Before the Hearings Commissioner appointed by the Invercargill City Council

Under	the Resource Management Act 1991 (**Act**)
And	
In the Matter of	a notice of requirement for a designation under Section 168 of the Act to place a restriction on built form and electromagnetic interference around the Awarua Satellite Ground Station

Statement of Evidence of **John Stacey Ballingall** for Stewart Family Assets Limited (Economics)

Dated: 21 September 2026

Lane Neave
Level 1, 2 Memorial Street
Queenstown
Solicitor Acting: Joshua Leckie / Hayley Mahon
Email: joshua.leckie@laneneave.co.nz / hayley.mahon@laneneave.co.nz
Phone: 03 409 0321

lane neave.

Table of Contents

INTRODUCTION 1
SCOPE OF EVIDENCE 1
EXECUTIVE SUMMARY 2
THE STEWART FAMILY ASSETS SITE 5
ECONOMIC EFFECT OF THE NOTICE OF REQUIREMENT 7
RESPONSE TO SECTION 42A REPORT 10
RESPONSE TO SPACEOPS MATERIAL 13
CONCLUSION 16

INTRODUCTION

Qualifications and Experience

1. My name is John Stacey Ballingall.

2. I graduated from Massey University in Palmerston North with a Bachelor of Applied Economics and a Master of Applied Economics. I am a Chartered Member of the Institute of Directors.

3. I am currently employed as a Partner at Sense Partners Limited, an independent economics consultancy in Wellington. I have held that position since January 2019.

4. My previous work experience includes being the Deputy Chief Executive at the New Zealand Institute of Economic Research for 11 years, and the Deputy Director of the Economics Division at the Ministry of Foreign Affairs and Trade.

5. I have 25 years' experience in the application of economics to a wide range of business and policy issues, including regional economic development and economy-wide economic modelling.

6. I have been involved in several Environment Court cases and District Plan hearings.

Code of Conduct for Expert Witnesses

7. Although this is not an Environment Court hearing I have read and agree to comply with the Code of Conduct for Expert Witnesses in the Environment Court Practice Note 2023. This evidence is within my area of expertise, except where I state that I am relying on material produced by another person. 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

8. The topics covered in my evidence are as follows:

   (a) the Stewart Family Assets Limited (**SFAL**) Site;

   (b) the economic effect of the Notice of Requirement (**NOR**);

   (c) response to the Section 42A Report.

   (d) response to the Space Operations New Zealand (**SpaceOps**) material and evidence.

9. I have read the Notice of Requirement (NOR) application and the Section 42A Report prepared by Emma Spalding, Planning Consultant, dated 31 August 2026, and the evidence from Space Operations New Zealand Limited (SpaceOps) dated 14 and 15 September 2026.

10. I have also read the other evidence prepared for Stewart Family Assets Limited that is relevant to my area of expertise. I explain below where I rely on evidence or opinions from other witnesses.

EXECUTIVE SUMMARY

11. My evidence addresses the economic potential of the Awarua Quadrant, the likely economic consequences of constraining that potential through the proposed horizon mask and Electromagnetic Interference (**EMI**) limitation, and the economic matters raised in the Section 42A Report and the SpaceOps material.

12. My starting point is that both the Awarua Satellite Ground Station and the Industrial 4 (Awarua) Zone can generate economic benefits.

13. The relevant economic question is not which activity is more valuable in total. It is whether the *additional* protection sought for SpaceOps through the horizon mask and EMI limitation justifies the *additional* economic costs imposed on land that has been specifically identified for future industrial development: the marginal benefits of the NOR vs. its marginal costs for the regional economy and associated well-being.

14. I have therefore used a model of the regional and national economy to compare the economic impacts of developing the Awarua Quadrant under two scenarios: without the NOR ("unconstrained") and with the NOR ("NOR-constrained").

15. The difference between the two sets of results provides an indication of what the regional economy could miss out on if the NOR materially constrains development opportunities at the Awarua Quadrant – the opportunity cost of the NOR.

16. Without the NOR, my scenario modelling provides an unconstrained development benchmark in accordance with the underlying zoning for the Awarua Quadrant out to 2040. By 2040 the unconstrained scenario sees about 305 hectares are occupied, around $2.77b of capital expenditure and activities at the Site generating annual revenue of about $1.37b.

17. In this unconstrained scenario, the development of the Awarua Quadrant lifts Otago-Southland regional real GDP by $606 m above the business-as-usual baseline by 2040. Household spending – supported by more jobs and higher real wages over the projection period – is $262m above baseline by 2040.[1,2]

18. At the 2035 peak of the construction phase in this scenario, full time equivalent employment is 1,247 jobs higher than the baseline.

19. Over the 2027-2040 period modelled, the real GDP gains for the Otago-Southland economy relative to the baseline sum to $4.16b.

20. The NOR-constrained scenario is intended to represent a plausible development pathway if the horizon mask and EMI materially constrain development opportunities at the Site, either due to planning restrictions (particularly in the case of the horizon mask) or decreased investor appetite to locate there given higher regulatory uncertainty.

21. This scenario assumes the wind farm and silicon smelter do not proceed, land is absorbed more slowly, and the occupier mix shifts towards logistics, storage, primary sector handling and light industrial services.[3]

22. By 2040, the NOR-constrained scenario design assumes about 104 hectares are occupied and activities generate gross revenue of about $153 m per year.

23. Under these assumptions, regional real GDP is $0.21b above baseline by 2040, with the GDP gains over the 2027-2040 period summing to $1.16b. Employment is 257 jobs higher than baseline in 2035.

24. This indicates the NOR – should it result in a smelter and wind farm not happening due to planning challenges or a loss of certainty – could reduce the potential economic benefits of the Awarua Quadrant by $3.00b (or 72.1%) over the 2027-2040 period ($4.16b in the unconstrained scenario less $1.16b in the constrained scenario). Employment in the NOR-constrained scenario is 990 jobs lower than in the unconstrained scenario in 2035.

25. The table overleaf summarises the key results for both scenarios.

---

1 The baseline is the modelled business-as-usual path for the economy if the Awarua development scenario does not occur. Results above or below baseline are not changes from today; they are differences from that projected path in the stated year.

2 A computable general equilibrium (CGE) model is an economy-wide model that represents how industries, households, government and markets interact. It allows labour, capital and other resources to move between activities and regions as the economy adjusts to changes in the economic environment. It generates more conservative estimates of economic impacts than alternative methodologies such as multiplier analysis.

3 My modelling was finalised prior to reviewing the 14 September 2026 Statement of Evidence of Mr Dunn, in which he recommends less stringent NoR conditions. To the extent the revised conditions may permit more activity to occur at the Awarua Quadrant than I have assumed, my estimates of the potential opportunity cost of the NOR to the regional economy will be an upper bound. However, the direction of effects would not change and I am comfortable that the modelling provides an indication of the potential regional economic activity at risk.

Table 1 Comparison of unconstrained and NOR-constrained scenarios

Measure	Unconstrained	NOR-constrained	Difference/benefit forgone
Otago-Southland real GDP, 2035	+$458m	+$98m	$360m forgone
Otago-Southland real GDP, 2040	+$606m	+$208m	$398m forgone
Cumulative Otago-Southland real GDP, 2027-2040	+$4.16b	+$1.16b	$3.00b forgone
Otago-Southland employment, 2035	+1,247 FTE	+257 FTE	990 fewer FTE
Otago-Southland employment, 2040	-518 FTE	+411 FTE	Constrained scenario 929 FTE higher at this date
Otago-Southland real wage, 2040	+2.80%	+0.006%	2.794 percentage points lower
Otago-Southland household spending, 2027-2040	+$2.46b	+0.62b	$1.84b forgone

26. Based on this modelling, I therefore agree with the Section 42A Report that the main adverse economic effect of the NOR's horizon mask and EMI limitation is that it reduces development flexibility and investment certainty at the Awarua Quadrant. Based on my scenario modelling, this could result in up to a $3.00b loss to the regional economy, relative to an unconstrained development scenario, with accompanying negative impacts on employment, incomes and well-being.

27. From an efficiency of resource allocation perspective, this significant regional economic cost of the NOR needs to be compared against the potential additional benefits to the regional economy of SpaceOps expanding its operations.

28. I have seen no quantified estimates of the additional regional economic benefits of SpaceOps expanding its operations if a NOR were to be put in place. I do not doubt there would be some, but cannot imagine they would be of the same magnitude as the economic costs of the NOR I have estimated.

29. Unless SpaceOps can demonstrate that expanding its operations due to the NOR would deliver incremental economic benefits of more than $3.00b over the 2027-2040 period, the NOR would leave the regional economy worse off, with household well-being some $1.84b lower.

THE STEWART FAMILY ASSETS SITE

Economic Impacts of Unconstrained Development at the Awarua Quadrant

30. I first assessed the economic potential of the Stewart Family Assets site (**Awarua Quadrant** or **Site**) using the economic analysis in my September 2026 report 'Economic impact of the Milburn and Awarua Quadrants', which is at **Appendix 1.** For this evidence I rely on the modelling run in which the Awarua Quadrant is developed in isolation (see Appendix D of that report), rather than the combined Awarua and Milburn results. I have supplied a report of the economic analysis of the NOR at Awarua at **Appendix 2**.

31. I used a computable general equilibrium (CGE) model to estimate these economic impacts. Our CGE modelling framework is a 'what if?' scenario-based model: it answers the question "what would the regional economy look like if the Awarua Quadrant develops as expected?". The scenario results are compared against a business-as-usual baseline of the regional economy in which Awarua Quadrant is not developed.

32. The modelling was initially carried out with no NOR constraints. The unconstrained development scenario is a high-load scenario rather than a forecast. It is intended to show the scale of economic activity that could be enabled if the Site is successfully developed as a renewable energy-backed heavy industrial and logistics precinct, anchored by a silicon smelter.

33. The development scenario was designed with input from Calder Stewart, and is based on their commercial discussions to date. The modelling does not estimate the probability that each project proceeds. The modelling scenario I have used for the NOR-constrained scenario is included in Appendix 2.

Revenue and Scale

34. By 2040, the unconstrained modelled Awarua Quadrant development occupies about 305 hectares and supports activities generating indicative annual Site revenue of about $1.37b. The silicon smelter is the dominant activity, with indicative annual revenue of $1.2b, alongside food processing and cold-chain activity, South Port-linked logistics, and industrial services.

35. The development scenario includes a total indicative capital programme of about $2.77b, including approximately $1.4b for the silicon smelter, $750m for renewable generation, $350m of Site-wide enabling works and infrastructure, and further investment in processing, logistics and industrial services.

36. These revenue figures describe the scale of economic activity at the Site; they are not the same as GDP. GDP measures the value added generated after the cost of intermediate goods and services used in production has been deducted.

Investment Impacts

37. In the unconstrained scenario, real investment across the Otago-Southland region is $1.03b above the baseline in 2035 and remains $314m above baseline in 2040.

38. The difference between these regional investment results and the $2.77b capital programme at the Awarua Quadrant is due to the ‘no free lunches’ nature of CGE modelling. The CGE results measure the *net* economy-wide change in regional investment relative to a growing baseline, after allowing for imported capital equipment, displacement of other investment, and wider economic adjustment.

39. That is, because resources (land, labour, capital, energy, intermediate inputs) are limited, the resources required to generate the $2.77b capital spending at Awarua must come from somewhere else in the regional or national economy. This displaced activity is netted off the new activity at the Awarua Quadrant. The same logic applies to all results in the following sections.

Jobs and Wages

40. During the main construction and commissioning phase, additional economic activity at the Awarua Quadrant materially increases the demand for labour. The unconstrained scenario shows 1,247 additional full-time-equivalent (**FTE**) jobs across the Otago-Southland region in 2035 relative to the baseline, with real wages 2.5% higher.

41. By 2040, after the construction impulse has eased and the Site is in its operational phase, the model shows employment 518 FTE below the baseline but real wages 2.8% above it.

42. This does not mean that 2040 employment is lower than today. It is a comparison with a growing baseline and reflects the model's dynamic labour market adjustment: additional labour demand initially shows up strongly in employment, while over time it is increasingly reflected in higher real wages and labour moving towards higher-productivity activities. It also reflects workers returning home after being attracted into Otago-Southland from neighbouring regions during the construction phase.

43. The higher wages and employment (in aggregate) over the development of the Awarua Quadrant see real household spending in Otago-Southland lift by $262m above baseline by 2040.

Regional Gross Domestic Product

44. The most appropriate measure of the Site's contribution to economic activity is real GDP, or value added, rather than gross revenue. In the unconstrained scenario, Otago-Southland real GDP is $458m above baseline in 2035 and $606m above baseline by 2040.[4] Across the 2027-2040 period, these annual gains sum to $4.16b.

45. During the investment phase, resources are directed towards construction and capital formation, and Otago-Southland export volumes are $368m below baseline in 2035. Again, this reflects the conservative, 'no free lunches' concept that is built into CGE modelling: expanding one part of the economy (buildings and infrastructure at Awarua) uses up resources that might otherwise be used elsewhere to generate exports.

46. Once the smelter and other activities are operating, that pattern reverses: by 2040 regional export volumes are $855m above baseline. Real household spending is $410m above baseline in 2035 and $262m above baseline in 2040.

47. The transition from a construction-led investment phase to an export-led operating phase is central to understanding the economic potential of the Site in an unconstrained scenario. The enduring benefit of developing the Awarua Quadrant is not the temporary construction expenditure itself; it is the productive capacity that remains and generates output, wages and exports over time.

ECONOMIC EFFECT OF THE NOTICE OF REQUIREMENT

How I Assess the Economic Effect

48. The appropriate economic comparison is between plausible development outcomes with and without the NOR. It would be inappropriate to treat today's largely undeveloped Site as the permanent counterfactual. The Industrial 4 Zone exists to provide capacity for future large-scale industrial, warehousing and service activities, and the economic value of that land includes the ability to accommodate future investments whose precise identity cannot all be known today.

49. My unconstrained Awarua Quadrant scenario provides one benchmark for what the Site could support if its industrial development potential can be used without the horizon mask or EMI limitation constraint. The NOR-constrained scenario provides a second, lower-intensity pathway. I used the same CGE model for this analysis as for the unconstrained scenario.

[4] The model combines Otago and Southland into a single regional economy, so the regional results cannot be interpreted as a Southland-only estimate. Nevertheless, Awarua itself is in Southland and the modelled activities are centred on the Site, with wider effects transmitted through regional suppliers, households and labour markets.

50. The economic effect reported below is the difference between the two modelled contributions, measured on the same basis and against the same baseline. It is therefore an estimate of the economic consequences associated with the development constraints represented in the scenarios.

The NOR-Constrained Development Scenario

51. The NOR-constrained scenario assumes that the Awarua Quadrant continues to develop, but gradually as a lighter-scale industrial and logistics estate rather than as a heavy industrial precinct.

52. In this scenario the wind farm and silicon smelter do not proceed. Solar generation and battery storage are retained only as modest, staged on-site energy support. The occupier profile shifts towards port-linked logistics, warehousing and distribution, primary-sector storage and light processing, contractor yards, light manufacturing and assembly, bulk storage and container handling, and Site utilities.

53. By 2040 the NOR-constrained scenario assumes about 104 hectares are occupied, compared with 305 hectares in the unconstrained scenario. Indicative capital expenditure over 2027 to 2040 is about $299m, compared with $2.77b in the unconstrained design. Indicative annual gross revenue is about $153m, compared with $1.37b in the unconstrained scenario.

54. The economic modelling does not itself establish that the NOR would cause the wind farm or silicon smelter not to proceed, or that land absorption would follow the slower pathway. Those are scenario assumptions based on discussions with Calder Stewart regarding the potential commercial impacts of the NOR due to height restrictions and/or regulatory uncertainty.

55. My evidence quantifies the economic consequences *if* those development constraints occur and activity at the Site develops as assumed in the NOR-constrained scenario.

56. I have read the 14 September 2026 evidence of Mr Dunn, which proposes a revised set of NOR conditions. This evidence was received after I had finished my modelling work. To the extent the revised conditions are more permissive to potential activities at the Site, my NOR-constrained scenario may be conservative and the economic losses I then calculate due to the NOR may be an upper bound.

57. However, even if more activities *might* occur in theory than under the original conditions proposed, in practice it is still the case that the NOR will make investing at the Site a less attractive option for potential tenants than if the NOR were not in place. The regulatory uncertainty associated with the NOR remains – especially the need to seek approval from SpaceOps for some operations. And potential tenants for the Site – like any business – do not like regulatory uncertainty when they are considering investing millions or even billions of dollars.

What the Constrained Modelling Shows

58. The comparison shows a material reduction in the regional economic contribution of the Awarua Quadrant under the NOR-constrained pathway. The key results are summarised below in Table 2.

Table 2 Comparison of unconstrained and NOR-constrained scenarios

Measure	Unconstrained	NOR-constrained	Difference/benefit forgone
Otago-Southland real GDP, 2035	+$458m	+$98m	$360m forgone
Otago-Southland real GDP, 2040	+$606m	+$208m	$398m forgone
Cumulative Otago-Southland real GDP, 2027-2040	+$4.16b	+$1.16b	$3.00b forgone; 27.9% retained
Otago-Southland employment, 2035	+1,247 FTE	+257 FTE	990 fewer FTE
Otago-Southland employment, 2040	-518 FTE	+411 FTE	Constrained scenario 929 FTE higher at this date
Otago-Southland real wage, 2040	+2.80%	+0.006%	2.794 percentage points lower
Otago-Southland household spending, 2027-2040	+$2.46b	+0.62b	$1.84b forgone

59. By 2040, the NOR-constrained pathway as modelled still produces a positive economic contribution, but it is substantially smaller than under the unconstrained pathway. Otago-Southland real GDP is $208m above baseline under the constrained scenario, compared with $606m under the unconstrained scenario: a difference of $398m in that year.

60. Across 2027 to 2040, the cumulative regional GDP contribution is $1.16b in the NOR-constrained scenario compared with $4.16b in the unconstrained scenario. The NOR-constrained pathway therefore retains about 27.9% of the cumulative regional GDP gain and forgoes about $3.00b over the modelled period.

61. The 2040 employment results may look surprising at first glance. The unconstrained scenario is in its main construction phase in 2035 and is 990 FTE ahead of the constrained pathway. By 2040, however, the unconstrained construction programme has largely wound down while the NOR-constrained development path is still gradually building, so the NOR-constrained scenario has the higher FTE headcount at that single date.[5]

62. Note that in the unconstrained scenario, average real wages are 2.8% higher than the baseline by 2040. They barely move in the NOR-constrained scenario, being 0.006% higher than baseline.

63. This matters because household spending is driven by household income, which in turn is determined by a combination of job growth and real wage growth. Across the 2027-2040 projection period, the difference between household spending in the unconstrained and NOR-constrained scenario sums to $1.84b. This can be seen as a 74.8% decrease in additional well-being for the region's households because of the NOR as modelled.

RESPONSE TO SECTION 42A REPORT

64. I have considered the economic effects discussion at paragraphs 113 to 122 of Ms Spalding's Section 42A Report. In broad terms, I agree with its economic framing and conclusions.

65. My evidence adds more weight to the s42A findings. It demonstrates that the development opportunity forgone for the regional economy if the NOR were to be imposed is significant – around $3.00b of regional GDP over the 2027-2040 period.

Benefits of Protecting the Ground Station

66. At paragraphs 113 to 116, the Section 42A Report recognises positive economic benefits from protecting the ongoing operation of the Awarua Satellite Ground Station, including greater operational certainty, protection of existing and future investment and support for satellite communication services and the wider space sector. I accept that the ground station is economically valuable and that greater certainty may support continued investment.

[5] Recall as well that the results are the changes relative to a baseline in which employment is also growing – so the 2040 result in the unconstrained scenario does not mean that employment is lower than today. Rather there are 518 fewer FTE jobs than would otherwise have occurred in 2040.

67. The important economic distinction, however, is between the total value of SpaceOps now and the *additional* benefit created by this particular restriction. Existing employment, existing investment and satellite services that would continue *without* extending the horizon mask over the Awarua Quadrant are not benefits caused by that extension. They would happen regardless.

68. The relevant comparison is the additional regional economic benefit associated with SpaceOps applying the horizon mask and EMI limitation over the Site, against the additional regional economic cost associated with constraining development of the Site. There are no quantified estimates of the additional regional economic benefits of SpaceOps expanding its activities in the Section 42A report or SpaceOps' evidence.

69. This is also why I do not consider the issue to be a contest between the 'space sector' and 'industrial development'. If SpaceOps' core operational requirements can be achieved through a less restrictive approach, the economically preferable outcome is the one that preserves those benefits while avoiding unnecessary constraints on other productive activity. That is an application of opportunity cost: the value of the best alternative use that is given up when a resource (in this case industrial-zoned land) is constrained.

EMI Restrictions

70. At paragraph 117, Ms Spalding concludes that, subject to the recommended amendments, the electromagnetic-interference (EMI) restrictions are unlikely to materially constrain existing or anticipated industrial or infrastructure activities and that the associated economic effects are likely to be negligible.

71. I also note Mr Morley's evidence that he considers the EMI restrictions to be arbitrary and unnecessary.

72. In my opinion, there are potential adverse effects of the proposed EMI limitations regardless of how much they 'bite' in practice. Potential tenants at the Site will be put off by the uncertainty created by the suggested EMI limitations.

73. If prospective tenants are choosing between alternative sites, then all other things being equal they are likely to prefer the alternative that is unencumbered by EMI limitations. The EMI limitations effectively increase the required rate of return (or hurdle rate) for investors at the Awarua Quadrant compared to unencumbered sites, which will reduce the likelihood of them putting their capital into the Site.

74. This 'investment-chilling' effect is difficult to quantify directly but I note Mr Jones's evidence that even the potential for EMI limitations is already deterring investors.

75. My principal economic concern however is the horizon mask.

Horizon Mask, Development Capacity and Investment Certainty

76. At paragraphs 118 to 121, the Section 42A Report identifies the horizon mask as the main source of potential adverse economic effects. It notes that a 35 metre building would need to be approximately 377 metres from the boundary of the ground station Site to comply with the proposed mask, and that larger structures elsewhere in the affected area could require SpaceOps' approval. Ms Spalding concludes that this may require future operators to redesign, relocate or forego developments and may reduce development capacity and investment certainty.

77. Mr Dunn agrees, noting "I accept that this is an additional regulatory and development constraint. It may result in additional design work, technical assessment, relocation or modification of a [development] proposal" (para 68).

78. I agree with those economic mechanisms. Their effect is not limited to a building that is physically prohibited. A restriction can also change Site layout, require lower or differently configured structures, alter the relationship between an anchor tenant and supporting infrastructure, delay investment, or make development contingent on an additional approval. Each can reduce expected project returns and can affect whether, when and at what scale a project proceeds.

79. As outlined above, my economic modelling puts scale around this effect without assuming that all development is lost. The economic benefits forgone under a NOR-constrained scenario are significant (refer The key results are summarised below in Table 2.

80. Table 2).

Investment Uncertainty and Approval Pathways

81. The Section 42A Report also notes that activities breaching the designation would require SpaceOps' approval. From an economic perspective, there is a meaningful difference between development that can proceed under the ordinary planning framework and development that becomes contingent on a further approval. The latter can create additional risk, delay and design cost.

82. I do not attempt to put a separate dollar value on that uncertainty beyond that represented explicitly in the NOR-constrained scenario design. I nevertheless consider it relevant to the assessment because projects deterred at an early investigation stage may never appear as declined applications. The absence of observed refusals would therefore not establish that the approval requirement has no economic effect.

Overall Section 42A Recommendation

83. The Section 42A Report recommends that the horizon mask be modified to exclude the Industrial 4 (Awarua) Zone. From an economic perspective, that recommendation makes sense: it seeks to avoid restrictions that impose material opportunity costs on the wider regional economy where the operational objective can be achieved by a less restrictive method.

84. My economic modelling demonstrates that these opportunity costs are significant: some $3.00b of regional real GDP over 2027-2040, or 72.1% of the GDP benefits of the unconstrained scenario.

85. The overall *net* cost to the regional economy of the NOR would be this $3.00b less the additional economic benefits associated with SpaceOps expanding its operations. But as I outline below, these benefits have not been quantified.

RESPONSE TO SPACEOPS MATERIAL

Economic Benefits Claimed for Spaceops

86. I understand from the SpaceOps material that maintaining a low horizon improves the length and reliability of communication windows with low-Earth-orbit spacecraft. I do not offer an opinion on the engineering requirements of the ground station. I note, however, that the Section 42A Report records that some physical obstruction would reduce efficiency or communication windows rather than necessarily prevent the station from operating, and that the Council's engineering review questions whether a uniform restriction in all directions is required.

87. Those technical matters are important to the economic assessment. If the incremental benefit of protecting a particular direction is small while the restriction materially reduces the productive use of Industrial 4 land, the economic case for that part of the restriction is weaker. Conversely, if SpaceOps can demonstrate that a particular restriction will generate incremental economic activity through expanding services or investment, that benefit should be considered.

88. Unfortunately, there are almost no quantified incremental benefits in the SpaceOps evidence to help with a comparison of incremental costs and benefits associated with the NOR.

89. The SpaceOps NOR application identifies positive effects from protecting the ground station: continued efficient operation, protection of investment, continued satellite communications and potential wider benefits for Southland and New Zealand's space sector.

90. Mr McNeill states the current economic contribution of SpaceOps' operation includes around $50m of foreign investment in antennas, 20 high-tech jobs, and over 30 bed-nights for visitors (paras 111 to 113). A $4.55m headquarters is also under construction.

91. I do not dispute that this is a valuable economic contribution to the region, and that SpaceOps provides strategic and reputational benefits for New Zealand as a whole.

92. But that is not the question from an economic perspective. As noted above, when considering the allocation of a scarce resource such as industrial-zoned land, the question is: do the *additional* economic benefits of the NOR designation outweigh the *additional* economic costs?

93. Mr Dunn agrees: "The horizon mask must therefore be assessed on its own *additional* benefits and adverse effects" (paragraph 104, emphasis added).

94. But I disagree with the first part of his subsequent statement that "Those [additional benefits] include the protection it provides for the Ground Station's *continued* efficient operation and investment, alongside the additional assessment costs, uncertainty and potential constraints imposed on surrounding development" (paragraph 104, emphasis added).[6]

95. Continuing existing operations is not an additional benefit to the regional economy associated with the NOR. It would happen regardless, and does not make the regional economy any bigger than it otherwise would be without the NOR.

96. At the risk of repeating myself, we need to separate out the incremental benefit of the NOR on SpaceOps and the regional economy.

97. I have seen no quantified economic assessment from SpaceOps or any other party that estimates the additional regional economic benefit of imposing the horizon mask and EMI restrictions over the Industrial 4 Zone.

98. The Section 42A Report makes the same point: it records limited information quantifying the economic benefits of the NOR to the regional economy or demonstrating how those benefits are enhanced by the proposed designation beyond protections already available.

99. Mr Dunn asserts that "Overall, the NoR would result in substantial positive benefits for the continued operation of the Ground Satellite Station" (paragraph 116).

[6] Mr Dunn also notes at paragraph 115 that "The horizon protection provides a certain form of protection that is not otherwise available through RSM. This protection will provide SpaceOps with the ability to continue to invest in the site with a high level of certainty".

100. In my opinion, this is problematic for this hearing for three main reasons:

(a) It focuses on continuing operations (the status quo), not additional benefits due to the NOR.

(b) The "positive benefits" are not about the regional economy or economic well-being – they are as far as I can see almost entirely private benefits to SpaceOps.

(c) It has not been quantified so I have no idea how to interpret "substantial". Is this $1m of additional benefit per year to the regional economy? $50m? $500m?

101. Mr Dunn argues at paragraph 107 that designating the NOR with the revised conditions delivers "a certainty effect" that is a benefit to potential tenants of the SFAL land, as they won't get surprised by incompatible requirements late in the piece. This is perverse – a complete prohibition on developing any land at the Site would also deliver absolute certainty to potential tenants.

102. But that's not an economic benefit for the region that can be attributed to the NOR. It's clearly a cost relative to an unconstrained scenario. The cost may be lower under the revised conditions than the original proposal, but it's still a cost – some activity that would otherwise have been able to occur in the unconstrained scenario will now be subject to approval by SpaceOps.

SpaceOps' Characterisation of Effects on Industrial 4 Land

103. The NOR application (p.16) characterises effects on owners and occupiers of the Industrial 4 Zone as "minor", and Mr Dunn concludes they would be "acceptable" (para 81).

104. I strongly disagree that the adverse effects would be minor or acceptable. My economic modelling as outlined above demonstrates the effects of the NOR are likely to be significant – a potential loss of 72.1% of the accumulated regional GDP benefits that would otherwise occur under an unconstrained development scenario between 2027 and 2040.

105. Even if my estimates of losses are at the upper bound, given they were modelled before the revised NOR conditions were put forward, one could halve or quarter my estimated losses and the regional economic costs would still be significant.

106. In that respect, I agree with the Section 42A Report which concludes: "Overall, it is considered that the height limit imposed by the proposed horizon mask restriction will have potentially significant adverse effects on the future use and development of the Industrial 4 (Awarua) Zone. In my view, these effects are significant and are not justified in this instance" (para 112).

CONCLUSION

107. Any quantified assessment of the costs and benefits of the NOR should compare the incremental benefit to the regional economy of protecting the industrial zone airspace against the opportunity cost of constraining Awarua development.

108. SpaceOps has not provided a quantified economic case for applying the NOR over the Industrial 4 Zone. The benefits asserted are largely benefits of protecting the status quo or continued efficiency for operation of the ground station – nothing additional relative to what would otherwise happen.

109. My evidence quantifies the significant opportunity cost of constrained development at the Awarua Quadrant. The unconstrained scenario I have modelled indicates Otago-Southland real GDP would be $606m above baseline by 2040, with cumulative GDP benefits of $4.16b over the 2027-2040 period.

110. Under a NOR-constrained scenario, the regional economic benefits of developing the Awarua Quadrant are much lower: Otago-Southland real GDP would be $208m above baseline by 2040, with cumulative GDP benefits of $1.16b over the 2027-2040 period.

111. Based on the scenarios I have modelled, the opportunity cost to the regional economy of the NOR constraints is therefore up to $3.00b of real GDP over the 2027-2040 period.

112. Unless SpaceOps can demonstrate that expanding its operations due to the NOR would deliver incremental economic benefits of more than $3.00b over the 2027-2040 period, the NOR would leave the regional economy worse off, with household well-being some $1.84b lower.

John Stacey Ballingall

21 September 2026

Appendix 1: Economic Impact of the Milburn and Awarua Quadrants

Economic impact of the Milburn and Awarua Quadrants

A GSM8-NZR dynamic computable general equilibrium modelling assessment

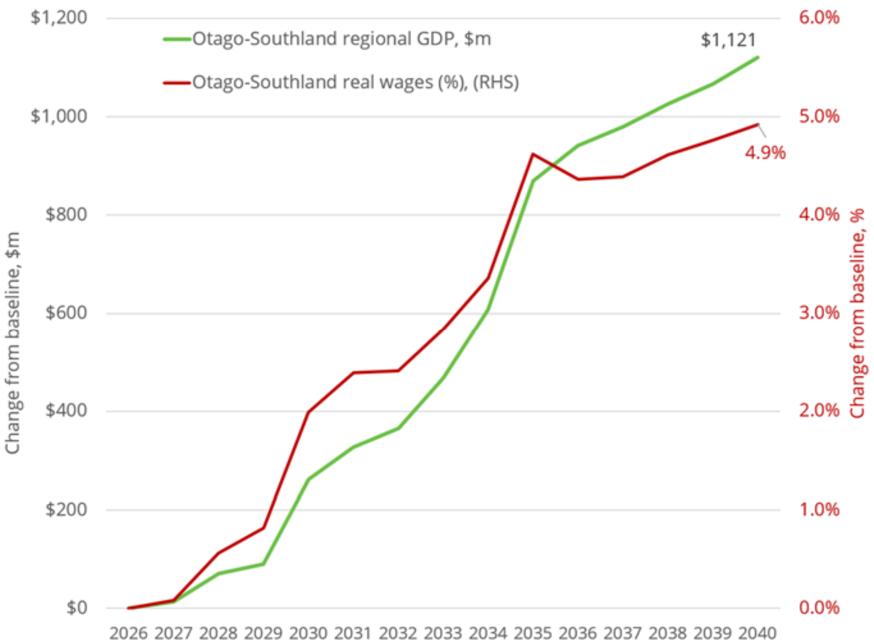
Final report, September 2026

Key points

This report uses the GSM8-NZR bottom-up regional dynamic computable general equilibrium model to examine the regional and national economic impacts of scenarios representing potential development pathways for the Awarua and Milburn industrial precincts out to 2040.

Headline results

FIGURE 1 INCREASED REAL GDP AND REAL WAGES IN OTAGO-SOUTHLAND REGION FROM DEVELOPMENT OF AWARUA AND MILBURN, RELATIVE TO BASELINE



Two complementary platforms: one larger proposition

- **Awarua is the energy-intensive platform.** Its centrepiece is a silicon smelter, supported by renewable generation, food and cold-chain activity, port-linked logistics and industrial services.
- **Milburn is the digital, processing and freight platform.** A large data centre campus sits alongside an intermodal hub, wood processing, food distribution and industrial services.
- **The enabling infrastructure has wider value.** Renewable generation, power connections and freight links add capacity that can support suppliers, customers and future investment beyond the two sites.
- **Construction brings the first wave of activity**. The larger prize is the productive capacity that remains after the build – supporting output, exports, wages and household spending year after year.

TABLE 1 THE PROPOSITION BY 2040

Measure	Awarua	Milburn	Combined
Occupied land	305 ha	145 ha	**450 ha**
Indicative annual site revenue	$1.37bn	$570m	**$1.94bn**
Indicative capital programme	$2.77bn	$2.93bn	**$5.70bn**
Renewable generation capex	$750m	$1.0bn	**$1.75bn**
Anchor investment	Silicon smelter	60 MW data centre	

First, the region gets a substantial investment and jobs lift

- **The work starts before the anchors open.** The enabling period runs from 2027–2031, followed by the core build from 2031–2036, so consenting, power, freight and site works need to be ready early.
- **The first beneficiaries are practical, local-facing industries.** Construction trades, machinery operators and drivers gain directly; sales and administration jobs expand as the regional economy and household spending grow.
- **Specialised equipment still matters.** Some of the additional capital is imported, while the installation, civil works, logistics and supporting services create substantial demand inside New Zealand.
- By 2035, **investment in the Otago-Southland region grows by 20% (or $1.7b)** above baseline and the region generates **more than 1,800 additional jobs**.
- The **regional economy is 2.4% larger than the baseline by 2035** due to this construction and preparatory activity.

Then, the new capacity changes the region's earning power

- **The regional economy is materially larger.** By 2040, Otago-Southland regional GDP is $1.1 billion, or 2.8%, above baseline, driven largely by increased export volumes.
- **Two industries make visible step changes in the regional economy.** Primary metals industry GDP is $220 million above baseline by 2040, including the silicon activity; media and communications is $154 million higher, including the data centre.
- **Established industries grow with them.** Construction, property services, wholesale and retail trade, road and rail freight, and water transport benefit from a larger customer base and higher volumes.
- **Households enjoy the benefits of growth,** with real wages lifting by 4.9% above baseline by 2040 ($3,400-$3,600 in today's terms for the average worker). Higher household incomes support an extra $0.5b of household spending in the region.

The gains extend well beyond Otago-Southland

- **The national result is positive even after allowing for competition for workers, capital and inputs.**
- That matters: the developments expand New Zealand's productive base rather than simply shifting activity to Otago-Southland.

TABLE 2 NEW ZEALAND GAINS MORE OUTPUT, EXPORTS AND SPENDING

National measure	Change from baseline in 2040	What it means
Real GDP	+$1.3bn (+0.23%)	A larger national economy
Export volumes	+$417m	More silicon, wood products and data services
Household spending	+$0.6bn	Higher disposable incomes with more jobs and increased real wages
Capital stock	Peak +$1.6bn in 2035	More productive assets in place; expanding the productive capacity of the wider economy
Tax revenue	+$1.3bn	Options to reduce fiscal deficit and/or lift public spending as income, company & GST tax take rises

By 2040, almost every region is better off than before

- **The Upper South Island enjoys the strongest spillover benefits.** Its proximity and strengths in non-metallic minerals, concrete, wood products and freight make it a natural supplier to the Otago-Southland economy as it expands. Its regional GDP is 0.14% above baseline by 2040.
- **Wellington sells capability into the projects.** Its professional and technical services fit the smelter and data centre, while construction and inter-Island sea freight also expand. The Wellington economy is 0.05% larger than baseline by 2040.
- **Auckland's result is small and relative.** It has fewer direct links to the developments but still competes nationally for capital, labour and inputs. Auckland continues to grow in absolute terms – just very slightly more slowly than its baseline.

Table of contents

KEY POINTS ... I

Headline results ... i
Two complementary platforms: one larger proposition ... i
First, the region gets a substantial investment and jobs lift ... ii
Then, the new capacity changes the region's earning power ... ii
The gains extend well beyond Otago-Southland ... iii
By 2040, almost every region is better off than before ... iii

TABLE OF CONTENTS ... IV

1. CONTEXT, OBJECTIVES AND SCOPE ... 1

1.1. Context ... 1
1.2. Objectives and approach ... 2
1.3. Scope and caveats ... 2

2. HOW WE MODEL ECONOMIC IMPACTS ... 4

2.1. Overview of GSM8-NZR model and database ... 4
2.2. Why use a CGE model? ... 4
2.3. Key features of GSM8-NZR ... 5
2.4. Overview of scenarios ... 6

3. QUADRANT DEVELOPMENT SCENARIOS ... 7

3.1. Awarua: a heavy industrial import-substitution and export platform ... 7
3.2. Milburn: a renewable-backed digital and primary sector logistics platform ... 9
3.3. Model closure assumptions ... 11

4. ECONOMIC IMPACT RESULTS ... 12

4.1. How to interpret these results ... 12
4.2. Impacts on Otago and Southland ... 12
4.3. Impacts on rest of New Zealand ... 18
4.4. Fiscal impacts ... 21

5. CONCLUSION ... 23

APPENDIX A: THE GSM8-NZR MODEL ... 24

Origin of GSM8-NZR ... 24
What is a CGE model? ... 25
GSM8-NZR considers the entire economy as an inter-linked system ... 25
Baseline and counterfactual scenarios ... 27
Results represent the difference between the initial and new equilibriums ... 29
Key dynamic features of GSM-NZ ... 29
Database aggregation for this project ... 30
Regional module ... 31

APPENDIX B YEAR-BY-YEAR DEVELOPMENT SCENARIOS ... 33

Awarua Quadrant ... 33
Milburn Quadrant ... 34

APPENDIX C INDUSTRY IMPACTS ... 36

APPENDIX D INDIVIDUAL QUADRANT MODELLING RESULTS ... 38

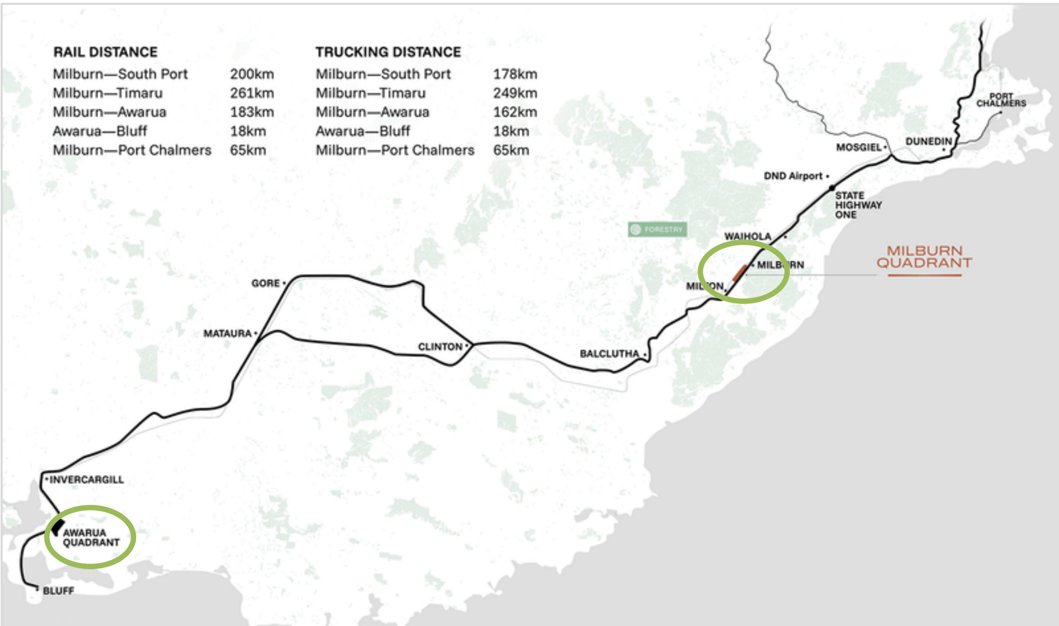
1. Context, objectives and scope

1.1. Context

Calder Stewart is progressing two large-scale industrial developments in the lower South Island: Awarua Quadrant in Southland and Milburn Quadrant in Otago.

The developments are intended to provide strategically located, large-format industrial land integrated with road and rail freight infrastructure and renewable electricity generation. The two Quadrants will operate as complementary nodes in the South Island freight network, supporting primary production, processing, manufacturing and export-oriented activities while shifting a greater share of freight from road to rail.

FIGURE 2 AWARUA AND MILBURN QUADRANTS



SOURCE: CALDER STEWART

Awarua Quadrant is located approximately 10km south of Invercargill, between Invercargill and Bluff. The 513-hectare site has around 403 hectares identified for development and is zoned for heavy industrial activity. It has direct access to State Highway 1 and the Main South railway line, while South Port at Bluff, Invercargill Airport and Invercargill itself are all around 10km away.

Calder Stewart's objective is to transition the site into a major industrial and logistics precinct supporting Southland's primary industries and higher-value activities including processing, cold-chain storage, technology, aquaculture and renewable energy. A large-scale silicon smelter is expected to be a major tenant. Renewable generation is intended to be an integral component, including rooftop and canopy solar and a proposed wind farm of up to seven turbines on adjoining or associated land.

Milburn Quadrant is a 200-hectare industrial development north of Milton in the Clutha District, positioned between State Highway 1 and the Main South railway line. The site forms part of the Tokomairiro Plain industrial area and is zoned industrial. Approximately 55 hectares of the Quadrant is proposed as an intermodal freight hub.

Calder Stewart's intention is for Milburn to function as an inland port and industrial precinct serving Otago and Southland exporters, allowing freight to be consolidated and transferred from truck to rail before reaching coastal ports. A large data centre is expected to be a key tenant. The development will feature renewable electricity through on-site solar generation and wind generation on nearby land.

1.2. Objectives and approach

Calder Stewart has engaged Sense Partners and Phylleos to provide independent economic impact analysis of the two Quadrants.

We first derive ambitious but plausible scenarios for the development of each site in terms of industries attracted, capital expenditure and potential revenue generated. In our scenario design, we take into account the potential for some economic activity at the Quadrants to be relocated from elsewhere in Otago, Southland or the rest of New Zealand.

We then use a state-of-the-art dynamic regional computable general equilibrium model called GSM8-NZR to compare the regional and national economies with and without development on each site out to 2040.

Based on the GSM8-NZR scenario analysis, we outline how the developments are expected to drive changes in regional and national economic activity, jobs, household spending and exports.

1.3. Scope and caveats

As with any dynamic CGE exercise, our results should be interpreted as **scenario-based estimates rather than forecasts**. The modelling asks how the New Zealand economy, and regional economies, could respond out to 2040 if the specified Awarua and Milburn development pathways occurred, relative to a business-as-usual baseline where the sites are not developed.

The development scenarios are ambitious, high-load cases and depend particularly on the assumed anchor investments – a silicon smelter at Awarua and a large data centre at Milburn – as well as the associated renewable generation and enabling infrastructure.

The results are therefore contingent on the scale, timing, industry mix, capital expenditure and additionality assumptions embedded in those scenarios. **Materially different development pathways would generate different economic impacts**.

The GSM8-NZR model's 72 industries represent groups of economic activities rather than individual firms or technologies. It **does not capture decision-making at the firm level**. Project-specific matters such as commercial viability, financing arrangements, ownership and profit retention, supply-chain contracting, consenting risk, electricity contracting etc are represented through scenario assumptions rather than forecast directly by the model.

Our estimates are best understood as **conditional economic impacts, not a benefit–cost assessment** or a statement that every modelled gain will be realised. CGE modelling is well suited to estimating net changes in output, wages, employment, investment and government accounts after allowing for displacement elsewhere in the economy and relative price changes, but it does not by itself assess the probability that the developments proceed.

2. How we model economic impacts

2.1. Overview of GSM8-NZR model and database

GSM8-NZR is a dynamic regional computable general equilibrium (CGE) model of the New Zealand economy. It is the bottom-up, regional version of GSM8-NZ, a national model.

GSM-NZ has been used extensively to look at the economic and emissions impacts of policy changes, natural resource limits, regulatory proposals and commercial decisions.[1]

'Bottom-up' means each of its 8 regions is modelled as an economy in its own right – with its own industries (72 in each region for this project), workers, prices and investment – linked to the others through trade, migration and shared national markets and policy settings.

GSM8-NZR is part of the GSM suite – national and regional models of many countries, and a global regional dynamic CGE model – among the most detailed dynamic CGE frameworks in current use. The suite has been applied in projects in dozens of countries and its models have been used in-house by governments, including the United States federal government. It is developed and maintained by Dr Ashley Winston of Phylleos, Inc., Washington DC, who produced the simulation results reported here.

GSM-NZ's database has been updated to the national input–output (IO) tables released by StatsNZ on 16 July 2026, so the simulations start from the most current official picture of the economy's structure available.

Beyond the IO tables, the national database draws on official statistics across the economy: national accounts and productivity data, Census occupation data, building consents, overseas trade and government finance statistics, tax data, and New Zealand's energy and greenhouse gas accounts. The regional module of the database uses regional GDP by industry data, supplemented with regional employment data.

2.2. Why use a CGE model?

Dynamic CGE modelling is widely regarded as a robust technique for examining economic impacts, as it:

- Estimates direct and flow-on effects, both positive and negative, after allowing for capital accumulation, investment, savings and debt over time, allowing assessment of short-run vs. long-run impacts.
- Explicitly captures how resources (labour, capital, etc.) are reallocated over time following a shock to the economy.

[1] Recent New Zealand clients include Treasury, Transpower, MBIE, Oji Fibre Solutions, Climate Forest Association, Ministry of Transport, Auckland International Airport and KiwiRail.

- Imposes economy-wide budget constraints, factor endowments and market-clearing conditions, preventing "free" creation of labour, capital or imports that often occurs implicitly in input-output or 'multiplier' analysis.
- Considers how firms, households and investors respond to changes in relative prices induced by the shocks, allowing substitution between inputs, products and factors of production.
- Incorporates technological change to explore shifts in economic structure over time.
- Captures distributional impacts across industries, regions and sources of final demand.

Due to the incorporation of feedback loops, resource constraints, price responses and intertemporal dynamics, CGE modelling will produce more moderate and defendable economic impacts than multiplier analysis.

2.3. Key features of GSM8-NZR

Features of the GSM8-NZR model that are particularly relevant to this project include:

- **Realistic labour market adjustment:** Wages adjust gradually rather than instantly, so new economic activity moves employment and unemployment in the near term and real wages in the long term. Labour supply responds through participation rates and through migration – between regions and internationally – and the workforce is tracked by occupation as well as industry.
- **Multi-asset capital by industry and region:** Capital is held as distinct asset types – buildings and structures, plant and machinery, transport equipment, intangibles – each accumulated separately via investment, so a data centre's capital build looks different from a smelter's.
- **Variable capital utilisation:** Industries can work existing capacity harder or idle part of it before investment responds, which is important for how the Otago and Southland economies absorb a construction boom.
- **AI capital:** GSM-NZ incorporates a dedicated treatment of AI-related capital that can substitute for or augment labour. This is relevant to the data centre included in the Milburn Quadrant scenario.
- **Energy and emissions detail:** The model and database include electricity generation by technology (hydro, geothermal, wind, solar, thermal); road, aviation and marine transport that can switch among petrol, diesel, biofuels, electricity and hydrogen; and emissions accounting by gas and industry, linked to the Emissions Trading Scheme price, the net-emissions cap and forestry sequestration.
- **Full external and fiscal accounts:** We can analyse export demand and import competition by commodity and explore fiscal impacts on central and local government.

- **Stocks as well as flows:** GSM incorporates explicit natural resource stocks – forests, fisheries, minerals, oil and gas – that earn the rents (flows) recorded in GDP. It also includes balance sheet accumulation for households, government and the nation's foreign assets and liabilities.

More details on the GSM8-NZR model are in Appendix A.

2.4. Overview of scenarios

For this project, we first model the New Zealand and regional economies each year out to 2040 in a **baseline or Business as Usual (BAU) scenario**.

The baseline scenario incorporates known policies and 'normal' expectations around the domestic and international economic environment. The aim is to project the economy out to 2040 on the basis that there won't be significant shifts in policy direction, disruptive technologies or the way New Zealand produces and consumes goods and services.

The baseline is itself a full year-by-year projection of the New Zealand economy to 2040, not a flat extrapolation.

It draws on official published expectations: the Treasury's latest economic and fiscal forecasts, StatsNZ population projections at the national and regional levels, Reserve Bank and IMF outlooks for New Zealand and its trading partners, and legislated climate policy settings including the Emissions Trading Scheme and the net emissions cap.

We take Treasury's latest macroeconomic forecasts for the first 5 years, and then Treasury's Long-Term Fiscal Model projections out to 2040. This gives us economic growth projections that determine the overall size of the economy.

We then apportion the economy between the 72 industries and 8 regions in our model. We combined the Otago and Southland economies into a composite regional economy, reflecting the close geographical and industry links between them.

Each regional industry's baseline trajectory is determined within the model through its production technology, demand for its products, regional factor availability, investment, relative costs, trade with other regions and overseas, and migration or labour market responses.

Because GSM8NZR is bottom-up, the baseline is carried through region-specific industries, capital stocks, labour markets, households, prices and trade relationships, while dynamic stocks such as capital and population are chained forward between periods.

The **Quadrant scenarios** are then run as deviations from this baseline. These are described in the next section.

3. Quadrant development scenarios

This section sets out the high-level economic modelling scenarios for the Awarua and Milburn Quadrants. The scenarios provide a year-by-year view of how each site could develop, what types of activity could be enabled and the indicative scale of that economic activity.

They were co-designed with Calder Stewart and draw on discussions with potential anchor tenants.

The scenarios are deliberately framed as ambitious high-load development cases. They are not forecasts. Their purpose is to test what the Quadrants' economic contribution could look like if successfully converted with large industrial landholdings, renewable energy propositions and transport connectivity into major new economic platforms for Southland and Otago.

The two scenarios describe the:

- **Awarua Quadrant:** a renewable energy-backed heavy industrial platform, anchored by a silicon smelter, with additional agri/aquaculture processing, port-linked logistics, storage and industrial support activity.
- **Milburn Quadrant:** a renewable energy-backed digital and primary-sector logistics platform, anchored by a major modular data centre, with forestry handling, wood processing, inland-port activity, food distribution and industrial support services.

3.1. Awarua: a heavy industrial import-substitution and export platform

FIGURE 3 AWARUA SITE

SOURCE: CALDER STEWART

3.1.1. High-level description

The Awarua scenario assumes that the site develops into a large-scale heavy industrial precinct that uses permissive industrial zoning, proximity to SouthPort and onsite renewable generation to attract activities that are unlikely to occur elsewhere in the lower South Island at similar scale.

The scenario includes a **silicon smelter as its anchor tenant**, based on commercial discussions already under way. Such a development would effectively create a major new export industry in New Zealand, as no such facilities exist elsewhere in the country.

The smelter is supplemented by agriculture and aquaculture processing, cold-chain storage, port-linked warehousing, industrial yards, engineering services and utilities.

Proximity to SouthPort is important because it gives exporters of manufactured or processed goods faster access to international shipping routes, while Awarua's scale creates space for activities that require buffers, laydown areas, storage, utilities and future expansion.

3.1.2. What will the Awarua Quadrant look like by 2040?

By 2040, the first major wave of Awarua development is assumed to occupy around 305ha of the net developable area of ~400ha. This leaves capacity for the wind and solar and later development beyond the modelling horizon.

By 2040, we expect annual revenue generated by activities at Awarua to be around $1.4b, and over $2.75b of capital spending to have occurred.

TABLE 3 OVERVIEW OF AWARUA BY 2040

Activity	Occupied land, ha	Indicative revenue, NZ$m p.a.	Indicative capex, NZ$m	Rationale
Silicon smelter	200	$1,200	$1,400	Energy-intensive anchor activity
Food processing and cold-chain	35	$70	$100	Linked to Southland primary sector growth
Storage; SouthPort-linked logistics	35	$65	$100	Warehousing, consolidation, laydown and port-linked export logistics
Industrial services and support	35	$35	$70	Maintenance, contractor yards, utilities, related industrial activity, etc
Site-wide enabling works & infrastructure	-	-	$350	Earthworks, roading, utility corridors, water, wastewater, stormwater
Renewable energy generation	-		$750	Wind, solar, BESS, internal reticulation, connection works and infrastructure
Total	**305**	**$1,370**	**$2,770**	

SOURCE: SENSE PARTNERS, CALDER STEWART

A year-by-year development description is in Appendix B. We use this to design our modelling shocks for each year.

3.2. Milburn: a renewable-backed digital and primary sector logistics platform

3.2.1. High-level description

The Milburn scenario assumes that the site develops into a multi-modal logistics and industrial precinct with a major data centre as the anchor energy user. It treats data centre attraction as central to the development pathway.

Milburn's development proposition is different from Awarua's. Awarua is framed around heavy industrial permissiveness and SouthPort proximity. Milburn is framed around **connectivity, rail access, SH1 access, primary sector logistics, renewable energy and digital infrastructure**.

The scenario assumes that Milburn's first movers are forestry and logistics users requiring a centralised location for export handling and distribution. Over time, the rail siding and inland-port function support wider freight consolidation, wood processing, food distribution and cold-chain activity.

The large data centre then becomes the anchor energy user, absorbing a substantial share of the nearby wind and onsite solar generation. We assume a 60MW IT-load data centre.

FIGURE 4 MILBURN SITE

SOURCE: CALDER STEWART

3.2.2. What might Milburn look like by 2040?

By 2040, the first major wave of Milburn development is assumed to occupy around 145ha of the ~200ha site, excluding the renewable energy infrastructure (Table 4). We expect annual revenue generated by activities at Milburn to be around $570m by 2040, with almost $3b of capital spending to have occurred.

TABLE 4 OVERVIEW OF MILBURN BY 2040

Activity	Occupied land, ha	Indicative revenue, NZ$m p.a.	Indicative capex, NZ$m	Rationale
Data centre campus	25	$240	$1,000[2]	60MW IT-load campus; revenue of ~$4m per MW of IT load
Intermodal freight hub and logistics	55	$110	$200	Inland port, storage, cross-dock, container handling and export consolidation
Forestry & wood processing	35	$145	$170[3]	Log handling, sawmilling, timber processing and associated services
Food distribution and cold-chain	20	$55	$90	Regional food distribution and temperature-controlled logistics
Industrial services and support	10	$20	$40	Engineering, fleet support, utilities and industrial services
Site-wide enabling works & infrastructure	-	-	$425	SH1 access, internal roads, rail siding, utility corridors, stormwater, water, wastewater, fibre
Renewable energy generation	-	-	$1,000	Wind, PV/BESS interfaces, electricity reticulation, connection works and energy-enabling infrastructure
Total	**145**	**$570**	**$2,925**	

SOURCE: SENSE PARTNERS, CALDER STEWART

[2] KPMG's 2026 data-centre benchmarking report puts base construction costs at roughly US$6.7m–$8.5m per MW, plus owner-furnished contractor-installed equipment of roughly US$3.5m–$3.8m per MW. That is approximately US$10.2m–$12.3m per MW before bespoke AI/HPC requirements, major grid reinforcement, abnormal ground conditions, fibre connections and tenant white-space fit-out. Converted at a broad 0.60 USD/NZD exchange rate assumption, that is around NZ$17m–$21m per MW, or roughly NZ$1.0b–$1.25b for 60MW. We take the lower end as a conservative estimate.
The best local comparator is Datagrid in Southland. Datagrid's material says its Makarewa Data Centre Park is 49ha and designed for 280MW of capacity. Public reporting describes the first phase/project as US$2b/NZ$3.5b, implying roughly NZ$12.5m per MW if benchmarked against 280MW. Applied to Milburn's 60MW, that points to an order-of-magnitude data centre capex of around NZ$750m, before any adjustment for site-specific grid works, AI-ready fit-out or customer IT hardware.

[3] A useful local comparator is Niagara. Niagara announced a $115m expansion at Kennington near Invercargill, including a new sawmill, with the company saying the investment would more than double output and increase log intake to over 500,000 tonnes p.a. Here, we assume more up-front infrastructure spending before a new plant can start operating.

3.3. Model closure assumptions

The 'closure' of a CGE model refers to the elements that we tell the model about (exogenous variables) and those which we want the model to tell us about (endogenous variables). We use a standard set of core macroeconomic closure assumptions, including:

- The volume of government spending and investment in the counterfactual scenarios remains the same as in the baseline, with the fiscal balance adjusting in line with changes in tax revenue.
- Regional household consumption and saving propensities fixed so the trade balance adjusts endogenously to reconcile saving, investment and domestic absorption.
- The economy is linearly transitioning to its Net Zero targets, with economy-wide ETS emissions exogenised and the ETS unit price varying to clear the emissions market (i.e. how much emissions can be generated by each industry).
- Technology and productivity assumptions are largely exogenous. These include labour-, capital-, energy-, primary factor- and intermediate input-augmenting technical change, emissions technology, sequestration technology, and a range of industry/commodity-specific efficiency parameters.
- Several key aggregate quantities are exogenous, including the average nominal exchange rate, population at time *t*, labour supply projections, natural resource supplies, sequestration quantities and global GDP.

4. Economic impact results

4.1. How to interpret these results

All results are shown as either cumulative percentage changes or changes in millions of dollars relative to a baseline where the economy is growing steadily out to 2040. They are not changes from today's economy or growth rates.

The national results flow from the sum of the regional results, so a positive change represents a net expansion in the New Zealand economy after resources have been shifted around regions and between industries following the development of the Quadrants.

Our focus is on real GDP, which represents the value-added component of the extra revenue generated by the Quadrants. Value added is the sum of returns to factors of production (i.e. wages, profits, land returns) or alternatively gross revenue less the costs of intermediate inputs.

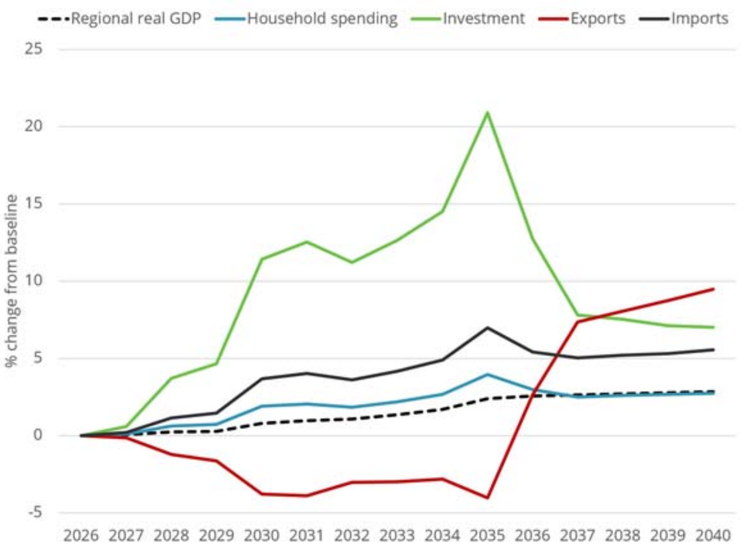
This section reports the results from our 'Combined' modelling run, where we model Awarua and Milburn at the same time. Appendix D summarises the results for the runs where we modelled each Quadrant's development separately.

4.2. Impacts on Otago and Southland

Strong investment in the initial development phase

In the enabling period (2027-2031) and core build period (2031-2036), infrastructure works and on-site construction draws investment, labour and imported equipment into the Otago-Southland regional economy. This sees **regional capital investment surge to be over 20% ($1.7bn) above baseline by 2035.**

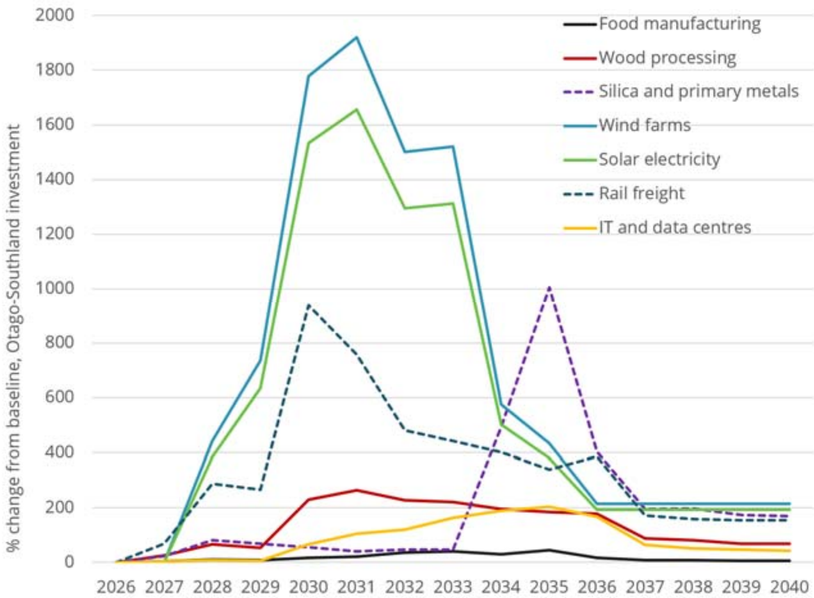
FIGURE 5 ECONOMIC IMPACTS ON OTAGO-SOUTHLAND, REAL, % RELATIVE TO BASELINE



The investment boom can be most easily seen at the industry level in Figure 6, which combines the investments at Milburn and Awarua. We see huge investments in wind and solar generation early in the construction phase, along with rapid expansion of rail infrastructure to support the movement of primary processed goods such as forestry.

The development of the silica smelter at Awarua can be seen in purple in the early- to mid-2030s and the data centre in yellow.

FIGURE 6 INVESTMENT IMPACTS ON OTAGO-SOUTHLAND REGION, REAL, % RELATIVE TO BASELINE



Under our closure settings, the resources required to enable the investment have to come from somewhere else in the economy. This explains why in the early years exports are slightly below baseline – at the margin labour, capital and intermediate inputs are being used for development activities at the Quadrants rather than for generating exports.[4]

The additional infrastructure and construction activity draws in additional imports of capital items, which increase by around 3.5% above baseline out to 2035.

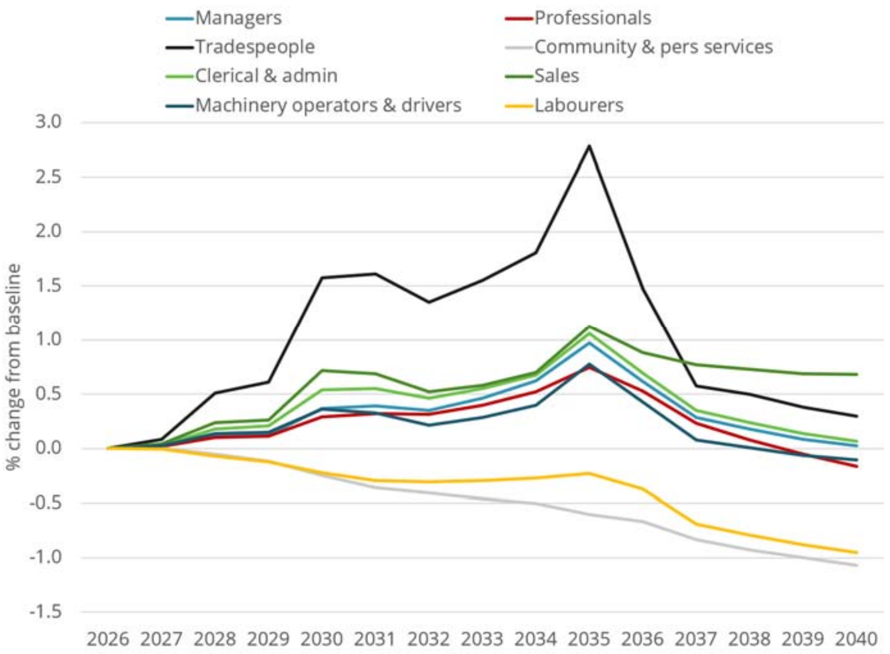
The demand for workers rises sharply above baseline during the construction period

The additional capital expenditure at Awarua and Milburn supports strong jobs growth in the construction period. As Figure 7 shows, the jobs impacts will be enjoyed most by those in the construction sector such as tradespeople, machinery operators and drivers; and those in sales

[4] Recall that these % changes are relative to a baseline that is growing. In the baseline, exports grow at around 2.4% per year between 2026 and 2035. In the Quadrant scenarios, it averages 2.0% per year.

and administration as the regional economy grows faster and household spending rises above its baseline level.[5]

FIGURE 7 JOBS IMPACTS BY OCCUPATION, OTAGO-SOUTHLAND REGION, % RELATIVE TO BASELINE

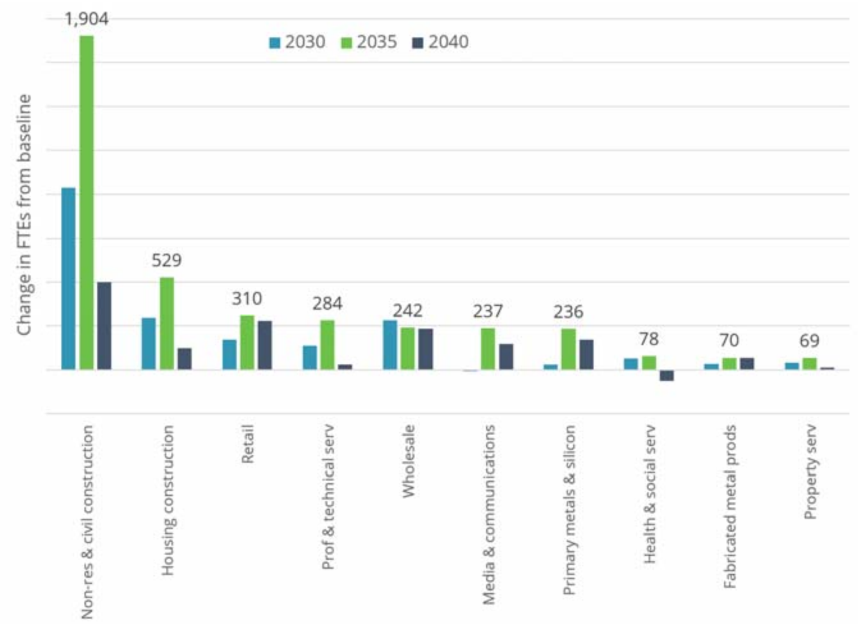


Across the Otago-Southland region, **this results in over 1,800 net additional full time equivalent (FTE) jobs by 2035.**

Figure 8 shows the 10 industries experiencing the largest job gains in 2035.[6] In the construction phase, workers are drawn from other parts of New Zealand, especially the wider South Island and lower North Island to meet the additional demand.

[5] Relative to the baseline (where jobs growth still occurs), the demand for labourers and community and personal services workers decline marginally. This is due to the change in the composition of the regional economy that becomes more heavily concentrated on heavy construction, renewable energy, primary processing, data centres and retail.
[6] In a resource-constrained economy, additional workers have to come from somewhere else, either regionally or from other parts of the economy. In the Otago-Southland region, labour is drawn from the tourism and manufacturing sector initially, and there is also an increase in the labour force participation rate (i.e. people entering the labour force who were previously unemployed). Additional workers shift into the region from the Upper South Island and the North Island.

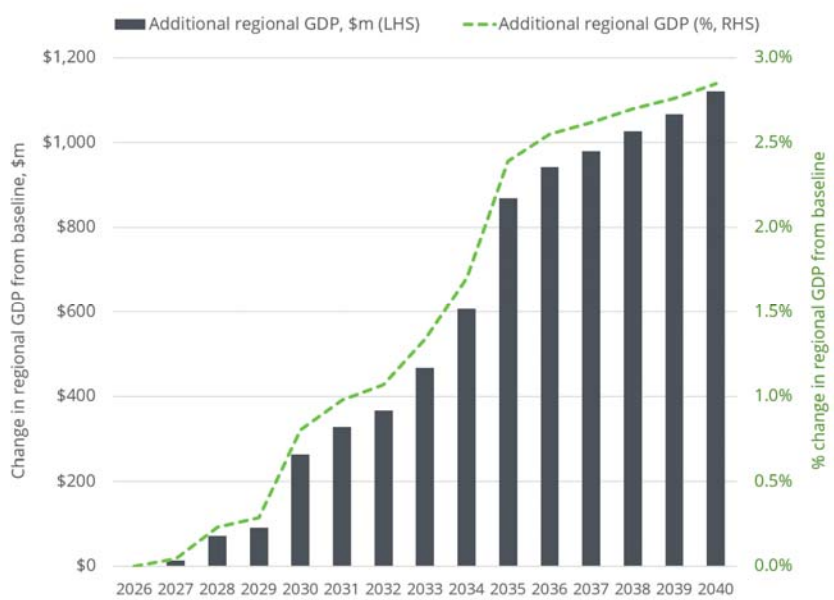
FIGURE 8 JOBS IMPACTS BY SELECTED INDUSTRY, OTAGO-SOUTHLAND REGION, FTES RELATIVE TO BASELINE



Later in the projection period this employment impulse eases as the Quadrants enter their fully operational phase. In our dynamic modelling of the labour market, additional demand for labour is first felt through additional employment, and later through real wage increases (see Figure 12 below).

Operations then convert the new capital stock into output, exports, wages and tax revenue year after year

FIGURE 9 OTAGO-SOUTHLAND REAL GDP, % CHANGE AND $M RELATIVE TO BASELINE

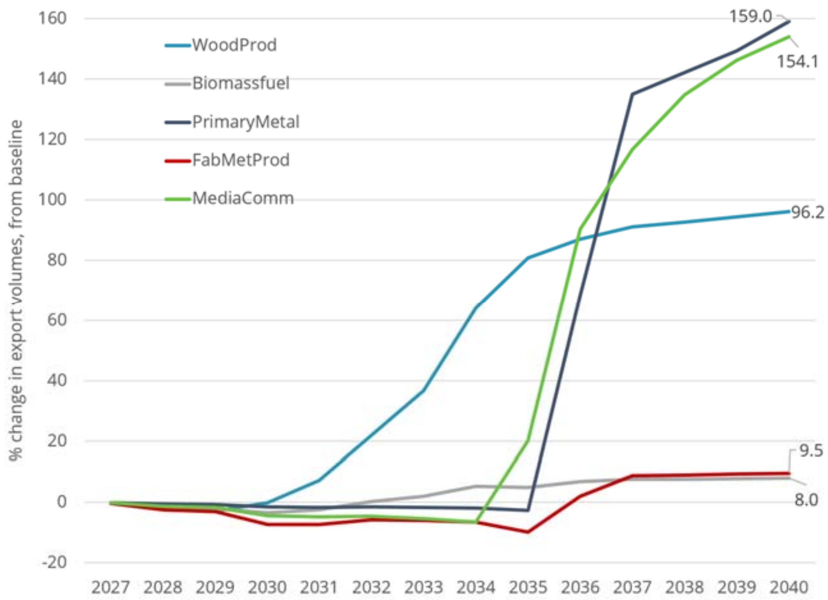


Once the construction phase starts to ease off, the economic impact of the Quadrants' development is driven by increased output and exports from the anchor tenants at Awarua and Milburn, and the accompanying flow-on benefits to the wider regional economy.

As Figure 9 shows, **by 2040 the regional economy is $1.1b (or 2.8%) larger than baseline in real terms, driven largely by increased export volumes**.

The capital expenditure at both Quadrants expands the productive capacity of the Otago-Southland region, and much of that additional capacity is dedicated to exports – of silicon, wood products and IT services (labelled 'MediaComm') in particular (Figure 10).

FIGURE 10 OTAGO-SOUTHLAND EXPORT VOLUMES, % CHANGE RELATIVE TO BASELINE, SELECTED INDUSTRIES



There are some offsetting impacts on other export industries as result of more resources going towards the new or expanded activities at Awarua and Milburn, plus higher wage costs for labour-intensive, export-focused services such as those in the tourism sector. Greater competition for resources pushes up the cost of intermediate inputs, which drives up the real exchange rate, reducing export competitiveness for some industries.

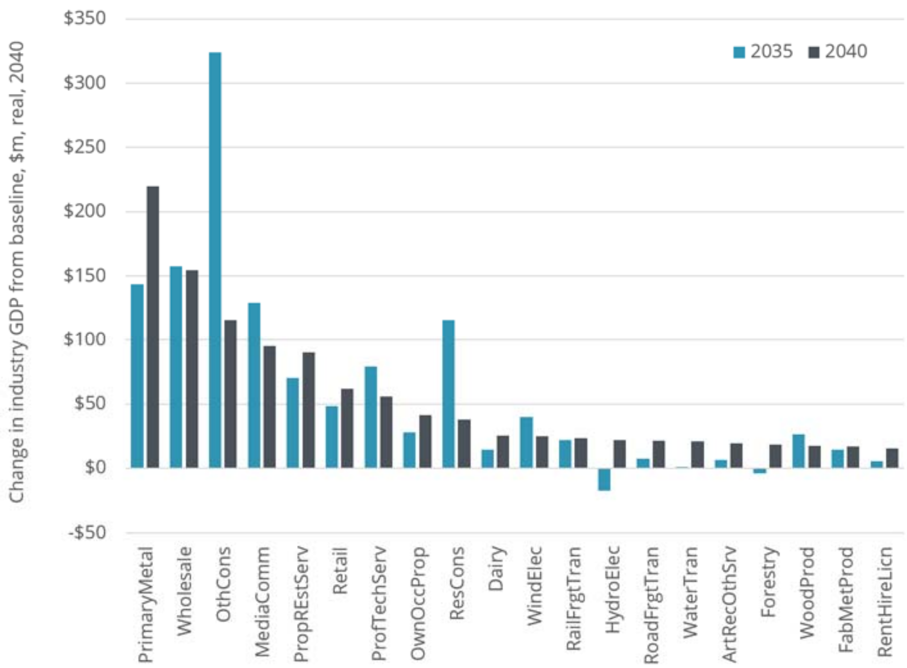
Strong growth in industries across the economy

Development at the Quadrants leads to significant growth in a range of existing and new industries. Figure 11 shows the largest winners, in dollar terms, from those developments:

- PrimaryMetal in the chart includes silicon in our database, and the new smelter boosts its industry GDP by $220m above the baseline by 2040. The data centre's output growth is captured in the Media Comm industry, which is $154m larger than baseline by 2040.

- The Quadrants deliver a sustained boost to the construction sector, as can be seen in the GDP gains to OthCons (non-residential and civil construction), PropREstServ (property and real estate services), ResCon (housing construction) and RentHireLicn (rental hire and licensing services).
- Wholesale and retail trade benefit as the regional population grows when workers come to Otago-Southland, supported by real wage increases.
- Rail, road freight and water transport expand as demand for their services lifts when primary product manufacturing grows.

FIGURE 11 OTAGO-SOUTHLAND INDUSTRY GDP, $M CHANGE RELATIVE TO BASELINE, SELECTED INDUSTRIES, 2040



A full set of industry value added/GDP and job impacts for the region can be seen in the heatmaps in Appendix C.

Otago-Southland households are big winners

Otago-Southland households benefit significantly from the Awarua and Milburn Quadrant developments.

During the construction phase, many will benefit from improved job opportunities as the demand for labour grows, as outlined above. But the **lasting benefit is through higher wages, which are on average 4.9% higher than baseline by 2040**.

This occurs due to higher demand for labour as the economy grows and improved labour productivity due to capital deepening.

To put the 4.9% in context, the average worker in Otago earns $74,050 per year and the average worker in Southland earns $69,950.[7] **Their increased annual earnings would be $3,600 and $3,400 respectively** if the 4.9% was applied to today's incomes.

As household incomes rise through both increased employment and higher real wages, total household spending lifts too. By 2040, **real household spending in the Otago-Southland region is $0.51b above baseline**.

That is, due to the growth in the regional economy following the two Quadrants' development, households in the region can afford to buy half a billion dollars' worth of extra goods and services, improving their collective standard of living.

FIGURE 12 OTAGO-SOUTHLAND REAL WAGES (%) AND HOUSEHOLD SPENDING ($M), CHANGE RELATIVE TO BASELINE

4.3. Impacts on rest of New Zealand

The Quadrants improve New Zealand-wide economic outcomes

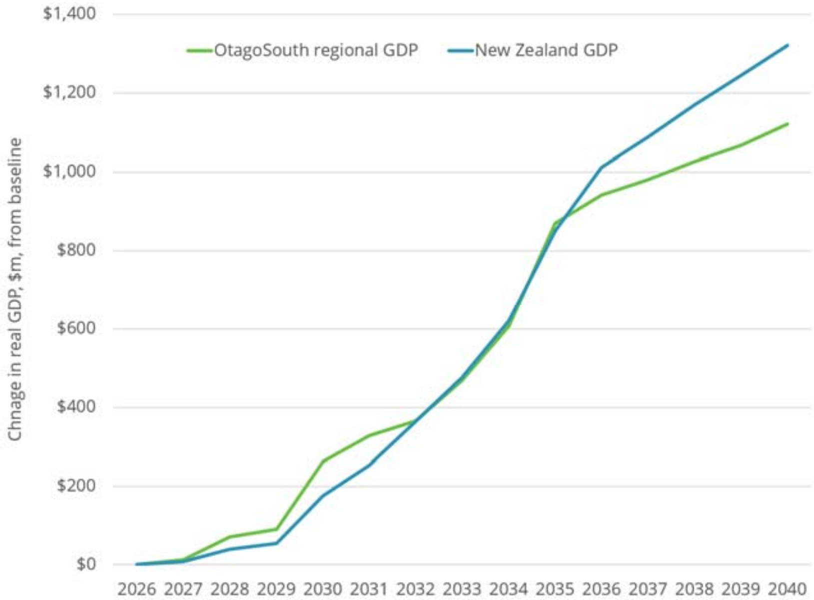
The section above outlined how the Otago-Southland region would benefit considerably from the developments at Awarua and Milburn. But their impacts will be felt across New Zealand too.

[7] Source: StatsNZ Household Labour Force Survey, year ended June 2025, downloaded from Aotearoa Data Explorer.

By 2040 **the national economy is $1.3b (0.23%) larger than in the baseline** (Figure 13). While the Otago-Southland region understandably comprises the bulk of this gain, the fact that the national economy grows materially too demonstrates:

- The developments are large enough to move the dial for other regions too. This is in part due to freight productivity improvements that support a more efficient path to market, and the spillover effects in supply chains across regional boundaries as Otago-Southland industries grow more rapidly.
- While there is some resource reallocation away from regions towards Otago-Southland, especially during the construction phase, this does not have a lasting dampening effect on other regions' economies.
- There is much national-level additionality associated with the developments – notably the silicon smelter and data center – meaning less activity is 'cannibalised' from elsewhere in the country.
- The additional electricity generation incorporated into both Quadrants' designs means less upward pressure on energy costs as demand rises, which in turn doesn't push up energy costs for other industries.

FIGURE 13 NZ REAL GDP VS OTAGO-SOUTHLAND REGIONAL GDP, $M RELATIVE TO BASELINE



Other notable New Zealand-level impacts include:

- **National export volumes increase by $417m above baseline by 2040**. National exports are boosted by silicon, wood processing and data services from Awarua and Milburn, with other export-focused industries seeing sales decline marginally as the exchange rate appreciates and input costs (e.g. labour costs) increase.

- **Household spending is almost $0.6b higher** than baseline by 2040, supported by increased disposable incomes as employment and wages rise.
- The **national capital stock expands by a peak of $1.6b** above baseline in 2035 as the construction period at Awarua and Milburn reaches completion.

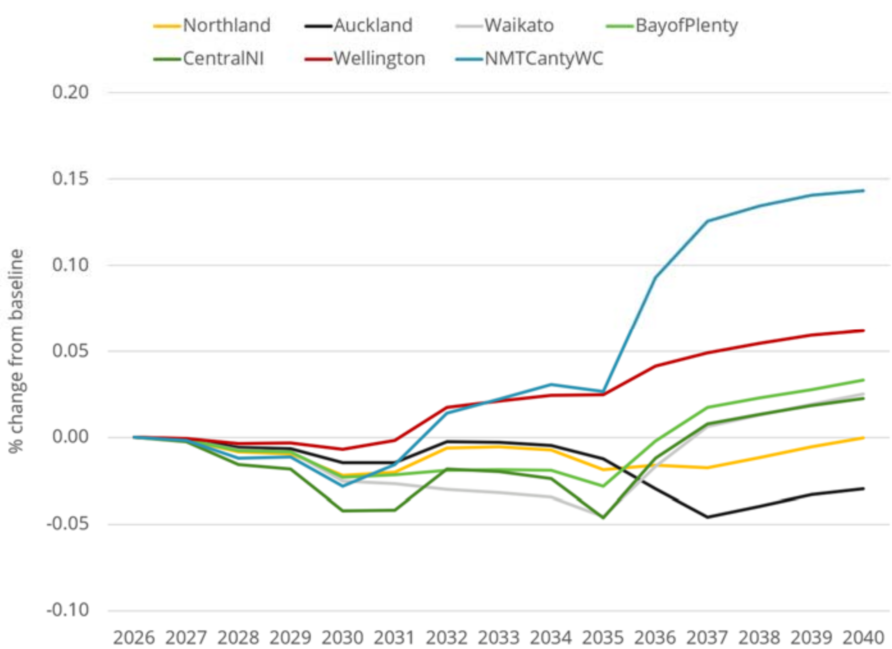
Almost all regions benefit from Otago-Southland's growth

Figure 14 below shows changes in regional GDP, relative to the baseline scenario, for all regions included in this study (excluding Otago-Southland, which was 2.84% above baseline by 2040).

Recall that in a bottom-up regional model, regional impacts are not estimating by apportioning the national impact across regions using fixed GDP shares: they emerge through competition for resources, trade, migration, investment and shared supply chains and markets.

By 2040, regional GDP is 0.14% higher than baseline in the composite Upper South Island (NMTCantyWC) region and 0.05% higher in Wellington, while Auckland is 0.02% below baseline.

FIGURE 14 REGIONAL GDP IMPACTS, % CHANGE RELATIVE TO BASELINE



Resource reallocation during construction; then wider supply-chain gains

During the Quadrants' early years of development, the projects bid for construction capacity, labour, machinery and capital. Mobile resources such as labour move toward higher returns, and wage and input-cost pressure squeezes competing activity elsewhere.

As a results, all seven regions outside Otago-Southland are therefore marginally below baseline in 2030; five remain below in 2035.

But as investment expands capacity, migration responds and the Quadrants move into operation, inter-regional suppliers capture ongoing demand. By 2040 every other region except Auckland is above its baseline economic trajectory.

The Upper South Island and Wellington benefit from Otago-Southland's growth due to their geographical proximity (relative to the other regions), supply chain linkages and industrial strengths.

- **Wellington**'s strong professional and technical services sector experiences increased demand, reflecting the highly technical aspects of some Quadrant initiatives such as the smelter and data centre. Its construction sectors also expand. As exports from Otago-Southland start to rise later in the projection period, so too does the demand for inter-Island sea freight.

- The **Upper South Island** sees growth above baseline in its non-metallic minerals and concrete sector, which will supply products to support the Quadrants' infrastructure. Its wood products industry grows above baseline, reflecting improved freight links in the South Island and higher construction demand.

Auckland's supply chain gains are marginally outweighed by 'crowding out'

Auckland still gains marginally in some linked industries – notably forestry and electricity supply (as the national economy grows faster). But declines below baseline in air transport (-0.8%), chemicals (-0.7%), and primary metals (-0.5%) outweigh those gains.

This is consistent with Auckland having less direct exposure to the Otago-Southland industrial developments while still competing with it for resources in national labour and capital markets, as well as for intermediate inputs that become harder to find (i.e. more expensive) as the Otago-Southland economy expands relative to baseline.

Note that Auckland continues to grow overall, just very marginally slower than in the baseline scenario.

4.4. Fiscal impacts

In our model closure, we hold real government consumption at its baseline level for the counterfactual scenarios.

As the national economy grows above baseline, more tax revenue is generated:

- Income tax revenue lifts as incomes rise

- Corporate tax increases as economy-wide profits lift because of the larger, more productive capital stock and freight system efficiency improvements

- GST revenue grows in line with increased household spending.

By 2040, and based on the model closure we selected, tax revenue would be over $1.3b above baseline. This could be used to fund more public services or reduce the fiscal deficit.

FIGURE 15 FISCAL IMPACTS, $M CHANGE RELATIVE TO BASELINE

5. Conclusion

This research has analysed the regional and national economic impacts of developing the Awarua and Milburn industrial precincts using a bottom-up dynamic regional CGE model, GSM8-NZR.

Based on the theory and parameters embodied in our modelling framework, and the development scenarios agreed in conjunction with Calder Stewart, we find Awarua and Milburn initially create a large construction stimulus in the Otago-Southland region, followed by a permanent expansion in regional and national productive capacity.

The largest economic benefits accrue to Otago-Southland, but new export activity, supply-chain demand and freight efficiencies also lift the wider New Zealand economy.

The key results and implications are summarised below in Table 5.

TABLE 5 HEADLINE IMPACTS

Conclusion	Key result
The developments would materially lift the southern economy.	By 2040, Otago-Southland regional GDP is $1.1 billion, or 2.8%, above baseline.
Construction provides the initial lift; operations provide the enduring benefit.	Regional investment rises more than 20% above baseline and supports over 1,800 additional FTE jobs by 2035. The lasting gains come from the smelter, data centre, renewable generation, processing and logistics activities.
Households share in the gains.	Average real wages in Otago-Southland are 4.9% higher by 2040, while regional household spending is $510 million above baseline.
This is nationally significant, not simply activity shifted south.	New Zealand real GDP is $1.3 billion, or 0.23%, above baseline by 2040, and national exports are $417 million higher.
Benefits extend through national supply chains.	By 2040, almost every region is above its baseline trajectory. Regional GDP is 0.14% higher in the Upper South Island and 0.05% higher in Wellington. Auckland is only 0.02% below baseline and continues to grow in absolute terms.
A larger economy strengthens the fiscal position.	Under the modelled fiscal settings, tax revenue is more than $1.3 billion above baseline by 2040, creating scope to fund services or reduce the deficit.

In short, we find that **successful development of the Awarua and Milburn Quadrants would produce economic gains that are large, durable and enjoyed wider than in Otago-Southland alone.**

Appendix A: The GSM8-NZR model

This appendix summarises the structure and operation of GSM8-NZR, the dynamic bottom-up multi-regional computable general equilibrium model used for this assessment. The emphasis is on the features that are most relevant to interpreting the Awarua and Milburn simulations.

Origin of GSM8-NZR

GSM8-NZR forms part of the Phylleos Global Systems Model (GSM) suite of national and regional computable general equilibrium models. The New Zealand model is a dynamic structural simulation model: it represents production, consumption, investment, labour markets, government, trade, energy, emissions and the external accounts within one internally consistent system.

The New Zealand version of GSM was developed for Sense Partners in 2019 by Dr Ashley Winston of Phylleos Inc. in Washington, D.C.

The GSM-NZ modelling suite[8] is built on the foundation of the pathbreaking and proven US GSM model. Versions of the GSM modelling framework have informed key policy reform and other economic matters in dozens of countries, including advising The White House on US biofuels and other energy reform issues.

GSM-NZ has a lineage that traces back to the MONASH dynamic CGE model developed by the Centre of Policy Studies, then at Monash University, now at Victoria University, Melbourne.[9] Dr Winston implemented several improvements to the MONASH model as a PhD student under the tutelage of Professor Peter Dixon in the late 1990s/early 2000s.

Dr Winston continued developing dynamic CGE models throughout the next two decades, including the USAGE model of the US economy[10] and the FLAGSHIP suite of models for over 20 countries, before building and continually extending the proprietary GSM suite of models from 2015. GSM-NZ is built and run in the GEMPACK software suite.[11]

We have used GSM-NZ[12] for several New Zealand clients including MBIE (on LNG terminals, gas supply, electricity prices, Accelerated Depreciation and biofuels mandates), Transpower, MoT, KiwiRail, Oji Fibre Solutions, New Zealand Climate Forestry Association, The Treasury, Auckland Airport, and a group of Economic Development Agencies.

[8] We use "suite" because we have a variety of modelling solutions, including comparative static, recursive dynamic, top-down regional, and bottom-up regional versions, with different levels of industry and commodity detail. The 8 in GSM8 is the model's version number, reflecting the continued improvements made to the model code and theory over time.
[9] See https://www.copsmodels.com/monmod.htm. Full documentation is in Dixon and Rimmer (2002b).
[10] See https://www.copsmodels.com/usage.htm. Dixon and Rimmer (2002a) has the technical documentation.
[11] See Horridge et al (2018).
[12] Earlier versions of GSM-NZ were called MDG-NZ.

What is a CGE model?

A CGE model is a quantitative representation of an economy in which industries, households, government, investors and overseas markets interact through prices, incomes and purchases. Three components are central:

1. A **database** describing the structure of the economy in a base year, including production, intermediate inputs, factor incomes, household and government demand, investment, taxes, trade and other flows. GSM8-NZR starts from the StatsNZ national input-output system (portraying the New Zealand economy in 2024, released in July 2026) and associated official satellite accounts, then constructs the regional detail required for the bottom-up model.

2. Behavioural **parameters** that govern how strongly economic agents respond when relative prices or returns change. These include substitution elasticities, export demand elasticities, wage adjustment parameters and the parameters governing investment and capacity utilisation.[13]

3. A **system of equations** that define the model specification or theory, which is generally based on standard neoclassical economic assumptions[14], but not necessarily constrained by them. The equations impose production technologies, household demand, zero-profit and accounting identities, market-clearing conditions, tax and government accounts, trade relationships and the dynamic accumulation of stocks such as capital and population.

The model is solved under a specified ‘closure’. A closure determines which variables are taken as exogenous information and which are solved endogenously. Different closures are used for the reference baseline, dynamic scenario analysis and short- or long-run comparative static questions.

GSM8-NZR considers the entire economy as an inter-linked system

GSM8-NZR **treats regional economies as a connected system** rather than as a collection of independent industries and regions. A change that raises activity in one industry in one region changes its demand for labour, capital, electricity, materials and services; these changes affect prices and returns, which in turn influence other industries, households, investment, trade and government revenue.

The model therefore does not apply a simple multiplier to project expenditure. Resource use is reconciled across the whole economy, region-by-region. If a new activity increases demand

[13] We rely on published studies for elasticity estimates to calibrate GSM-NZ. Elasticities are set at values widely understood to be valid in the modelling community and can be replaced by country- or industry-specific estimates where available for specific projects.
[14] Alternative theoretical specifications can be incorporated as required.

for scarce workers, construction capacity or other inputs, wages, returns and prices respond and some activity can be displaced elsewhere. Conversely, higher incomes, investment and demand create flow-on gains in supplying industries. These positive and negative market clearing effects are solved simultaneously.

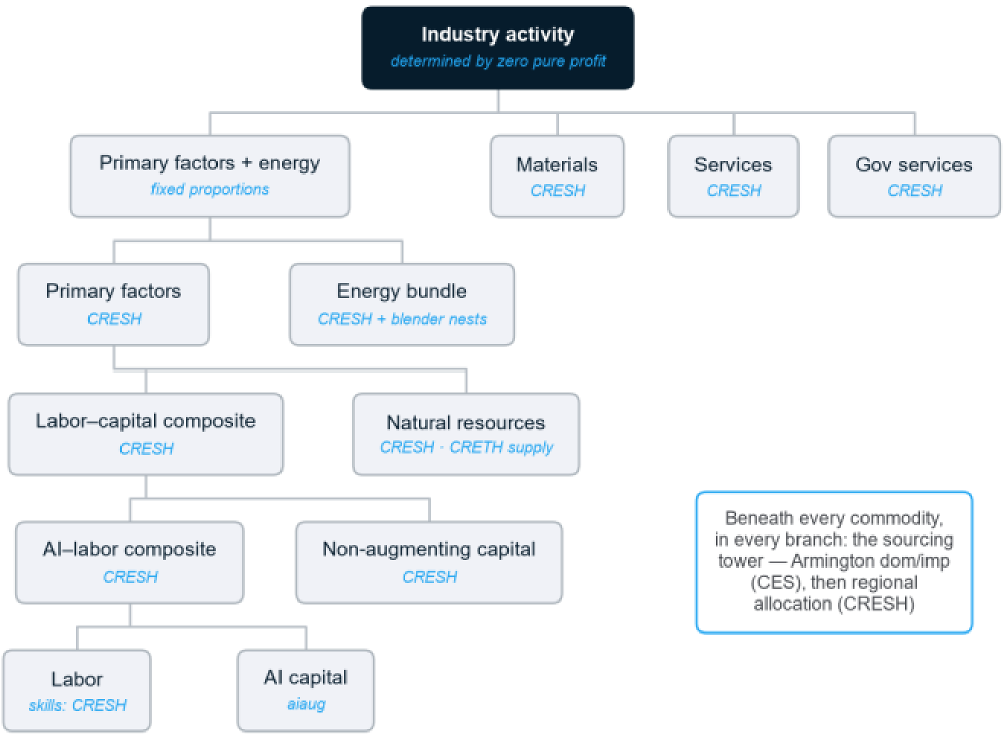
Several qualifications to the conventional market clearing shorthand matter in a dynamic application. Regional wages adjust gradually; labour supply can respond, including through migration; installed capital can be used more or less intensively within a period; and new capital is accumulated through investment over successive periods.

These mechanisms allow short-run adjustment to differ from long-run adjustment rather than forcing all markets to jump immediately to a new long-run position.

Production is represented through a nested structure (Figure 16). At the top level, industry activity uses a primary factor-and-energy composite alongside non-energy intermediate inputs. Primary factors include labour, capital and natural resources.

Energy has dedicated substitution structures, while each commodity purchased by firms, households, investors or government is sourced through a two-stage sourcing system: first a domestic-versus-imported Armington choice, and then an allocation across domestic source regions (or foreign source regions) using regional sourcing nests.

FIGURE 16 GSM8-NZR'S PRODUCTION NEST



SOURCE: PHYLLEOS, INC. (2026), GSM8NZR: A DYNAMIC BOTTOM-UP MULTI-REGIONAL COMPUTABLE GENERAL EQUILIBRIUM MODEL FOR NEW ZEALAND, TECHNICAL AND NARRATIVE DOCUMENTATION, AUGUST 2026.

Household demand is modelled separately in each region using a Stone-Geary linear expenditure system. Regional consumption is linked to regional disposable income.

Central and local government accounts, taxes, imports and exports, energy use, emissions and the external balance are also represented explicitly, so changes in one part of the system must remain consistent with the economy-wide accounting identities.

In every year GSM8NZR represents a general equilibrium accounting framework across all regions:

- Commodity markets balance across regional production, interregional trade and overseas trade
- Firms minimise production costs using nested combinations of intermediate inputs, energy, labour, capital and natural resources. Zero pure profit is imposed at the industry–region level.
- Households make consumption decisions from regional disposable income, and central and local government accounts, international trade and financial flows are reconciled consistently across the economy.
- Labour, capital and other dynamic factors do not necessarily adjust instantaneously: regional wages, employment, capital utilisation and investment adjust through explicit dynamic mechanisms over time.
- Climate policy settings (e.g. pathway to Net Zero), fiscal settings and external account settings are imposed through the baseline and model closure rather than being intrinsic equilibrium conditions.

Baseline and counterfactual scenarios

The dynamic analysis is organised around a **baseline or business-as-usual scenario** and one or more counterfactual scenario paths. Importantly, GSM8-NZR does not treat the baseline as an unconstrained model forecast. In dynamic baseline mode the model is 'data-taking': official forecast paths and other externally specified assumptions enter as data, and the model uses shifters that absorb the difference between those paths and the behaviour that the model would otherwise generate.

The resulting baseline is therefore a disciplined, internally consistent representation of the assumed official outlook. It establishes the reference paths for output, prices, employment, investment, population, government and other variables. For this project, the baseline is carried year by year to 2040.

Because the model is bottom-up, the baseline path is represented through regional industries, regional capital stocks, regional households and labour markets, regional prices and regional trade flows. Dynamic states are carried from one annual solution into the next.

The counterfactual scenarios are then introduced in deviation mode, with the model's behavioural mechanisms live, and are solved relative to those reference paths.

See section 3 for explanation of the baseline and counterfactual scenarios used in this project.

Changes in industry, investor or household behaviour in **counterfactual scenarios** are driven primarily by changes in relative prices (that is, the price of one good or service, or factor of production, relative to another). These changes are determined by 'shocking' the model – exogenously adjusting the value of variables used to proxy changes in the economic environment.

Each relative price shift has multiple flow-on effects, which filter through industries and the wider economy. For example:

- A shift in export demand towards more sustainably-produced products will push up the world price of (say) New Zealand's clean aluminium. This induces greater production by the aluminium industry.
- More aluminium production requires more inputs (unless it's all due to a productivity improvement). The demand for electricity rises, pushing up its price.
- This higher price for electricity pushes other electricity-using industries (e.g. pulp and paper) to either reduce output or seek other inputs to use instead to maintain output levels.
- Higher aluminium exports lead to overseas buyers purchasing more New Zealand dollars. This pushes up the nominal exchange rate (the price of New Zealand's currency), which in turn makes other exporters less competitive.
- Other exporters reduce their output, including in labour-intensive industries such as tourism or tertiary education. This puts downwards pressure on wages (the price of labour).
- Relatively cheaper labour benefits the labour-intensive, non-tradable part of the economy, such as personal services like hairdressing or food services (restaurants, bars, etc.).
- Due to the exchange rate appreciation, imports become cheaper. This benefits households as the purchasing power of their wages rises. And it benefits industries using a lot of imported materials, such as road passenger transport (for both vehicles and petrol/diesel) and construction.

The chain of logic extends a long way. In any scenario, there are many thousands of prices changes – some of which we input into the model as exogenous variables as 'shocks', and others which adjust as the economy reacts.

In each scenario, unless we tell the model otherwise, the price of every input to production changes, as does the price of every industry's output.

These price changes flow into the demand functions of households, overseas buyers, investors and the government sector. The extent of changes in quantities demanded and supplied as prices move (i.e. behavioural change) is determined by thousands of elasticities of demand

and elasticities of substitution. The larger the elasticity, the more demand or supply adjust. Each industry or economic agent has its own set of elasticities.

Results represent the difference between the initial and new equilibriums

Following the introduction of shocks to represent different counterfactual scenarios, supply and demand iteratively adjust across all commodity and factor markets until a new equilibrium is reached.

The results are best understood as the difference between two model solutions: the baseline path and the scenario path. Each year is a complete general equilibrium solution. The **reported impact is the deviation of the counterfactual scenario solution from the corresponding baseline solution**, with the two paths otherwise sharing the same reference assumptions.

This distinction is important when reading the results. A finding that regional GDP is, for example, 1% above baseline in 2040 does not mean regional GDP grows by only 1% or rises by 1% from today. It means the region is 1% larger in 2040 than it would have been in the baseline scenario.

GSM8-NZR produces these deviations for regional and national macroeconomic aggregates and for detailed industry variables, including output, value added, employment, wages, investment, trade, prices, energy and emissions. National results are the aggregation of the regional results; they are not used as fixed totals that are subsequently allocated back to regions.

The model's results are generally presented as percentage changes from the baseline, but it also generates certain impacts as changes from the baseline in 'ordinary' or levels measures (dollars, PJs, MT CO_2-e, etc.)

We focus on the headline macroeconomic and regional results and industry impacts in our reporting and are happy to provide more detailed results in supporting spreadsheets as required.

Key dynamic features of GSM-NZ

GSM8-NZR is recursive-dynamic. The model solves one period at a time and carries selected end-of-period stocks and state variables into the next period. Agents do not optimise over the entire future path with perfect foresight; the model instead uses explicit adaptive and adjustment mechanisms.

GSM-NZR contains five key dynamic mechanisms that link successive years:

1. **Capital accumulation**. Capital is tracked by asset type, industry and region. End-of-period capital equals the opening stock after depreciation plus new investment. Investment

responds to expected returns through a bounded capital supply relationship, so productive capacity changes progressively rather than instantaneously.

2. **Capacity utilisation**. Installed capital and the services obtained from it are distinct. Utilisation can rise or fall within a period in response to profitability, providing a faster adjustment margin before investment changes the capital stock.
3. **Regional labour market adjustment**. Wage-setting is regional. Real and nominal wage deviations evolve in response to regional employment conditions rather than adjusting instantly. Labour supply can also change, including through shifts in participation rates and migration, so early impacts can appear in employment while longer-run impacts increasingly appear in real wages.
4. **Population and household demand**. Regional population is a carried stock and household demand evolves with regional disposable income and changing expenditure shares. This allows demographic and income effects to compound through time.
5. **Energy, emissions and other carried states**. Emissions intensity adjusts gradually toward the level implied by carbon prices, while other state variables such as expected-return disequilibrium, utilisation and selected reference prices are carried between annual solves. The model also maintains full external and government accounts so scenario-induced changes in trade, income flows, assets and liabilities remain mutually consistent.

The chaining process occurs within the model's recursive framework: closing stocks from one annual solve are written out and become predetermined opening conditions for the next. This is what turns the annual solutions into a dynamic path rather than a sequence of unrelated comparative static exercises.

Database aggregation for this project

GSM8-NZR is constructed at greater detail than is used in the simulations here. The database routine first works at a highly disaggregated level (140 industries, 220 commodities and 16 regions).

Regionalisation and the estimation of interregional trade are undertaken at that full detail. Aggregation is applied only at the final stage, using sector and region membership maps. This 'full detail first, aggregate last' approach means that changing the model resolution does not change the upstream regionalisation method.

StatsNZ's national IO database is rectangular, with industries able to produce more than one commodity. Before the model is solved, the database is diagonalised so each industry produces one commodity. For this report, the final model resolution is 72 single-product sectors across 8 regions.

The greenhouse gas emissions associated with each sector's activities, and those of end users such as households, are also incorporated into our database.

The database for this project features:

- 72 single-product industries, comprising:
  - 10 primary sector industries and primary processing industries
  - 4 extractive industries
  - 12 industrial manufacturing industries
  - 12 fuel industries
  - 7 types of electricity generation[15], plus an electricity distribution industry
  - 3 utilities industries
  - 7 freight and passenger transport and logistics industries
  - 16 government, construction, business and recreational services industries.
- 10 natural resource endowments[16]
- 18 energy/fuel types[17]
- 17 types of greenhouse gas emitting activities[18], producing 8 different gases[19]
- 8 labour market occupations[20] in each industry
- Dozens of different tax and government spending instruments.

The database is subject to robust reconciliation and verification checks. National totals are conserved when flows are regionalised; regional and national product identities are checked; and the assembled model database must solve with zero pure profit to the model's stated tolerance and satisfy nominal homogeneity tests.

Regional module

The defining feature of GSM8-NZR is its bottom-up regional architecture. Each domestic region is represented as an economy in its own right, with its own production activities, capital stocks, investment, households, population, labour market, local government, prices, energy use and emissions. Regions trade with each other and with overseas markets.

[15] Hydro; Geothermal; Wind; Solar; Gas; Coal; Other.
[16] Forests; Fish; Coal; Oil; Gas; Metals and minerals; Arable land; Semi-arable land; Marginal land; Non-arable land.
[17] Coal, coke, and tar products; Natural gas; Petrol; Diesel; Advanced Aviation Fuel; Heavy Fuel Oil; Other Petroleum Products; Ethanol; Biodiesel; Advanced Marine Fuel; Biomass Fuel; Hydrogen; Light Vehicle Fuel blend; Heavy Vehicle Fuel blend; Aviation Fuel blend; Marine Fuel blend; Manufactured gas.
[18] Enteric fermentation; Manure management; Ag soils - excreta + other; Ag soils – fertiliser; Urea - CO2; Liming; Field burning; Coal mining fugitive; Gas fugitive; Oil fugitive; Chemical process; Non-metallic mineral production; Metals production; Geothermal fugitive; Sewage treatment fugitive; Waste processing fugitive; Land use, land use change & forestry.
[19] Carbon Dioxide; Methane; Nitrous Oxide; Fluorinated gases; Nitrogen Oxides; Carbon Monoxide; Non-methane Volatile Organic Compounds; Sulphur Dioxide. Converted to CO2-e using GWP.
[20] Managers; Professionals; Technicians and tradespeople; Community and personal services; Clerical and administration; Sales; machine operators and drivers; Labourers.

A supply or demand shock in one region therefore propagates to other regions through relative prices, sourcing decisions, migration, investment and trade rather than through fixed allocation shares.

Regional commodities are designated either as 'local' or 'national' products. These are analogous to non-tradeable and tradeable products at the national level. Local goods are not traded a great deal and tend to be produced and consumed locally (e.g. restaurants and personal services such as haircuts). National goods are impacted more by national economic drivers that affect all regions (e.g. manufacturing commodities).

New Zealand does not publish complete regional input-output tables or an observed matrix of trade between regions. GSM8-NZR therefore separates observed regional information from estimated regional flows. Regional GDP by broad industry and subnational population are observed inputs. The national input-output table and associated satellite accounts are also observed.

The regional split uses different allocation shares for different economic flows:

- Production, factor use, intermediate use and investment are allocated using regional value-added patterns for the relevant producing, using or investing industry.
- Household and central government demand are allocated by population; local-government demand follows the location of local government activity; and exports, imports and inventories follow the producing-region share of commodity supply.
- Electricity generation technologies are sited using plant location rather than a generic share where the geography is known.

Interregional trade is estimated because no official matrix exists. For each commodity, a gravity prior relates trade from a source region to the source's supply, the destination's use and transport distance (adjusted for inter-island transport modes). The prior is then reconciled by minimum cross-entropy.

Within the model, buyers first choose between domestic and imported supply and then choose among source regions. As relative regional prices change, sourcing can change as well. This is what allows a project in Southland or Otago to alter activity in other regions through supply chains and competition.

Regional labour and capital adjustment are also endogenous but not instantaneous. Wage-setting and labour supply operate regionally, and population can move through internal migration. Capital is installed by industry and region and grows through investment responding to expected returns; existing installed capital does not simply relocate between regions within the period.

For the Awarua and Milburn assessment this architecture is particularly important. It allows the model to represent the local pressure of large construction and operating programmes on South Island labour, capital and supplier markets, the sourcing of goods and services from other New Zealand regions and overseas, and the subsequent migration, investment, wage and trade responses. National effects emerge from these interacting regional outcomes.

Appendix B Year-by-year development scenarios

Awarua Quadrant

TABLE 6 AWARUA DEVELOPMENTS YEAR BY YEAR

Year	Scenario milestone	Indicative capex p.a. NZ$m	Occupied ha by year end	Renewable generation available, GWh	Indicative annual revenue, NZ$m
2027	Detailed pre-construction design, cost estimation and feasibility work; consenting, market engagement and enabling works; JSwap/other occupiers	15	2	0	3
2028	Major earthworks, roading, utilities and Awarua wind construction starts	150	2	0	3
2029	Wind construction continues; PV/BESS starts; first serviced pads prepared	200	2	0	3
2030	Wind commissioned; first logistics/storage activities open	200	35	160–180	15
2031	PV/BESS commissioned; agri/aquaculture processing begins	175	50	205–230	35
2032	Agri/aquaculture processing expands	175	75	205–230	55
2033	Industrial services cluster grows	200	80	205–230	90
2034	Silicon smelter EPC starts	350	100	205–230	125
2035	Silicon smelter commissioning	700	140	205–230	155
2036	Silicon smelter reaches 50% operation	250	200	205–230	700
2037	Silicon smelter reaches full operation	100	270	205–230	1200
2038	Logistics & by-product handling expand	100	280	205–230	1250
2039	Secondary industrial services, maintenance and storage deepen	80	295	205–230	1300
2040	Mature heavy industrial precinct	75	305	205–230	1370

SOURCE: SENSE PARTNERS AND CALDER STEWART

Awarua additionality assumptions

For our modelling, an important consideration is additionality. We cannot say every dollar invested and generated at Awarua is “new” money for the regional and national economies.

Activities such as silicon smelting are likely to be more additional at the national level than other activities, because they would represent new or materially expanded industrial activity rather than relocation from elsewhere in New Zealand. By contrast, some logistics and storage activity may partly reflect rerouting or consolidation of existing freight flows and will be less net additional.

Our additionality assumptions are summarised below.

TABLE 7 ADDITIONALITY ASSUMPTIONS AT AWARUA

Activity	Regional additionality	National additionality
Silicon smelter[21]	90%	90%
Agri/aquaculture processing	60%	35%
Freight/export storage	50%	25%
Industrial services	55%	30%

SOURCE: SENSE PARTNERS

Milburn Quadrant

TABLE 8 MILBURN DEVELOPMENTS YEAR BY YEAR

Year	Scenario milestone	Indicative capex, NZ$	Occupied ha by year end	Renewable generation available, GWh	Indicative annual revenue, NZ$
2027	Detailed design, staging, market engagement and data centre prospecting	15	0	0	0
2028	Initial earthworks, SH1 access, internal roads & utility corridors; first forestry pads prepared	50	0	0	0
2029	Rail siding/inland port works	50	0	0	0
2030	Freight hub phase 1 opens; wind construction starts; data centre confirmed	430	35	0	25
2031	Freight/forestry expansion; wind continues; data centre design and connection works	500	45	0	55

[21] We do not assume 100% additionality for the smelter because some capital equipment and specialist inputs are likely to be imported, some labour and electricity may be drawn away from other domestic uses, and the ownership and profit-retention structure is not yet clear.

Year	Scenario milestone	Indicative capex, NZ$	Occupied ha by year end	Renewable generation available, GWh	Indicative annual revenue, NZ$
2032	Wind commissioned; wood processing phase 1; data centre civil works begin	400	60	640–720	105
2033	PV/BESS commissioned; data centre shell and electrical works; food logistics begins	430	75	685–770	160
2034	Data centre module 1 online, 20MW IT load; freight & wood processing deepen	350	95	685–770	260
2035	Data centre module 2 online, 40MW IT load; logistics and cold-chain expand	320	115	685–770	380
2036	Data centre module 3 online, 60MW IT load	225	130	685–770	485
2037	Data centre stabilises; wood processing and inland-port throughput grow	60	135	685–770	520
2038	Additional forestry value-add and logistics customers	40	140	685–770	545
2039	Incremental fill-in: storage, industrial services, food/cold-chain	30	143	685–770	560
2040	Mature digital/logistics precinct	25	145	685–770	570

SOURCE: SENSE PARTNERS AND CALDER STEWART

Milburn additionality assumptions

TABLE 9 ADDITIONALITY ASSUMPTIONS AT MILBURN

Activity	Regional additionality	National additionality
Data centre	85%	70%
Freight hub/logistics	60%	30%
Forestry/wood processing	75%	55%
Food distribution/cold-chain	60%	35%
Industrial support uses	55%	30%

SOURCE: SENSE PARTNERS

Appendix C Industry impacts

TABLE 10 INDUSTRY IMPACTS IN OTAGO-SOUTHLAND, REAL VALUE ADDED BY INDUSTRY, % CHANGE FROM BASELINE

	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Crops	0	-0.1	-0.5	-0.7	-1.7	-2.0	-1.8	-2.0	-2.3	-3.2	-2.7	-2.5	-2.6	-2.7	-2.7
SheepBeef	0	-0.1	-0.5	-0.7	-1.5	-1.7	-1.6	-1.8	-2.0	-2.8	-2.5	-2.4	-2.5	-2.5	-2.6
Dairy	0	0.0	-0.1	-0.2	-0.3	-0.2	0.0	0.3	0.5	0.6	0.8	0.9	0.9	0.9	0.9
OthLivestock	0	-0.1	-0.5	-0.7	-1.5	-1.7	-1.6	-1.7	-1.9	-2.6	-2.2	-2.2	-2.3	-2.3	-2.4
Forestry	0	-0.1	-0.4	-0.5	-1.1	-1.1	-0.9	-0.8	-0.5	-0.6	0.0	0.5	0.7	0.9	1.1
FishingAqua	0	-0.1	-0.5	-0.8	-1.9	-2.2	-2.1	-2.3	-2.6	-3.6	-3.2	-3.1	-3.2	-3.3	-3.4
Coal	0	0.0	-0.3	-0.4	-1.1	-1.3	-1.3	-1.5	-1.7	-2.3	-1.3	-0.5	-0.2	0.1	0.3
Oil	0	0.0	-0.1	-0.2	-0.4	-0.5	-0.5	-0.6	-0.7	-0.9	-0.9	-1.0	-1.0	-1.1	-1.2
NaturalGas	0	0.0	0.1	0.2	0.5	0.7	0.8	0.9	1.2	1.6	5.8	10.4	12.5	14.5	16.5
OtherMining	0	0.0	-0.3	-0.4	-0.9	-1.0	-0.9	-1.0	-1.2	-1.7	-1.0	-0.4	-0.2	-0.1	0.1
MeatProd	0	-0.1	-0.7	-1.0	-2.2	-2.6	-2.5	-2.8	-3.2	-4.3	-3.8	-3.7	-3.9	-4.1	-4.3
DairyProd	0	-0.1	-0.6	-0.9	-2.0	-2.2	-2.0	-2.1	-2.2	-2.9	-1.9	-1.4	-1.4	-1.4	-1.4
OthFood	0	0.1	0.1	0.1	0.3	0.6	1.0	1.7	2.4	3.0	3.4	3.5	3.5	3.6	3.7
BevTob	0	-0.1	-0.6	-0.9	-2.1	-2.3	-2.1	-2.2	-2.4	-3.1	-1.7	-1.1	-0.9	-0.8	-0.8
TCF	0	-0.1	-0.5	-0.7	-1.6	-1.7	-1.4	-1.5	-1.5	-2.2	-1.3	-1.0	-1.0	-1.1	-1.1
WoodProd	0	0.0	0.0	0.0	2.5	5.5	10.5	16.1	26.3	33.7	34.3	35.0	35.7	36.3	37.0
PaperProd	0	-0.1	-0.6	-0.8	-1.4	-1.2	-0.4	-0.1	0.2	-0.4	0.7	1.1	1.1	1.2	1.3
Printing	0	0.0	0.0	-0.1	-0.1	-0.1	0.0	0.1	0.3	1.4	3.6	4.4	5.0	5.5	5.8
Petrol	0	-0.2	-1.1	-1.6	-3.9	-4.6	-4.6	-5.4	-6.3	-8.7	-8.2	-8.4	-8.9	-9.3	-9.6
Diesel	0	-0.1	-0.7	-1.0	-2.5	-3.0	-3.1	-3.6	-4.2	-5.7	-5.4	-5.4	-5.7	-6.0	-6.2
OthRefinery	0	-0.2	-1.5	-2.1	-5.0	-5.9	-5.9	-6.9	-8.1	-10.9	-10.4	-10.7	-11.2	-11.6	-12.0
Bioethanol	0	0.0	0.2	0.2	0.7	0.8	1.0	1.3	1.8	2.5	1.7	1.2	1.2	1.1	1.1
Biodiesel	0	0.0	0.0	0.0	0.1	0.4	0.8	1.2	2.0	2.5	2.3	2.1	2.2	2.2	2.2
OthBiofuels	0	-0.1	-0.6	-0.8	-1.9	-2.0	-1.6	-1.6	-1.6	-2.4	-1.5	-1.0	-1.1	-1.0	-1.1
Biomassfuel	0	0.0	-0.1	-0.2	-0.4	-0.3	-0.1	0.1	0.3	0.2	12.3	24.0	25.7	27.5	29.8
Hydrogen	0	0.0	-0.2	-0.2	-0.3	-0.3	-0.2	-0.2	-0.1	-0.2	1.8	4.1	4.8	5.5	6.5
LightVehFuel	0	0.1	0.6	0.8	2.0	2.2	2.0	2.4	3.0	4.4	3.2	2.6	2.7	2.7	2.7
HeavyVehFuel	0	0.1	0.3	0.4	1.2	1.6	1.7	2.3	3.1	4.3	3.7	3.3	3.3	3.3	3.4
AviationFuel	0	0.0	-0.3	-0.5	-1.1	-1.3	-1.2	-1.3	-1.5	-2.1	-2.1	-2.3	-2.4	-2.5	-2.7
MarineFuel	0	0.0	-0.3	-0.5	-1.1	-1.2	-1.1	-1.2	-1.3	-1.9	-0.3	1.1	1.2	1.3	1.5
Chemicals	0	0.0	-0.4	-0.5	-1.0	-1.1	-0.8	-0.8	-0.7	-1.1	-0.6	-0.4	-0.4	-0.3	-0.3
RubberPlastc	0	0.0	-0.3	-0.4	-0.8	-0.7	-0.4	-0.2	0.1	0.0	0.5	0.6	0.5	0.5	0.4
NMMConCem	0	0.1	0.5	0.6	1.6	2.0	2.2	2.6	3.1	4.2	3.3	2.4	2.2	2.0	1.9
PrimaryMetal	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	38.3	74.9	79.9	84.9	91.4
FabMetProd	0	0.1	0.6	0.8	2.0	2.4	2.4	2.8	3.4	4.6	4.9	4.9	4.9	4.9	5.0
TransportEqp	0	0.1	0.4	0.5	1.1	1.3	1.2	1.4	1.7	2.4	2.0	1.7	1.6	1.5	1.5
MachOthEqp	0	0.0	0.1	0.1	0.3	0.5	0.7	0.9	1.1	1.3	2.5	3.0	3.1	3.1	3.2
OthManufact	0	0.0	0.2	0.2	0.6	0.9	1.3	1.8	2.4	3.2	3.6	3.8	3.8	3.9	3.9
HydroElec	0	0.0	-0.1	-0.1	-0.4	-0.4	-0.7	-0.7	-0.8	-0.9	-0.4	0.1	0.2	0.3	0.5
GeothermElec	0	0.0	0.3	0.4	0.1	0.1	-3.1	-3.2	-3.3	-2.9	-1.8	-0.4	0.0	0.3	0.6
WindElec	0	0.0	0.0	0.0	14.2	15.7	71.6	73.0	74.5	75.9	77.4	78.8	80.2	81.6	82.9
SolarElec	0	0.0	0.0	0.0	0.0	13.1	13.4	32.4	33.0	33.7	34.3	34.9	35.6	36.2	36.8
CoalElec	0	0.1	0.4	0.5	0.2	0.1	-4.2	-4.1	-4.0	-3.3	-2.3	-1.1	-0.9	-0.8	-0.7
GasElec	0	0.1	0.5	0.6	0.3	0.3	-4.4	-4.3	-4.1	-3.3	-1.9	-0.2	0.1	0.3	0.7
OtherElec	0	0.0	0.0	0.0	-0.3	-0.4	-1.6	-1.7	-1.7	-1.7	-1.0	-0.3	-0.1	0.1	0.3
Electricity	0	0.0	0.1	0.1	0.5	0.6	1.6	1.7	1.9	2.1	4.0	5.9	6.3	6.7	7.2
GasSupply	0	0.0	0.2	0.2	0.7	0.8	0.9	1.2	1.6	2.2	1.8	1.5	1.6	1.6	1.7
WaterSewDrn	0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.3	0.3	0.4	0.4	0.4	0.5
Waste	0	0.0	0.2	0.2	0.5	0.6	0.6	0.8	1.0	1.3	1.1	0.9	0.9	0.9	0.9
ResCons	0	0.3	2.0	2.6	6.3	7.0	6.4	7.3	8.4	11.9	7.6	4.8	4.6	4.3	4.3
OthCons	0	0.3	1.6	2.0	4.9	5.5	5.1	5.8	6.8	9.5	6.3	4.1	3.9	3.7	3.6
Wholesale	0	0.0	0.0	0.0	0.3	0.7	1.3	2.0	3.0	3.8	4.0	4.1	4.2	4.3	4.4
Retail	0	0.1	0.3	0.3	0.9	1.0	1.0	1.2	1.4	2.1	2.0	2.1	2.2	2.2	2.3
AccmFoodServ	0	0.0	-0.3	-0.4	-1.0	-1.2	-1.2	-1.3	-1.4	-1.9	-1.5	-1.3	-1.3	-1.3	-1.3
RoadFrgtTran	0	0.0	-0.1	-0.2	-0.3	-0.2	0.1	0.4	0.8	1.1	1.9	2.5	2.7	2.8	3.0
RoadPassTran	0	0.0	-0.2	-0.3	-0.7	-0.8	-0.7	-0.8	-0.9	-1.2	-1.0	-1.0	-1.0	-1.0	-1.1
RailFrgtTran	0	0.0	0.0	0.0	16.7	37.0	71.1	109.3	178.6	229.3	233.9	238.4	242.9	247.4	251.8
RailPassTran	0	0.0	-0.1	-0.2	-0.3	-0.4	-0.3	-0.3	-0.3	-0.4	-0.4	-0.4	-0.5	-0.5	-0.6
WaterTran	0	0.0	-0.2	-0.3	-0.5	-0.4	0.0	0.4	1.0	1.3	15.4	29.6	32.0	34.4	37.3
AirTran	0	-0.1	-0.4	-0.6	-1.4	-1.6	-1.5	-1.7	-1.9	-2.7	-2.6	-2.8	-2.9	-3.0	-3.2
OthTran	0	0.0	-0.2	-0.2	-0.5	-0.6	-0.5	-0.5	-0.5	-0.7	-0.3	-0.1	-0.1	-0.1	-0.1
MediaComm	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.9	24.7	30.7	35.3	38.4	40.7
FincInsrServ	0	0.0	0.0	-0.1	-0.2	-0.2	-0.1	0.0	0.1	0.1	0.3	0.4	0.5	0.5	0.6
RentHireLicn	0	0.0	-0.1	-0.1	-0.1	-0.1	0.1	0.3	0.5	0.8	1.2	1.4	1.7	1.8	2.0
PropREstServ	0	0.0	0.2	0.3	0.7	1.0	1.1	1.3	1.6	2.2	2.3	2.3	2.3	2.4	2.5
OwnOccProp	0	0.0	0.2	0.2	0.5	0.7	0.7	0.9	1.1	1.5	1.5	1.5	1.6	1.7	1.8
ProfTechServ	0	0.0	0.0	0.0	0.1	0.3	0.5	0.8	1.2	1.6	1.7	1.7	1.8	1.8	1.8
LocalGovServ	0	0.0	0.1	0.1	0.3	0.3	0.3	0.3	0.4	0.6	0.3	0.2	0.2	0.2	0.2
CentGovServ	0	0.0	0.0	0.0	0.1	0.1	0.1	0.2	0.3	0.4	0.3	0.3	0.3	0.3	0.3
Education	0	0.0	-0.1	-0.1	-0.3	-0.4	-0.5	-0.6	-0.6	-0.8	-0.9	-1.1	-1.2	-1.3	-1.4
HealthSocial	0	0.0	0.1	0.1	0.3	0.3	0.2	0.3	0.4	0.6	0.3	0.2	0.2	0.2	0.2
ArtRecOthSrv	0	0.0	0.0	0.0	-0.1	-0.1	-0.1	0.0	0.1	0.2	0.4	0.6	0.7	0.7	0.7

TABLE 11 INDUSTRY IMPACTS IN OTAGO-SOUTHLAND, CHANGE IN NUMBER OF FTES FROM BASELINE, BY INDUSTRY

	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Crops	0	-5	-36	-50	-121	-135	-125	-140	-158	-220	-184	-175	-183	-188	-194
SheepBeef	0	-6	-43	-60	-142	-161	-148	-166	-188	-263	-225	-216	-227	-234	-243
Dairy	0	0	-14	-22	-48	-46	-33	-17	-3	-15	-9	-18	-24	-29	-33
OthLivestock	0	-1	-4	-5	-12	-14	-12	-14	-15	-21	-18	-18	-19	-19	-20
Forestry	0	-6	-45	-62	-137	-141	-110	-101	-70	-101	-23	30	33	41	57
FishingAqua	0	-1	-4	-6	-16	-19	-18	-20	-23	-33	-30	-30	-32	-33	-35
Coal	0	0	-1	-1	-3	-4	-4	-4	-5	-7	-4	-2	-1	-1	-1
Oil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NaturalGas	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OtherMining	0	-1	-4	-6	-14	-17	-16	-18	-21	-31	-19	-10	-10	-10	-9
MeatProd	0	-7	-46	-62	-140	-158	-150	-169	-193	-262	-232	-223	-230	-234	-239
DairyProd	0	-1	-11	-16	-38	-43	-38	-42	-46	-64	-43	-37	-38	-40	-42
OthFood	0	-7	-41	-49	-118	-125	-101	-114	-132	-211	-147	-133	-147	-157	-170
BevTob	0	-1	-6	-9	-22	-24	-21	-23	-26	-35	-18	-13	-13	-13	-14
TCF	0	0	-2	-3	-7	-8	-7	-7	-7	-11	-7	-6	-6	-6	-7
WoodProd	0	0	5	17	12	32	40	37	10	-16	-12	-13	-25	-36	-49
PaperProd	0	0	-1	-1	-2	-2	0	0	0	-1	1	1	1	1	1
Printing	0	0	0	0	-1	-1	-1	-1	0	5	17	19	22	24	25
Petrol	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diesel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OthRefinery	0	0	-1	-2	-4	-5	-5	-6	-7	-9	-9	-8	-9	-9	-9
Bioethanol	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Biodiesel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OthBiofuels	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Biomassfuel	0	0	0	0	0	0	0	0	0	0	2	3	4	4	4
Hydrogen	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1
LightVehFuel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HeavyVehFuel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AviationFuel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MarineFuel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chemicals	0	0	-2	-2	-5	-6	-4	-4	-4	-7	-5	-4	-4	-4	-5
RubberPlastc	0	0	0	-1	-1	-1	-1	-1	0	-1	0	0	-1	-1	-1
NMMConCem	0	0	3	3	9	10	10	12	14	20	12	6	5	4	4
PrimaryMetal	0	-1	-3	25	32	47	67	74	80	236	391	272	237	213	173
FabMetProd	0	2	10	12	32	37	35	41	50	70	69	68	67	66	68
TransportEqp	0	0	3	3	9	10	8	10	12	17	12	8	7	7	6
MachOthEqp	0	1	2	1	4	6	7	9	12	13	31	39	38	37	38
OthManufact	0	0	1	0	2	3	4	5	7	10	10	10	10	11	11
HydroElec	0	-1	-5	-7	-23	-28	-44	-49	-53	-64	-36	-12	-13	-12	-9
GeothermElec	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WindElec	0	0	0	5	10	22	15	18	19	16	17	16	13	10	8
SolarElec	0	0	0	1	2	4	5	5	5	5	5	5	4	4	4
CoalElec	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GasElec	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
OtherElec	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Electricity	0	0	0	0	2	2	6	6	6	7	15	23	23	23	24
GasSupply	0	0	0	0	0	1	0	1	1	1	1	0	0	0	0
WaterSewDrn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Waste	0	0	1	1	3	3	3	3	4	6	4	2	2	2	2
ResCons	0	14	92	115	295	312	267	307	356	529	265	129	134	125	125
OthCons	0	49	321	400	1039	1102	955	1103	1286	1904	1000	513	523	497	499
Wholesale	0	10	85	114	282	276	195	169	142	242	195	220	220	218	233
Retail	0	10	56	59	172	168	132	156	196	310	240	238	251	261	279
AccmFoodServ	0	-9	-72	-107	-263	-310	-300	-347	-399	-553	-467	-460	-488	-510	-542
RoadFrgtTran	0	0	-5	-7	-11	-8	-1	5	17	23	46	57	59	61	66
RoadPassTran	0	0	-2	-3	-6	-7	-6	-6	-7	-11	-10	-10	-11	-12	-13
RailFrgtTran	0	0	1	6	-20	-14	-6	3	15	24	28	32	33	35	37
RailPassTran	0	0	0	0	0	0	0	0	0	0	0	-1	-1	-1	-1
WaterTran	0	0	0	0	0	0	0	0	0	0	4	7	7	8	9
AirTran	0	0	-3	-5	-12	-14	-14	-16	-19	-27	-26	-29	-31	-33	-36
OthTran	0	-2	-13	-19	-42	-48	-42	-46	-48	-68	-44	-35	-39	-42	-46
MediaComm	0	-1	-4	-2	-9	41	110	169	241	237	230	243	204	172	146
FincInsrServ	0	0	-2	-4	-9	-11	-12	-12	-13	-15	-14	-14	-16	-18	-18
RentHireLicn	0	0	-2	-3	-5	-6	-5	-4	-3	-2	0	-1	-1	-1	-1
PropREstServ	0	2	13	14	40	39	29	35	43	69	34	15	14	12	11
OwnOccProp	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ProfTechServ	0	8	43	54	138	140	131	149	183	284	233	118	80	51	29
LocalGovServ	0	0	1	1	4	4	3	3	3	5	0	-3	-4	-5	-5
CentGovServ	0	1	2	2	7	7	5	5	7	13	6	1	-1	-2	-2
Education	0	0	-13	-31	-68	-99	-115	-137	-161	-209	-256	-317	-347	-375	-404
HealthSocial	0	4	23	22	64	53	30	34	42	78	2	-44	-52	-59	-64
ArtRecOthSrv	0	1	-1	-10	-14	-28	-34	-37	-34	-23	-13	-22	-26	-30	-34

Appendix D Individual Quadrant modelling results

To separate out the impacts of each Quadrant, we also ran modelling scenarios where we assume each precinct develops in isolation. While this is unlikely in practice, it serves to demonstrate the relative scale of each Quadrant's economic impacts.

We present here just the headline results, with further results available on request.

TABLE 12 INDIVIDUAL QUADRANT RESULTS – CHANGES FROM BASELINE

	Change from baseline			
Measure	**Milburn 2035**	**Milburn 2040**	**Awarua 2035**	**Awarua 2040**
New Zealand real GDP	$427m	$607m	$398m	$691m
Tax revenue (nominal)	$434m	$413m	$686m	$801m
Otago-Southland real GDP	$387m	$495m	$458m	$606m
Otago-Southland real investment	$562m	$252m	$1.03b	$314m
Otago-Southland real household spending	$238m	$233m	$410m	$262m
Otago-Southland export volumes	-$83m	$268m	-$368m	$855m
Otago-Southland FTE jobs	534	29	1,247	-518
Otago-Southland real wages	2.1%	2.1%	2.5%	2.8%

SENSE PARTNERS

DATA LOGIC ACTION

Appendix 2: Economic analysis of Notice of Requirement at Awarua

SENSE PARTNERS
DATA LOGIC ACTION

Phylleos

Economic analysis of Notice of Requirement at Awarua

10 September 2026

1. Purpose of note

Sense Partners and Phylleos Inc. have been commissioned by Calder Stewart Limited to prepare this economic analysis. Using scenario analysis, we estimate the potential economic impacts of a Notice of Requirement being proposed by SpaceOps at its Awarua site that constrains development opportunities at the Awarua Quadrant industrial precinct.

We have previously estimated the economic impacts of unconstrained development pathways for the Awarua Quadrant and the Milburn Quadrant.[1]

2. Methodology

We use the GSM8-NZR dynamic computable general equilibrium model to compare two scenarios. Sense Partners & Phylleos (2026a) provides detail on the modelling framework and we do not repeat it here.

The first scenario is an unconstrained development path at Awarua out to 2040. A full description of this scenario's design is in Sense Partners & Phylleos (2026a), and is summarised in the next section.

The second scenario considers what might happen if the NOR – particularly its height restrictions – acts to constrain the types of activities that could occur at Awarua, with the most notable changes being the omission of a silica smelter and the proposed windfarm. See next section for an overview and comparison with the unconstrained scenario.

The scenarios were developed in conjunction with Calder Stewart to ensure they reflected commercial realities and captured the types of discussions they have had with potential tenants.

Our analysis is not intended to be a forecast of what will happen. Our results should be interpreted as "what if?" scenario-based estimates. The modelling asks how the Otago-Southland economy could respond out to 2040 if the specified Awarua development pathways occurred, relative to a business-as-usual baseline where the site is not developed. We acknowledge this is subject to uncertainty and alternative pathways could also be considered.

[1] Sense Partners and Phylleos. (2026a). 'Economic impact of the Milburn and Awarua Quadrants: A GSM8-NZR dynamic computable general equilibrium modelling assessment'. Report to Calder Stewart, September 2026.

We do not estimate the economic impact of SpaceOps' activities at Awarua under either scenario, as our focus is on the regional economic impacts of alternative development pathways for Calder Stewart's Awarua site.

We model the scenarios in both their construction and operations phases. The construction phase is a path of capital expenditure: earthworks, buildings, plant, generation and network assets, bought year by year from the construction, machinery and services industries. This construction generates demand for labour, materials and equipment while it lasts, and then eases as construction is completed.

The operations phase captures the revenue the completed facilities generate each year, produced by the industries at Awarua. The operating path is a permanent addition to what the region produces, together with the capital and the workforce needed to produce it.

The rest of the regional economy responds to changes at Awarua. Workers move between industries, and the region's labour supply rises with the post-tax real wage; capital accumulates from the imposed investment; the region's output, income and prices adjust; and the macroeconomic results record what remains after the adjustment. The model measures that net result, not just the gross activity at the Site.

3. Overview of scenarios

These are alternative potential development pathways rather than a developed-versus-undeveloped comparison. As noted above, we are not saying this is what *will* happen at Awarua. Rather we are estimating the regional economic impacts of each potential pathway as specified.

Both scenarios assume some Awarua development relative to a business-as-usual case in which the site is not developed. The difference is the scale, type and timing of the development assumed to be feasible.

The unconstrained case is dominated by the silicon smelter. The NOR-constrained case does not replace that anchor with another large energy-intensive activity, which results in significantly lower capital expenditure and output.

When the NOR is in place, the scenario assumes Awarua instead takes on an industrial and logistics role, supporting SouthPort-linked freight and storage, primary sector handling and some light manufacturing.

The difference between scenarios is about timing as well as a different mix of activities. The NOR-constrained design removes the silicon smelter and wind farm, while alternative activities take place more slowly, so the Quadrant is only partly developed by 2040.

Table 1 overleaf summarises the unconstrained and NOR-constrained scenarios. [2] [3]

[2] A full description of the unconstrained Awarua scenario is in section 3.1.2 and Appendix B of Sense Partners & Phylleos (2026a).
[3] A full description of the NOR-constrained scenario is in Appendix A of this note.

TABLE 1 COMPARISON OF AWARUA SCENARIO DESIGNS

Dimension	Unconstrained	NOR-constrained
Development role	Renewable energy-backed heavy-industrial export platform	Moderate industrial and logistics estate
Anchor and occupiers	Silicon smelter; wind and solar generation; agri/aquaculture processing and cold chain; port-linked logistics; industrial services	Port-linked logistics and warehousing; primary sector storage and processing; contractor yards; light manufacturing and assembly; bulk storage and freight yards; small solar/BESS
Energy and manufacturing intensity	High energy and manufacturing intensity, with the wind farm supporting a powered industrial platform	Wind farm removed; modest staged solar/BESS retained; lower energy and manufacturing intensity
Land occupied by 2040	305 hectares	104 hectares
Capital expenditure, 2027-2040	$2,770m	$299m
Enabled revenue by 2040	$1,370m a year	$153m a year
Absorption path	Major development wave over about 12-14 years	About 30 years overall; only the first part is modelled to 2040

4. Results for the regional economy

The tables below show the headline results for the two scenarios in terms of impacts on the Otago-Southland regional economy. The differences are calculated as the NOR-constrained scenario impacts less the unconstrained scenario impacts.

4.1. The numbers

TABLE 2 REAL REGIONAL GDP RELATIVE TO BASELINE, SELECTED YEARS, $M

Year	NOR-constrained	Unconstrained	Difference	% decrease
2030	21	92	-71	-77.2%
2033	64	183	-119	-65.0%
2035	98	458	-360	-78.6%
2040	208	606	-398	-65.7%
2027-2040	1,159	4,159	-3,000	-72.1%

TABLE 3 REAL HOUSEHOLD SPENDING RELATIVE TO BASELINE, SELECTED YEARS, $M

Year	NOR-constrained	Unconstrained	Difference	% decrease
2030	16	89	-73	-82.0%
2033	35	134	-99	-73.9%
2035	51	410	-359	-87.6%
2040	104	262	-158	-60.3%
2027-2040	620	2,459	-1,839	-74.8%

TABLE 4 OTAGO-SOUTHLAND EMPLOYMENT RELATIVE TO BASELINE, SELECTED YEARS, FTES

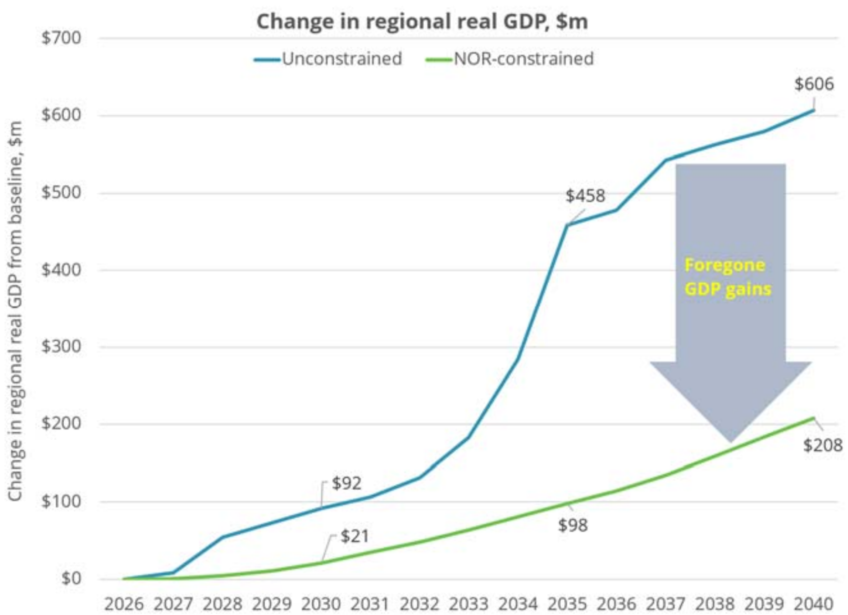
Year	NOR-constrained	Unconstrained	Difference
2030	102	227	-125
2033	203	358	-154
2035	257	1,247	-990
2040	411	-518	+929

4.2. The implications

4.2.1. Impacts on regional GDP

Based on these scenarios, Table 2 and Figure 1 shows the constraints imposed the by NOR forgo $398m of regional real GDP in 2040 and $3,000m over 2027 to 2040.

FIGURE 1 REGIONAL GDP GAINS UNDER SCENARIOS, $M



The NOR-constrained scenario retains 34.3% of the unconstrained annual regional GDP gain at 2040 and 27.9% of the cumulative gain between 2027 and 2040.

The gap between the two scenarios is a gross forgone benefit. It does not net off the value of the additional SpaceOps activity the NOR is lodged to protect, which was not modelled.

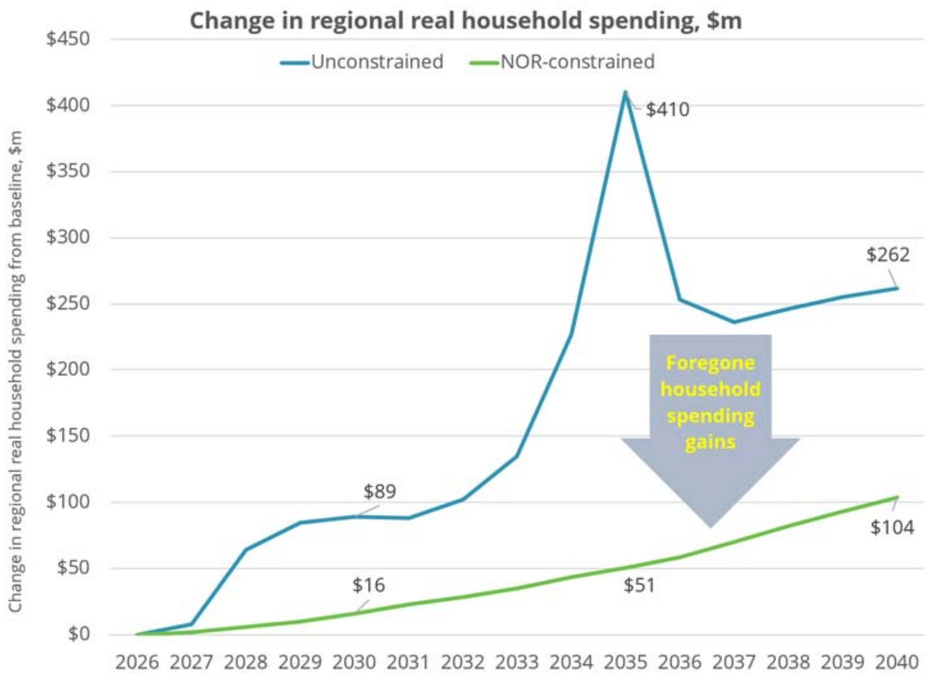
4.2.2. Impacts on regional economic well-being

Another measure of economic impact is the change in real household spending. It looks at the amount (or quality) of goods and services household can buy, which supports the economic well-being of families. Household spending is driven by household incomes, which in turn is determined by job growth and real wages.

Table 3 and Figure 2 show Otago-Southland real household spending would be $158m lower in 2040 in the NOR-constrained scenario, relative to the unconstrained scenario.

Across the 2027-2040 projection period, foregone real household spending accumulates to $1,839m, which can be seen as a 74.8% decrease in additional well-being for the region's households.[4]

FIGURE 2 REGIONAL HOUSEHOLD SPENDING GAINS UNDER SCENARIOS, $M



[4] That is, well-being still increases under a NOR-constrained scenario, but by almost 75% less than in an unconstrained scenario.

4.2.3. Labour market impacts

In our CGE modelling framework, both employment and real wages can change as the economy develops due to development at Awarua. Workers can move between industries, between regions or stay in the same industry in better paid roles.

In its core construction phase (2027 to 2036), employment across the region is much higher in the unconstrained scenario than the NOR-constrained one. At its 2035 peak, there are almost 1,000 more jobs in the unconstrained scenario than in the NOR-constrained scenario.

By 2040, regional employment is higher in the NOR-constrained scenario. This counter-intuitive result occurs because by 2040 the unconstrained scenario's construction phase is over and Awarua is into its operating phase. The core tenant – the silicon smelter – is capital- and energy-intensive, so employs relatively few people to generate its output. Employment in the unconstrained scenario therefore 'unwinds' after surging in the 2030s.

In contrast, the NOR-constrained scenario is still in its building phase as it gradually expands its footprint by attracting more, smaller tenants.

The other labour market impact comes through higher real wages, which feed into household incomes. In the unconstrained scenario, average real wages in the region rise to be 2.80% above the baseline by 2040. By comparison, they rise only very marginally in the NOR-constrained scenario, to be 0.006% higher by 2040.

Higher real wages tends to be felt by labour-intensive businesses in the economy, who may not be able to employ so many workers as their costs rise. This tends to drag employment growth down.

The overall impacts of the scenarios on the labour market are therefore a combination of employment and real wage changes, with the net effect being seen most clearly in household spending – much higher in the unconstrained scenario.

It is also important to note that the employment 'decline' in 2040 in the unconstrained scenario is relative to baseline employment that increases over time, not a decline from today's employment level.

Appendix A: NOR-constrained scenario details

Scenario narrative

Under this scenario, Awarua develops gradually as a large-scale industrial and logistics estate rather than as a heavy industrial precinct. Because the modelling horizon ends in 2040, the scenario captures only the first part of a longer 30-year absorption pathway. By 2040, around 104ha is assumed to be occupied, generating indicative gross revenue of about $153m per year.

The site's economic role is still material, but different: it provides scarce industrial-zoned land, improves freight and storage options near SouthPort, and enables some expansion of primary sector and industrial service activity. However, without a large renewable generation anchor or a major energy-intensive manufacturer, the site supports lower gross output per hectare, lower electricity demand and a smaller share of genuinely new-to-New-Zealand activity.

Much of the modelled benefit therefore comes through regional capacity, productivity and logistics-efficiency gains rather than the creation of a new, transformative heavy manufacturing industry (the smelter).

Modelled land-use mix by 2040

By 2040, the scenario assumes around 104ha of the c.500ha Awarua site is occupied. This is the position at the end of the modelling horizon, with further land take-up expected beyond 2040 under a 30-year absorption pathway.

TABLE 5 WHAT MIGHT AWARUA LOOK LIKE IN 2040 UNDER A NOR-CONSTRAINED SCENARIO?

Activity by 2040	Occupied ha	Gross revenue, NZ$m p.a.	Rationale
Port-linked logistics, warehousing & distribution	35	49	Storage, consolidation, warehousing and export/import handling linked to SouthPort
Primary sector storage and processing	21	36	Agri/aquaculture storage, grading, packing, cold-chain and light processing
Contractor yards, equipment storage, industrial services	19	18	Lower-density yards, fleet services, engineering, maintenance and laydown
Light manufacturing and assembly	14	33	Smaller manufacturing tenants, fabrication, assembly and packaging
Bulk storage, freight yards and container handling	11	13	Low-density freight, container, materials and industrial storage
Solar/BESS operations and utilities	4	4	Modest onsite solar/BESS, site utilities and energy services
Total by 2040	**104**	**153**	

Year-by-year development pathway to 2040

The table below assumes the scenario starts in 2027 and presents assumptions only to 2040.

TABLE 6 AWARUA DEVELOPMENTS YEAR BY YEAR, NOR-CONSTRAINED SCENARIO

Year	Scenario milestone	Occupied ha by year-end	In-year capex, NZ$m	Solar/BESS generation	Annual enabled revenue, NZ$m
2027	Planning, consenting, market testing, revised low-intensity masterplan	0	8	0 GWh	0
2028	Initial site preparation, access, internal roading and utilities	5	18	0 GWh	2
2029	First serviced lots; contractor yards and storage users	12	22	0 GWh	8
2030	Early logistics/storage tenants; no wind development	20	25	0 GWh	18
2031	Port-linked warehousing and freight yards expand	28	28	0 GWh	30
2032	First primary sector storage/cold-chain users	36	24	5 GWh	42
2033	Light industrial services and contractor yards deepen	44	20	10 GWh	55
2034	Additional warehousing and distribution	52	22	15 GWh	68
2035	Bulk storage and transport support activity	60	20	20 GWh	80
2036	Slower infill; primary sector handling expands	68	18	25 GWh	92
2037	Second-stage logistics precinct	77	24	30 GWh	106
2038	Light manufacturing/assembly tenants added	86	26	35 GWh	122
2039	Cold-chain and food/agri storage expansion	95	24	40 GWh	138
2040	Freight, storage and site services deepen; end of modelled horizon	104	20	45 GWh	153