES

Trans-Tasman Resources Ltd, *Taranaki VTM Project, Fast-Track Act Application*, 15 April 2025.

NZIER, *Economic impact assessment of TTRL's Taranaki VTM Iron Sands Project*, Report to Trans-Tasman Resources Limited, 12 March 2025.

Matthew Roskrug, Richard Meade, Trinh Le, Georgia McLellan, John McDermott, *Understanding the economic value of Māori taonga: a scoping study*, Te Au Rangahau Māori Business School, Massey University, November 2022.

BERL and MBIE, *Te Ōhanga Māori 2023 The Māori Economy 2023*, Whiriringa-ā-rangi 2024.

Sonette van Zul and Joey Au, *The Start of a Conversation on the Value of New Zealand's Natural Capital*, Office of the Chief Economic Adviser, Living Standards Series Discussion Paper 18/03, NZ Treasury, February 2018.

David Pearce, Giles Atkinson, and Susana Mourato, *Cost Benefit Analysis and the Environment: Recent Developments*, Organisation of Economic Co-operation and Development, 2006.

Mānuka Hēnare, *The economy of mana*, in D. Cooke, C. Hill, P. Baskett, & R. Irwin (Eds.), Beyond the free market: rebuilding a just society in New Zealand, (pp.65–69). Dunmore, 2014.

Kiri Dell, Nimbus Staniland, and Amber Nicholson, *Economy of Mana: Where to Next?*, Mai Journal: A New Zealand Journal of Indigenous Scholarship, 7(1), 2018.

Te Runanga o Ngati Ruanui Trust, Annual Report for Year Ended 31 March 2024.

Christopher Fleming and Andrew Buckwell, *Evidence commissioned by K Kiwis Against Seabed Mining (KASM), Greenpeace Aotearoa Inc., and Concerned Communities of Taranaki and Manawatu Against Seabed Mining*, Griffith Business School, Griffith University, Queensland, Australia, Draft September 2025.

Te Ohu Kaimoana, *Response to the Taranaki VTM Project – Fast Track Approvals Application*, Draft September 2025.

APPENDIX SECTOR CLASSIFICATIONS

Table 1 Sector classification and groupings

Part 1²²:

ANZSIC classification	Broad sector grouping
A01 Agriculture	Primary
A02 Aquaculture	Primary
A03 Forestry and Logging	Primary
A04 Fishing, Hunting and Trapping	Primary
A05 Agriculture, Forestry and Fishing Support Services	Primary
B06 Coal Mining	Mining
B07 Oil and Gas Extraction	Mining
B08 Metal Ore Mining	Mining
B09 Non-Metallic Mineral Mining and Quarrying	Mining
B10 Exploration and Other Mining Support Services	Mining
C11 Food Product Manufacturing	Primary processing
C12 Beverage and Tobacco Product Manufacturing	Other manufacturing & utilities
C13 Textile, Leather, Clothing and Footwear Manufacturing	Other manufacturing & utilities
C14 Wood Product Manufacturing	Primary processing
C15 Pulp, Paper and Converted Paper Product Manufacturing	Primary processing
C16 Printing	Other manufacturing & utilities
C17 Petroleum and Coal Product Manufacturing	Primary processing
C18 Basic Chemical and Chemical Product Manufacturing	Other manufacturing & utilities
C19 Polymer Product and Rubber Product Manufacturing	Other manufacturing & utilities
C20 Non-Metallic Mineral Product Manufacturing	Other manufacturing & utilities
C21 Primary Metal and Metal Product Manufacturing	Primary processing
C22 Fabricated Metal Product Manufacturing	Other manufacturing & utilities
C23 Transport Equipment Manufacturing	Other manufacturing & utilities
C24 Machinery and Equipment Manufacturing	Other manufacturing & utilities
C25 Furniture and Other Manufacturing	Other manufacturing & utilities
D26 Electricity Supply	Other manufacturing & utilities
D27 Gas Supply	Other manufacturing & utilities
D28 Water Supply, Sewerage and Drainage Services	Other manufacturing & utilities
D29 Waste Collection, Treatment and Disposal Services	Other manufacturing & utilities

²² ANZSIC: Australia New Zealand Standard Industrial Classification 2006, 2 digit Subdivision.

Part 2:

ANZSIC classification	Broad sector grouping
E30 Building Construction	Construction
E31 Heavy and Civil Engineering Construction	Construction
E32 Construction Services	Construction
F33 Basic Material Wholesaling	Trade & hospitality
F34 Machinery and Equipment Wholesaling	Trade & hospitality
F35 Motor Vehicle and Motor Vehicle Parts Wholesaling	Trade & hospitality
F36 Grocery, Liquor and Tobacco Product Wholesaling	Trade & hospitality
F37 Other Goods Wholesaling	Trade & hospitality
F38 Commission-Based Wholesaling	Trade & hospitality
G39 Motor Vehicle and Motor Vehicle Parts Retailing	Trade & hospitality
G40 Fuel Retailing	Trade & hospitality
G41 Food Retailing	Trade & hospitality
G42 Other Store-Based Retailing	Trade & hospitality
G43 Non-Store Retailing and Retail Commission Based Buying and/or Selling	Trade & hospitality
H44 Accommodation	Trade & hospitality
H45 Food and Beverage Services	Trade & hospitality
I46 Road Transport	Transport & communications
I47 Rail Transport	Transport & communications
I48 Water Transport	Transport & communications
I49 Air and Space Transport	Transport & communications
I50 Other Transport	Transport & communications
I51 Postal and Courier Pick-up and Delivery Services	Transport & communications
I52 Transport Support Services	Transport & communications
I53 Warehousing and Storage Services	Transport & communications
J54 Publishing (except Internet and Music Publishing)	Transport & communications
J55 Motion Picture and Sound Recording Activities	Transport & communications
J56 Broadcasting (except Internet)	Transport & communications
J57 Internet Publishing and Broadcasting	Transport & communications
J58 Telecommunications Services	Transport & communications
J59 Internet Service Providers, Web Search Portals and Data Processing Services	Transport & communications
J60 Library and Other Information Services	Transport & communications

Part 3:

ANZSIC classification	Broad sector grouping
K62 Finance	Finance & property services
K63 Insurance and Superannuation Funds	Finance & property services
K64 Auxiliary Finance and Insurance Services	Finance & property services
L66 Rental and Hiring Services (except Real Estate)	Finance & property services
L67 Property Operators and Real Estate Services	Finance & property services
M69 Professional, Scientific and Technical Services (except Computer Systems Design and Related Services)	Science & professional services
M70 Computer System Design and Related Services	Science & professional services
N72 Administrative Services	Other services
N73 Building Cleaning, Pest Control and Other Support Services	Other services
O75 Public Administration	Other services
O76 Defence	Other services
O77 Public Order, Safety and Regulatory Services	Other services
P80 Preschool and School Education	Other services
P81 Tertiary Education	Other services
P82 Adult, Community and Other Education	Other services
Q84 Hospitals	Other services
Q85 Medical and Other Health Care Services	Other services
Q86 Residential Care Services	Other services
Q87 Social Assistance Services	Other services
R89 Heritage Activities	Other services
R90 Artistic Activities	Other services
R91 Sport and Recreation Activities	Other services
R92 Gambling Activities	Other services
S94 Repair and Maintenance	Other services
S95 Personal and Other Services	Other services
S96 Private Households Employing Staff	Other services
Total Industry	Total