

Waikato West Coast Mussel Spat Nursery

Economic Assessment in support of the Substantive Application
under the Fast-Track Approvals Act (2024).

m.e
consulting



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Executive Summary

North Western Mussels Limited (NWML) is proposing to establish and operate a mussel spat nursery near Raglan. This economic assessment has been prepared in support of the substantive application under the Fast-Track Approvals Act 2024 (FTAA). It assessed the extent of the project's regional and/or national benefits (clause 81(4)) and the proportionality of those benefits relative to the adverse effects, from an economic perspective (clause 85(3)). The assessment focuses on the economic aspects and does not extend to environmental, cultural or other non-economic effects.

New Zealand's aquaculture sector, including mussels, is identified as a key sector in the New Zealand Aquaculture Development Plan (2025–2030). This proposal aligns with Action 1b of the Development Plan which prioritises more productive, resilient and secure access to spat to maximise the value from existing consented marine space.

Two economic assessment tools were used to assess the project: a benefit-cost style assessment and an economic impact assessment. A 30-year period is used and the results are expressed in present value terms using 2% and 8% discount rates. The two discount rates return a range.

Crucially, the assessment captures the proposal's own economic footprint as well as the wider, facilitated economic benefits associated with the aquaculture production that is supported by available spat. That is, the project will address a known industry bottleneck in the mussel industry thereby facilitating growth that is aligned with national aspirations.

Economic benefits and costs

For the nursery on a standalone basis, the total economic benefits are estimated at \$136.9m (2% discount rate) and the total (economic) costs are estimated at \$59.2m – therefore the benefits outweigh the costs. This position remains even if the higher discount rate (8%) is used. On a standalone basis, the economic benefits outweigh the costs regardless of the discount rate that is used.

However, the true scale of the anticipated economic benefits that the project will deliver are associated with the facilitated activity i.e., enabling aquaculture production and processing. The economic benefit of this activity is \$3.2bn (in gross terms). These benefits are subject to greater uncertainty, particularly around the availability of processing infrastructure, the scale is significant.

Overall, the proposed project is assessed as likely to deliver positive economic benefits even after accounting for the cost of resources used. This is the case for the nursery on a standalone basis but the facilitated effects are where the regionally significant benefits are experienced.

Economic impacts (GDP, income and employment)

The MRIO modelling shows the nursery's own footprint (capex, recapitalisation and farming activity) generates a total GDP impact of \$144.9m (2%) returns \$45.4m (2%) in income to households. The facilitated production impacts, i.e., the mussel processing and enabled exports deliver the largest economic impact and are significantly greater than the nursery's own activities. These are between \$3.4bn and \$3.9bn with the range subject to the underlying assumptions.

Combining the project's own footprint with the facilitated impacts gives a total GDP contribution of \$3.5bn to \$4.0bn (2%) and total income of \$1.7bn and \$2.2bn. (2%). Over 95% of the total GDP impact is attributable to the facilitated production category, underscoring the nursery's role as an enabler of wider aquaculture sector activity. The employment impacts follow the same pattern with the project's own



footprint supporting around 1,938 job-years. The facilitated production supports 48,547 to 56,672 job-years (over thirty years).

The project also delivers a distributional benefit to Iwi through a profit-share mechanism, estimated at \$5.4m (8%) to \$12.2m (2%) in present value terms over the 30-year project life, providing an ongoing financial interest consistent with the Iwi's role as kaitiaki. The risk to Māui dolphin is assessed as minor, subject to the proposed Marine Wildlife Management Plan, and transport-related social costs and carbon costs are moderate with the social costs (of road accidents due to transportation) estimated at between \$50,000 and \$120,000 and the shadow price of carbon (reflecting the transport emissions) estimated at between \$320,000 and \$790,000 (over thirty years in present value terms).

The project has regional and national economic significance because it addresses a key constraint on the productive use of New Zealand's existing mussel farming capacity: reliable access to spat. By providing an additional source of spat, the nursery is expected to support increased utilisation and productivity of existing consented grow-out space, particularly in the Coromandel, Hauraki Gulf and potentially the Bay of Plenty.

The economic assessment distinguishes between the nursery's direct footprint and the wider activity it facilitates. The nursery itself produces a positive net economic benefit under both discount rates tested. The larger regional and national opportunity arises from the additional grow-out, processing, and exports that it facilitates. These activities are downstream from the nursery and are facilitated. While there is a degree of uncertainty around the specific timing and scale of the uptake (of the facilitated opportunity), the assessment considered these effects. At full operation, the nursery could support total mussels production in the order of 37,775t to 40,682t with the assumptions used determining the total yield. These yields translated into indicative export value of \$182m - \$196m per year (based on conservative settings).

The full facilitated benefit is contingent on grower uptake, processing capacity, logistics infrastructure and export market conditions. Nevertheless, the project is necessary because it removes a binding constraint and facilitates sectoral growth and expansion. From an economic perspective, the assessment concludes that the proposal is likely to deliver regional and national benefits consistent with clause 81(4) of the Fast-track Approvals Act 2024, and that those benefits are proportionate to the economic costs considered under clause 85(3)

Overall, the nursery is assessed as economically viable across the full range of discount rates tested. The project's greatest economic significance lies in the facilitated activity it enables elsewhere in the aquaculture supply chain, rather than in its own, comparatively modest, direct footprint.



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1 Introduction

1. New Zealand has a large economic opportunity associated with aquaculture and using marine space to grow protein for global consumption. The aquaculture sector generates in the order of \$750m of revenue annually and there are strong growth ambitions to lift this value. The aquaculture sector's potential is recognised in central government's strategy and development work for the sector. The New Zealand Aquaculture Development Plan (2025-2030) lists the key actions to grow the sector to a \$3bn industry. Aquaculture is known for being a sustainable industry that can deliver protein that is comparatively less emissions-intensive than other protein options, such as dairying. This combination means that aquaculture is well placed to capture economic wellbeing effects while delivering these effects without adding to overall environmental pressures. The New Zealand mussel industry is part of the overall aquaculture sector, accounting for circa 34% of total exports¹.
2. The mussel sector has potential to expand and contribute positively to exports but the sector is limited by spat supply. Spat are young shellfish that have settled from their free-swimming larval stage and attached themselves to a surface. Obtaining sufficient spat is an essential pre-requisite for mussel farming. However, without spat, consented marine space cannot be used and remains undeveloped. According to the Ministry for Primary Industries (MPI), investment into hatcheries and nurseries is needed so there is enough spat to fully use existing space. The NZ Aquaculture Plan² identifies the development of a more productive, resilient and secure access to spat as a priority development action – Action 1b the heading “Maximise the value from existing space”. **This proposal aligns directly with this action.**

1.1 Context

3. North Western Mussels Limited (NWML) is proposing to develop a spat nursery near Raglan on the west coast. The proposal will enable spat to be caught and to then be grown before transferring the spat to mussel farms in the Hauraki Gulf and potentially other locations, such as the Bay of Plenty and even Te Tau Ihu, Marlborough-Nelson. The proposal is not for the establishment of a mussel farming operation because the location is not suitable for such a venture.
4. The referral application has been accepted and the economic assessment focuses on the substantive application associated with the Fast Track Approvals Act. Market Economics Ltd (M.E) has been commissioned to assess the project from an economic perspective under the Fast Track Approvals Act (FTAA) 2024. The FTAA has been developed to:
“facilitate the delivery of infrastructure and development projects with significant regional and national benefits”.
5. The economic assessment has been prepared in accordance with the FTAA and addresses/considers two key clauses:

¹ Ministry for Primary Industries. (2024). *New Zealand aquaculture: Economic performance and industry overview*. <https://www.mpi.govt.nz/dmsdocument/67776/direct>

² New Zealand Aquaculture Development Plan (2025-2030).

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- a. The extent of the project's regional or national benefits (clause 81(4)).
 - b. The proportionality of the benefits relative to the adverse effects (clause 85(3)).
6. Crucially, the second point relating to the proportionality is undertaken from an economic perspective. The intent is not to undertake a full cost-benefit analysis as this is not the requirement. The assessment focuses on the economic elements (and it does not stray beyond economic matters). It is beyond the scope of this assessment to capture the environmental, cultural or other non-economic matters.

1.2 Aims

- 7. The economic assessment is a new, bespoke analysis of the proposed project's economic impacts and anticipated benefits. The analysis is influenced and informed by other, relevant aquaculture assessments with a specific focus on the proposal's attributes and how it will facilitate sectoral development beyond the immediate project. The assessment is guided by the requirements of the FTAA, and specifically seeks to identify, estimate and scale the economic impacts and benefits of the project. Crucially, the assessment looks beyond the immediate proposal and illustrates the facilitated economic benefits that it will deliver.
- 8. The assessment uses two distinct economic tools to assess the economic benefits, and to comment on the wider economic impacts. Crucially, the two tools are not combined in any way. The purpose of using two approaches is to provide a richer picture of the anticipated economic benefits that the proposal will deliver.
- 9. The first part of the assessment considers the economic benefits, with adjustments for opportunity costs, and displacement effects. The value of the economic resources used in the production process are factored into the assessment. This part is structured along the lines of a Cost-Benefit Assessment but it is not a 'full' CBA³.
- 10. The second part considers the economic linkages of the project, estimating the change in economic activity that the investment impulse, and the project itself, and facilitated effects that the project will unlock. The facilitated effects/impacts relate to the change in the economic activity that will result from the lift in exports due to additional spat that is provided to the market.

1.3 Approach

- 11. The project approach is consistent with that followed in other economic assessment for substantive applications. The analysis relies on information supplied by NWML, as well as industry information. This information was combined with published sectoral data to develop a full(er) picture of expected development trends and how it would interact with the local economy. The project's delivery timelines, production levels as well as operational expenditures are based on modelling from NWML, with supplementary information from other sources. The additional information was used to triangulate the data points. The analysis was undertaken in a way that keeps different parts separate to show the contribution/impacts of the parts. The following parts were assessed:
 - a. Capital spending associated with establishing the mussel (spat) farms,
 - b. The operational expenditure relating to seeding, maintaining and harvesting spat, and
 - c. Lift in production of additional mussels, and the processing of this product for export.

³ That is the assessment does not integrate potential environmental, cultural or other impacts. It focuses on economic matters.



12. Enabling the spat farming operations will address a known constraint that mussel farming is experiencing. Ignoring the wider supply chain and stimulatory effects will misstate the economic effects, and benefits, of the project. These facilitated, or consequent, benefits are reported separately for transparency. In addition, the project's contribution to developing new market opportunities is integrated into the assessment.
13. In terms of the project approach, the capital and operational spending of the project were mapped to economic sectors. An array of assumptions regarding the spatial patterns (source location) of where goods are purchased from underpin the assessment. These assumptions were informed by discussions with NWML as well as industry information. Similarly, the assumed grow-out and processing, as well as the spatial patterns are based on discussions with NWML.
14. With reference to the two assessment tools, the benefit assessment and the impact assessment, the two tools are not linked in any way. Only the input data is shared but the different elements are considered from different perspectives. For example, when assessing the benefits, the initial capital investment (capex) is treated as a cost. The value of the new activity that is enabled by the operation is considered. The value of economic resources used to deliver the outputs are treated as a cost and included in the assessment with allowance made for displacement effects and opportunity costs.
15. However, in an economic impact assessment, the initial spending is seen as an economic impulse (with buying-selling transactions) that flow through the economy. The flow-on impacts are assessed using a bespoke Multi-Regional Input Output (MRIO) model with 109 sectors that was developed specifically for this project. Appendix 1 provides a high-level introduction to IO modelling and summarises its limitations. The model explains the flow of goods and services through the economy and expresses the change in terms of GDP, employment and income impacts. These metrics are economic impacts, not costs or benefits *per se*. The net change in economic activity can be interpreted as a larger economy, and there are benefits associated with a larger economy (more jobs, higher income and economic wellbeing effects). Spatially, the model covered:
 - a. Waikato District,
 - b. Hamilton City,
 - c. Bay of Plenty,
 - d. Rest of Waikato, and
 - e. Rest of New Zealand.
16. Value Added (VA) arises through the spending, directly and indirectly, as the new activity flows on to other sectors of the economy. The links between different locations within the Waikato region and the rest of New Zealand are captured, showing the extent of the spread of the additional economic activity.
17. Both the benefit assessment, and the EIA consider the net change in activity, that is, if something would have happened regardless of the project, then it is excluded from the assessment.
18. The project is assessed over a 30-year period. The changes are multi-year and future values are expressed in present value terms using Discounted Cash Flow (DCF) analysis. Discounting is used to reflect the rate



of time preference and the opportunity cost of capital, reflecting the present value of future benefits. The discount rate reflects two⁴ purposes:

- a. The discount rate represents the rate at which society is willing to trade off present benefits and costs against future benefits and costs, thus capturing the time value of money. A high discount rate indicates a high degree of impatience in the time value of money or more simply a greater preference towards immediate consumption of resources.
 - b. As resources committed to one activity preclude those resources being committed to another purpose, the discount rate reflects the opportunity costs of resource expenditure.
19. The discount rate provides a way to weigh (give importance to) future values relative to those occurring immediately or in the near term. Importantly, the project will scale up over a decade or so meaning that many of the benefits and impacts are anticipated over the medium to long terms. The discounting process reduces the present value of the future effects.
20. Two discount rates are used in accordance with New Zealand Treasury's guidance - 2% rate, and a sensitivity analysis (using 8%).

1.4 Code of conduct

21. I have been provided with a copy of the Code of Conduct for Expert Witnesses contained in the Environment Court's 2023 Practice Note. While this is not an Environment Court hearing, I have read and agree to comply with that Code. This evidence is within my area of expertise, except where I state that I am relying upon the specified evidence of another person. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

1.5 Information sources

22. The assessment draws on several sources with the central sources being:
- a) Information received from NWML, including:
 - o Investment costs,
 - o Production estimates,
 - o Project timelines,
 - o Overheads and business costs.
 - b) StatsNZ information:
 - o Business Demography Survey,
 - o Linked employee-employer data (LEED),
 - o Census data,
 - o Supply and Use tables, and Input-Output tables, and

⁴ Adopted from Waka Kotahi NZTA.

- 
- Price inflators.
 - c) Other reports
 - Reports and strategy documents from central government i.e., Ministry for the Environment, and Ministry for Primary Industries (MPI),
 - Open Oceans Business Case (prepared for New Zealand Trade and Enterprise, NZTE) and
 - d) Research around international prices.
 - e) M.E internal regional databases and economic models.

1.6 Limitations and caveats

23. Like any economic assessment, this assessment draws on available datasets and other modelling work (e.g., financial modelling). It contains projections and statements with a set of caveats and limitations, including:
- a) The assessment draws on information received from NWML and it is assumed that this information is correct.
 - b) No project specific primary research was undertaken for this assessment.
 - c) Operational expenditure, such as equipment renewal and reinvestment frequencies, is based on industry standards. Detailed financial modelling of the different component parts is not available and consequently, assumptions inform the analysis.
 - d) The assessment reflects current values (\$-2025) and future impacts of inflation are not captured.
 - e) A thirty-year period is assessed, allowing for a delay in when the investment period starts (2027). This delays the point where production starts and when the economic benefits could materialise.
 - f) The assessment focuses on the economic factors, and the financial information was not reviewed or audited. The economic assessment does not express any opinion about the financial viability, risk or return position of the proposal.
 - g) The assessment does not consider the support infrastructure, like additional roading or electricity infrastructure. It is assumed that the existing infrastructure is sufficient. We have not included costs associated with developing additional (non-specified) infrastructure or undertaking additional work that might be needed in support of the project. However, some commentary about these additional spending items is included to help provide an indication of the anticipated scale of these effects.
 - h) The assessment focuses on the economic effects and remains within the relevant field of expertise.

1.7 Report structure

24. The rest of the report is structured as follows:
- a) Section 2 provides a high-level introduction of the project, and outlines the assumptions
 - b) Section 3 reports the results of the assessment, dealing with the economic impacts and benefits separately.
 - c) The report concludes with Section 4 that summarises the key points.



2 Concept and assumptions

25. This section describes the proposal concept i.e., what the project entails and how it is assessed under the Fast-track Approvals Act 2024 (FTAA). The concept information presented here reflects the detail as set out in the referral application, noting that the scope of the application has been amended to remove the fourth site, Site D. The information provides the background context for the economic assessment. The second part of the section contains the key assumptions to ensure transparency.

2.1 Concept

26. North Western Mussels Limited (NWML) is seeking to establish and operate a mussel spat nursery off the west coast of the Waikato region, near Whāingaroa/Raglan. A spat nursery is part of the aquaculture sector and is the initial stage of mussel farming. The nursery captures and cultivates Greenshell mussel larvae, known as spat. Spat are caught on weighted 'hairy' dropper lines suspended from backbone lines during periods of natural spat settlement. Once caught, the spat is left to grow in place and once the required size is achieved, the seed mussels are harvested from the nursery. The seed mussels are then transported by road, via land-based facilities at Raglan, to grow-out farms elsewhere around New Zealand.
27. The proposal responds to observed pressures in the availability and reliability of New Zealand's traditional mussel spat supply. Beach-cast spat from Ninety Mile Beach and wild-caught spat from established sources have become less consistent. Predation of spat and juvenile mussels (e.g., by snapper in the Coromandel) reduces industry yields. These pressures sit against the New Zealand mussel industry's 2020 Greenshell Mussel Spat Strategy, which identifies a consistent, high-quality supply of spat as a precondition for the industry's continued growth. NWML's response is to provide spat to the industry, thereby providing the industry with another source from where the essential input can be sourced. The nursery is intended to supply seed to existing grow-out operations in the Coromandel and Hauraki Gulf, including farms operated by Gulf Mussel Farms, Vela Fishing and OP Colombia, rather than to establish new grow-out capacity itself. The option to establish a grow-out facility is limited by the conditions on the West Coast combined with the infrastructure requirements that would be able to cope with the weight of grown-out mussels. The proposal comprises three sites located off the Waikato west coast, at least 3.1 kilometres offshore in water depths of approximately 20 to 40 metres. A staged approach will be followed during the rollout. The assessment is based on a graduated rollout, beginning with 34 lines increasing to 68 lines. Lines will be added over subsequent years until a maximum number of 369 is reached. The staging will be informed by monitoring results.
28. The assumptions underpinning the assessment, as well as sources are presented next.

2.2 Assumptions

29. The project will take several years to establish, and it is assumed that the first stage, during which 68 lines are delivered will take two years to set up. From there, the number of lines will be delivered in stages to a maximum of 369 lines. The specific delivery timelines are subject to the monitoring work and market conditions. **Error! Reference source not found.** shows the approximate location of the different sites.

Figure 2-1: Site locations



30. The establishment costs vary marginally across the stages with Stage 1 being slightly higher in costs due to differing costs associated with the barging and labour costs during the establishment phases. The capital development costs (cost per line), for the main items are:

- | | |
|---------------------------------|---------|
| • 12m double helix screw anchor | \$4,400 |
| • Anchor warp | \$435 |
| • Back bone | \$493 |
| • End floats - 300 litre | \$1,320 |
| • Surface floats | \$1,760 |
| • Sub Surface floats | \$1,340 |
| • Float ties | \$214 |
| • Spat rope 1st cycle | \$8,400 |



- Spat rope 2nd cycle \$8,400
- Dropper ties \$26
- Stone bags \$169
- Subtotal (excluding barge and labour) \$26,957
- Installation barge labour (stage 1) \$9,240
- Installation barge labour (stage 2) \$1,800

31. Based on the above breakdowns, the total development costs per stage (per line, and rounded) are:
- a. Stage 1 \$36,200,
 - b. Stage 2 \$28,760.
32. The spending will be directed towards the main economic centres where aquaculture materials are normally sourced from. That is, 83% of the capital spending will be directed to Auckland from where most goods will be sourced. The balance (17%) will be sourced from the Coromandel. The percentages reported here reflects the relative shares with the labour and barge costs kept separately (excluded).
33. Once established, the nurseries will then start to catch spat that will then start the farming process. The specific duration of the grow cycle until the spat can be harvested is uncertain and seasonal. The infrastructure degrades over time, with the key parts needing replacement. All the items, apart from the double helix screw anchors are assumed to have a useable life of 7 years. The anchors' useable life is assumed to be 10 years.
34. With reference to the anticipated yields, it is assumed that the revenue per metre of line is \$2.55/m. The direct revenue is estimated to be in the order of \$7m once fully operational.
35. Once operational, the project will incur direct costs and overheads. While these costs scale with development, they are insensitive to scale and can be seen as broadly fixed, starting at \$6,000/year and increasing to \$12,000/year once fully operational.
36. Spat are small (few millimetres in length) when first collected. As they grow/attached to grow-out ropes, they grow-out to full mussels over an 18–24-month cycle. In terms of the growing cycles, a conservative position is maintained by assuming longer grow cycles and it is assumed that the 2-year growth cycles are used. The potentially, shorter periods (18 months) are not used. This reduces the total product that is delivered to the market by undercounting the potential volume.
37. The facilitated effects of the proposal are an essential part of the anticipated benefits that it will deliver. These will occur 'outside' the proposed project and relate to the enabled activity. Specifically, the spat will enable new aquaculture activity in the Hauraki Gulf and Coromandel. In turn the additional aquaculture production will enable processing by providing product to process and to then export internationally. The exports generate foreign exchange for New Zealand (a critical benefit).
38. The following conversion ratios are used in the assessment, specifically facilitated economic impacts and benefits that the project will deliver:
- a. Conversion ratio from nursery rope to grow-out rope (m) 1m spat rope to 3m grow out rope,
 - b. Production yields (kg per m of rope) 2 – 10kg/m (7kg/m used),
 - c. Growth period from spat to harvest (production cycle) 2 years,



- d. Total facilitated mussel yield 37,775t (to 40,682t)
- e. Processing yield (greenweight to frozen half-shell product) 46%,
- f. Export value \$10.50/kg (half shell)
- g. The total kg of exportable product (per year) is estimated in the order of 17,377t⁵ (half shell, lower estimate).

- 39. Based on the above assumptions, the proposed project is estimated to generate saleable product (spat) that is valued at: \$7.1m (at 100% operational). The enabled export value (spat grown out, then processed) is estimated at \$182m to \$196m .
- 40. A vessel might be purchased as the project establishes. However, the specific need to invest in a new vessel is not certain and will only become apparent as production associated with around 60-70 lines is achieved. A vessel is likely to cost in the order of \$5m - \$7m (each) and would be purchased from Auckland or Nelson. This spending will have direct GDP, employment and income impacts but due to the uncertainty, it is excluded from the assessment. If this spending occurs then it will have a unique set of additional economic impacts arising from the investment impulse.
- 41. The economic impacts and benefits of the proposed project are reported in the next section.

⁵ A conservative position that is influenced by the weight/yield (kg) per meter and the recovery rate (weight per halfshell).



3 Estimated Effects

42. This section describes the project's estimated economic effects, covering the economic benefits as well as the economic impacts. The benefit assessment also highlights the key economic costs associated with the project. The economic impacts are expressed in GDP, employment and income terms. The relative contributions of different component parts are highlighted, and the spatial distribution is explained with a focus on different parts of the Waikato and Bay of Plenty. The Waikato District is referred to as the 'local area', and the Waikato is treated as the region to illustrate the regional significance of the proposed project. A wider spatial perspective is used for the facilitated effects (i.e., the enabled production) where the 'rest of Waikato' is separately identified. These are included in the Coromandel.
43. The results are presented for the following discrete parts:
 - a. Capital expenditure,
 - b. Recapitalisation,
 - c. Farming (mussel farming activity),
 - d. Wider facilitated production.
44. Spatially, the results are reported for:
 - a. Waikato District
 - b. Hamilton City
 - c. Bay of Plenty
 - d. Rest of Waikato
 - e. Rest of New Zealand.
45. A thirty-year period is assessed and the annual impacts/benefits are expressed in present value terms by discounting future-year impacts back to 2026 dollars. Two discount rates are applied, consistent with standard New Zealand economic appraisal practice: 2%, reflecting a lower social discount rate and giving more weight to impacts occurring later in the evaluation period, and 8 per cent, reflecting a higher discount rate and giving substantially less weight to later impacts.

3.1 Economic benefits and costs

46. Establishing the spat farming operation will deliver economic benefits in terms of the enabled activity as well as the operation's own, direct benefits. The facilitated benefits, i.e., those associated with the enabled exports are the largest ones but there are a range of uncertainties around these. These include the availability of infrastructure to respond to the opportunities. For example, additional aquaculture farms and processing capacity might be needed. There are costs associated with developing such infrastructure but these costs are unknown. The economic assessment reflects the economic benefits of the operation itself as well as the facilitated benefits separately to illustrate the direct benefits, as well as the potential wider and facilitated benefits.
47. The operation's own benefits are based on information received from NWML and the wider, facilitated benefits are based on industry ratios.
48. Not all new activity is a benefit and adjustments for opportunity costs and displacement were integrated into the assessment. Care is needed when translating the employment shifts into benefits. Only a portion

of the employment shift is a benefit because only the net (incremental) change is considered. Employment itself is not necessary a *new* benefit and the lift in aquaculture activity might transfer/displace employment from other parts of the economy. If a person is employed by the operation (or the facilitated activity), but that person is attracted from another/existing job elsewhere in the economy, then society has not gained an extra labour unit. Only a portion of the labour increase is a benefit.

49. The capital expenditures and investment activity are treated as economic cost and the additional product that is delivered, and made available to the market is seen as the benefit. The new assets depreciate over time, and in this assessment, the value of the assets (after accounting for recapitalisation) is included as a benefit. The terminal value is used as the benefit⁶.
50. The economic value of the resources used during the production process is included as costs. Table 3-1 presents the key results relating to the economic benefits and core costs of the proposal. All figures are in \$m.

Table 3-1: Gross Benefits and Costs (Economic, \$m)

Item	2%	8%
Gross Benefit		
New activity	121.9	52.6
Labour (gross)	14.9	6.4
Terminal value	0.03	0.01
<i>Total benefit</i>	136.9	59.1
Gross Costs		
Capex and re-capex	10.4	7.5
Opportunity cost of labour	14.2	6.1
Economic resources	34.5	14.9
<i>Total Cost</i>	59.2	28.6

51. At a 2% discount rate, total benefits of \$136.9m exceed total costs of \$59.2m, yielding a net benefit of \$77.7m. This suggests that the economic benefits outweigh the anticipated economic costs. Using the higher discount rates (8%) places more emphasis on the short-term benefits and costs, and less on the future effects. Under this discount rate, total benefits fall to \$59.1m against total costs of \$28.6m, giving a net benefit of \$30.5m. The project therefore remains economically justified under both discount rate scenarios, though the margin narrows as the discount rate rises. A key take-away is that while the benefit position shrinks, they remain greater than the costs.
52. On the benefit side, new activity that is generated is the central driver at both discount rates, accounting for around 89% of gross benefit, with labour (gross) contributing roughly 11% and terminal value negligible. On the cost side, the cost of economic resources used is the main (52%-58%, depending on the discount rate), followed by the opportunity cost of labour (21%-24%). Capex and re-capex follow with the share of total costs estimated at between 18% and 26% (subject to the discount rate).

⁶ This is however relatively minor.



53. Overall, the proposed project is assessed as likely to deliver positive economic benefits even after accounting for the cost of resources used.
54. A key aspect of the proposed project is that it will enable the wider aquaculture industry to lift production, and exports. The scale of the anticipated benefits is significant (the range reflects the discount rates):
- a. Gross benefits
 - i. Export revenue \$1.1bn to \$2.8bn
 - ii. Labour (gross) \$138.3m to \$345.7m.
 - b. Gross costs⁷
 - i. Economic resources used \$641.3m to \$1.6bn,
 - ii. Labour (opportunity costs) \$131.7m to \$329.3m.
55. The analysis suggests that the facilitated (gross) benefits are likely to be regionally significant and are estimated to be between \$1.3bn and \$3.2bn⁸. Most of these benefits are expected to be felt in the area where processing occurs i.e., in the Wider Waikato or Bay of Plenty. The economic costs associated with delivering the facilitated effects (including the direct capex and recapitalisation of the proposal) are estimated between \$781m and \$1.9bn.

3.1.1 Other considerations

56. Other matters are also captured in the assessment, including:
- a. Economic contribution to Iwi/Māori,
 - b. Māui dolphin
 - c. Transport impacts.
57. In addition to the broad benefits outlined above, the proposal will also be delivered in a way that offers Iwi/Māori access to economic resource to further their aspirations. The specific value of the **economic contribution** will be finalised but indications are that 20% of the consent will be transferred to an Iwi entity. Drawing on the NWML information and applying a 20% share of profit, such a transfer will directly benefit the local Iwi through a share of profits generated by the mussel farm nursery (acknowledging that the specific mechanism to be used will still be finalised). The present value of this profit share is estimated at between \$5.4m (at an 8% discount rate) and \$12.2m (at 2%) over the 30-year project life. As with the wider cost-benefit analysis, this range reflects the discounting of a long-term revenue stream rather than a difference in the underlying amount transferred. This is a distributional benefit (transfer) describing who receives part of the project's value, rather than an additional item to be added to the benefit described above
58. This revenue stream would give the Iwi a direct, ongoing financial interest in the nursery's success, rather than a one-off payment, providing a source of income that could support Iwi-led priorities over the life of the project. Apart from the financial flow, the certainty of longevity of the flow will aid the Iwi-led initiative by helping forward planning (certainty of financial resource). In turn, this will help spread the economic benefits of the project by enabling economic opportunities beyond the proposed activity itself.
59. Beyond the direct financial return, the arrangement reflects a long-term partnership between the project and the local Iwi, consistent with their role as kaitiaki (guardians) of the surrounding coastal and marine environment in which the farm operates. Structuring a share of profit to flow to the Iwi over the full 30-

⁷ Excludes any additional (not related to the proposal) capital investment so the cost is understated. For example, the capital costs associated with investing in new plant and equipment to process the lift in available product.

⁸ These figures are the sum of the relevant parts. For example, the reported \$1.3bn is \$1.1bn (export revenue) plus \$138m (rounded).



year term, supports the relationship and gives the Iwi an ongoing stake in the management of the resource.

60. The proposed project sits within an area that is known to have Māui dolphin, an endangered species. The proposed mitigations include a Marine Wildlife Management Plan that specifies the actions that will be taken to mitigate the risk to Māui dolphin. The applicant points to a possible co-benefit: farm structures could host monitoring equipment and support toxoplasmosis research on the species.
61. The Māui dolphin risk, and the potential effects on the dolphins, are assessed as minor. The potential economic contribution and benefits of the project need to be considered in line with the proposed mitigations. There is limited relevant research to draw on to estimate the economic value that is at risk from the proposal activity. Available research uses⁹ non-market valuation and economic impact assessment techniques to put a value of dolphins, and protecting them (i.e., avoiding a fatality). However, these values are not necessarily transferable to the current proposal because the effects that were evaluated in available studies do not apply in the current proposal.
62. In addition to the above considerations, the project will require transporting spat to the Coromandel and/or Bay of Plenty. This transportation will generate other impacts, such as emissions and social costs (accidents). Using New Zealand Transport Authority (NZTA) metrics around the social costs, and the New Zealand Government's Shadow Price for carbon provides an ability to estimate these costs. These costs are comparatively minor because the spat is not heavy and the transport requirement is modest. The costs are estimated by assuming a 25t load, and transporting from Raglan to Sugarloaf Wharf on the Coromandel's west coast. The estimated costs are presented as a range using 2% and 8% discount rates. The resulting values are moderate with the social cost estimated at between \$51,750 and \$117,680 (present value over 30) and the shadow price of carbon is estimated \$318,640 to \$785,950.¹⁰
63. Overall, the nursery is assessed as economically viable across discount rates tested, but the result is sensitive to the assumptions: at higher discount rates the project moves closer to break-even (benefits equal to costs). However, the higher discount rate does not undermine the analysis.

3.2 Economic impacts

64. A multi-regional input-output (MRIO) model was used to estimate the economic impacts of the proposed ocean spat nursery. As mentioned, the results are presented using three metrics, GDP, income and employment. Spatially the analysis covers five regions and the different project components are reported separately, focusing on:
 - a. Capital expenditure (capex) associated with construction,
 - b. Recapitalisation (periodic reinvestment in infrastructure over the life of the project),
 - c. Farming activity (operational aquaculture activity at the nursery itself), and
 - d. Production, which captures the wider economic activity that the nursery facilitates downstream (i.e. the mussel farming and processing activity enabled by the spat the nursery supplies).
65. The results are presented as the present value (PV) of impacts over a 30-year assessment period and are expressed in 2026 New Zealand dollars (NZ\$ million), discounted at 2% and 8%. Two conventions are used

⁹ See Appendix 2.

¹⁰ Using very high emissions factors.

to describe the size of the economic impact, reflecting how far the supply chain effects of the project are traced through the economy.

- a. Type I, or open impacts relate to the direct and indirect impacts. These impacts relate to the business-to-business transactions, specifically those related to the economic impulse (capital spending) as well as the inputs that the aquaculture activity will require during normal operations. The indirect impacts relate to the changes in economic activity beyond the initial round i.e., the impulse and the first-round economic responses to the impulse. Put differently, the direct impacts of the project cover the operation's own purchases of goods and services from its suppliers, and the indirect impacts relate to the purchases by the suppliers' from their supplier, and so on.
- b. Type II, or closed impacts (direct, indirect and induced effects) include the Type I impacts, as well as the supply chain impacts associated with the salaries and wages that are derived and then spent in the economy. These impacts acknowledge that businesses pay employees who then engage in other economic spending that then generates other supply chain effects. In other words, the induced impacts capture the economic supply chain effects resulting from salaries and wages, and how these are spent.

66. The results by category are presented below.

3.2.1 One off - Capex (construction)

67. Construction of the farm infrastructure will generate an immediate economic impulse. Table 3-2 offers the results by region, and for the discount rates as well as the direct, indirect as well as the total impacts. The top half of the table reports the GDP impacts and the bottom half the income that is returned to households.

Table 3-2: Capex: GDP and income impacts (\$m, NPV)

GDP	Type 1 Direct and indirect		Type 2 Direct, indirect and induced	
	2%	8%	2%	8%
Waikato District	0.3	0.2	0.4	0.2
Hamilton City	0.1	0.0	0.1	0.1
Bay of Plenty	0.1	0.0	0.1	0.1
Rest of Waikato	1.3	1.0	1.9	1.5
Rest of New Zealand	6.8	5.0	10.6	7.8
Total	8.6	6.4	13.1	9.7
Income	2%	8%	2%	8%
Waikato District	0.2	0.1	0.2	0.1
Hamilton City	0.0	0.0	0.1	0.1
Bay of Plenty	0.0	0.0	0.1	0.1
Rest of Waikato	0.7	0.6	1.1	0.9
Rest of New Zealand	3.5	2.5	5.0	3.7
Total	4.4	3.3	6.5	4.8

Figures are rounded so might not sum perfectly

68. The project is estimated to generate an initial economic impulse through the capital spending. The associated GDP impacts (Type 2) are estimated at between NZ\$13.1m (2% discount rate) and NZ\$9.7m (8% discount rate). The total income that will be returned to households during the construction period,

is estimated at between NZ\$6.5m (2%) and NZ\$4.8m (8%). Spatially, the largest impacts will be felt in the Rest of New Zealand which will capture most of the impact – between \$7.8m (8%) and \$10.6m (2%). This reflects the spatial nature of supply chains where specialised construction inputs and equipment are likely to be sourced from Auckland (which sits in the Rest of New Zealand area). The rest of the Waikato is the next largest area in terms of impacts. This pattern is consistent with inputs being sourced from existing mussel farmers in the Coromandel. The two local territorial authority areas (Waikato District, Hamilton City) and the Bay of Plenty region each capture a comparatively modest share, consistent with a capital works programme that draws on a national supply chain.

3.2.2 Ongoing - Recapitalisation

69. The assessment period covers a long period and the nursery will recapitalise equipment. This periodic reinvestment in infrastructure over the project's operating life are part of the ongoing impacts, generating a smaller but ongoing impact. Table 3-3 summarises the present value of the GDP and income impacts associated with the recapitalisation spending.

Table 3-3: Recapitalisation: GDP and income impacts (\$m, PV)

GDP	Type 1 Direct and indirect		Type 2 Direct, indirect and induced	
	2%	8%	2%	8%
Waikato District	0.02	0.01	0.02	0.01
Hamilton City	0.00	0.00	0.01	0.00
Bay of Plenty	0.00	0.00	0.01	0.00
Rest of Waikato	0.03	0.01	0.05	0.02
Rest of New Zealand	0.37	0.14	0.56	0.22
Total	0.43	0.17	0.65	0.25
Income	Type 1 Direct and indirect		Type 2 Direct, indirect and induced	
	2%	8%	2%	8%
Waikato District	0.01	0.00	0.01	0.00
Hamilton City	0.00	0.00	0.00	0.00
Bay of Plenty	0.00	0.00	0.00	0.00
Rest of Waikato	0.02	0.01	0.03	0.01
Rest of New Zealand	0.19	0.07	0.27	0.10
Total	0.22	0.09	0.31	0.12

Figures are rounded so might not sum perfectly

70. At a total level (Type 2), the impacts are estimated at between \$0.25m (8%) and \$0.65m (2%). In terms of the income effects, the total income that is returned to households is estimated at between \$0.12m (8%) and \$0.31m (2%). As with capex, the impacts are concentrated in the Rest of New Zealand, again reflecting the specialised nature of the equipment and materials involved. Because recapitalisation spending recurs at intervals throughout the 30-year period rather than being concentrated at the start, it is more sensitive to the discount rate than capex. The results that are based on the higher discount rate (8%) are around 60% lower than the 2% result, compared with roughly 25% for capex.
71. The income that is returned to households is in the order of \$120,000 to \$310,000 in present value terms with most (85%) of the returned income flowing to the Rest of New Zealand.



3.2.3 Ongoing - Farming activity

72. Once operational, the nursery itself will generate ongoing economic impacts through its own spending activities. Table 3-4 summarises the breakdown of the impacts. The total economic impacts associated with these spending patterns are estimated at between \$56.6m (8%) and \$131.1m (2%). In terms of the income returned to households, the modelling indicates that once operational, the project will return between \$23.8m (8%) and \$55.2m (2%) to households around New Zealand.

Table 3-4: Farming impacts: GDP and income impacts (\$m, PV)

GDP	Type 1 Direct and indirect		Type 2 Direct, indirect and induced	
	2%	8%	2%	8%
Waikato District	51.0	22.0	55.0	23.7
Hamilton City	1.4	0.6	2.2	0.9
Bay of Plenty	1.4	0.6	2.2	1.0
Rest of Waikato	1.3	0.6	2.3	1.0
Rest of New Zealand	39.1	16.9	69.4	30.0
Total	94.2	40.7	131.1	56.6
Income	Type 1 Direct and indirect		Type 2 Direct, indirect and induced	
	2%	8%	2%	8%
Waikato District	20.3	8.8	21.0	9.0
Hamilton City	0.6	0.3	1.0	0.4
Bay of Plenty	0.6	0.3	1.0	0.4
Rest of Waikato	0.6	0.2	1.1	0.5
Rest of New Zealand	18.7	8.1	31.2	13.5
Total	40.8	17.6	55.2	23.8

Figures are rounded so might not sum perfectly

73. Unlike capex and recapitalisation, the farming activity's impacts are concentrated locally with the areas capturing the following shares of total GDP impacts:
- Waikato District 42%,
 - Rest of New Zealand 53%,
 - Other areas 6%¹¹.
74. The same general patterns emerge when income is considered but the weight shifts slightly to Rest of New Zealand which captures 57% of the income compared to 38% for the Waikato District. The patterns are consistent with economic flow that favour the large economic centres i.e., Auckland. If only the direct and indirect impacts are considered, then more than half (54%) of the GDP impacts are felt within the Waikato District and 41% is felt in the rest of New Zealand. The balance (4%) is felt in Hamilton, the Rest of the Waikato and the Bay of Plenty. The equivalent values for income are 50% in the Waikato District, 46% in the Rest of New Zealand and the balance (5%) in Hamilton, the Rest of the Waikato and the Bay of Plenty.
75. The impact patterns show that the local operating expenditure associated with running the nursery has an immediate, local impact and that the Waikato region will experience similar impact.

¹¹ Figures are rounded and might not add to 100%.



3.2.4 Facilitated production impacts

76. The project will enable additional mussel farming in other regions of New Zealand, such as the Coromandel and the Bay of Plenty. Once the product (mussels) is available, it will be processed and exported to global markets. The processing adds value to the goods and stimulates other rounds of economic activity. The economic linkages and supply chain effects associated with lifting aquaculture processing are materially greater than the farming impacts (even if it is somewhat removed from the initial project, it is a facilitated impact). These potential impacts are outlined below. While there are uncertainties around the specific location of processing, the likely scale of change remains material. Two spatial patterns are used:
- Scenario 1: 100% processing in Whitianga,
 - Scenario 2: 100% processing in the Bay of Plenty.

The production impacts represent the wider economic activity that the project will enable once operational, specifically the mussel associated processing activity made possible by the spat it supplies. Table 3-5 and Table 3-6 reports the GDP and income impacts of the two scenarios.

Table 3-5: Scenario 1 (Whitianga) - Facilitated impacts: GDP and income impacts (\$m, PV)

GDP	Type 1 Direct and indirect		Type 2 Direct, indirect and induced	
	2%	8%	2%	8%
Waikato District	8.5	3.4	14.5	5.8
Hamilton City	14.4	5.7	43.7	17.5
Bay of Plenty	19.3	7.7	44.8	17.9
Rest of Waikato	1,528.2	611.1	2,120.0	847.8
Rest of New Zealand	681.6	272.6	1,681.0	672.3
Total	2,251.9	900.6	3,903.9	1,561.2
Income	Type 1 Direct and indirect		Type 2 Direct, indirect and induced	
	2%	8%	2%	8%
Waikato District	4.1	1.7	6.2	2.5
Hamilton City	7.8	3.1	24.0	9.6
Bay of Plenty	9.8	3.9	21.6	8.7
Rest of Waikato	823.6	329.4	1,236.5	494.5
Rest of New Zealand	331.0	132.4	846.4	338.5
Total	1,176.4	470.4	2,134.7	853.7

Figures are rounded so might not sum perfectly

Table 3-6: Scenario 2 (Tauranga) - Facilitated impacts: GDP and income impacts (\$m, PV)

GDP	Type 1 Direct and indirect		Type 2 Direct, indirect and induced	
	2%	8%	2%	8%
Waikato District	4.3	1.7	7.6	3.0
Hamilton City	6.8	2.7	15.9	6.4
Bay of Plenty	1,622.8	649.0	2,171.6	868.4
Rest of Waikato	12.2	4.9	27.6	11.0
Rest of New Zealand	612.9	245.1	1,128.6	451.3
Total	2,259.0	903.4	3,351.3	1,340.2
Income	Type 1 Direct and indirect		Type 2 Direct, indirect and induced	
	2%	8%	2%	8%
Waikato District	2.0	0.8	3.0	1.2
Hamilton City	3.4	1.4	7.6	3.0
Bay of Plenty	883.8	353.4	1,090.6	436.2
Rest of Waikato	5.0	2.0	12.4	5.0
Rest of New Zealand	295.9	118.3	510.4	204.1

Total	1,190.1	475.9	1,624.1	649.5
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Figures are rounded so might not sum perfectly

77. Both scenarios deliver significant economic impacts with Scenario 1 seeing total GDP impacts of \$3.9bn (2%) compared to \$3.4bn (rounded) for Scenario 2. The spatial distribution of the impacts varies with Scenario 2 seeing most of the impacts remain within the Bay of Plenty (65%). Under Scenario 1, the rest of the Waikato (including the Coromandel) will retain more than half (54%) of the GDP impacts.
78. The *facilitated* production impacts clearly highlight the project's wider economic impacts that it will deliver. These impacts are beyond its own footprint (capex, recapitalisation and farming).

3.2.4.1 Key points – GDP and income

79. Table 3-7 summarises the key economic impacts of the project at a total level (direct, indirect and induced), and highlights the GDP and income impacts across all four categories. Total GDP impacts range from \$66.6m (8% discount rate) to \$144.9m (2% discount rate) over the 30-year evaluation period. The total impact returned to households is between \$45.4m to \$20.9m.

Table 3-7: Summary: Total GDP and income impacts by category (\$m, PV)

Category	GDP		Income	
	2%	8%	2%	8%
Capex (construction)	13.1	9.7	4.4	3.3
Recapitalisation	0.6	0.2	0.2	0.1
Farming activity	131.1	56.6	40.8	17.6
TOTAL	144.9	66.6	45.4	20.9
Facilitated impacts				
Production*	\$3.4bn to \$3.9bn	\$1.3bn to \$1.6bn	\$1.6bn to \$2.1bn	\$650m to \$854m
* The range reflect two spatial scenarios. Figures are rounded so might not sum perfectly				

80. Combining the project's own footprint with the facilitated production impacts gives the total economic contribution of the nursery, including the downstream farming and processing activity it enables. Because the production component is scenario-dependent, this total is also expressed as a range:
- Total GDP impact of \$3.5bn to \$4.0bn at a 2% discount rate,
 - Total income returned to households is between \$1.7bn to \$2.2bn.
81. Over 95% of total GDP impact is attributable to the production category, underscoring the nursery's function as a facilitator of wider aquaculture sector activity rather than a significant direct economic contributor.

3.2.5 Employment impacts

82. The employment impacts of the proposal are assessed with the different stages reflected separately covering the same categories used for GDP and income, including:
- Capex (construction),
 - Recapitalisation (periodic reinvestment in infrastructure over the life of the project),
 - Farming activity (operation of the nursery itself), and
 - Production, which captures the wider farming and processing activity the nursery facilitates.
83. The facilitated impacts are discussed separately from the other three categories, as they represent a distinct, standalone benefit of the proposal. The same spatial areas used above are retained. However, the regional effects are captured by aggregating the Waikato-based council areas.



84. Two employment metrics are reported:
- Job-years, which is the cumulative annual employment impact added up across the 30-year evaluation period, and
 - Peak employment, which is the highest employment level reached in any single year within that period, expressed as Modified Employee Counts (a headcount of employment plus an adjustment for working proprietors).
85. Peak employment figures are region- and category-specific: the year in which a given region or category reaches its peak is not necessarily the same year in which another region or category peaks (for example, a construction peak in the early years versus a production peak once downstream farms are established). Peak figures should therefore be read as the highest single-year level reached in that region/category.

3.2.5.1 Immediate employment impacts

86. Table 3-8 summarises the employment impacts of the project. Construction (capital expenditure) of the nursery is estimated to support 84 job-years (direct and indirect), increasing to 150 job-years if all the supply chain effects are included (over the 30-year period). Employment from capex is located outside the immediate project area in the Rest of New Zealand which accounts for 75% to 78% of the employment – this is consistent with specialised construction trades and equipment being sourced nationally. Notable shares of the employment impacts are felt within the Waikato region with the Rest of Waikato capturing 18% (total) of the employment impacts. However, the Waikato District, Hamilton City and Bay of Plenty each capturing only a small fraction. The highest single-year (peak) construction workforce is likewise recorded in Rest of New Zealand, at 6 MECs (Type I) or 12 MECs (Type II).

Table 3-8: Employment Impacts (proposed project)

	Type 1 Direct and indirect		Type 2 Direct, indirect and induced	
Region	Job-years	Peak	Job-years	Peak
Capital expenditure				
Waikato District	4.1	0.5	5.0	0.5
Hamilton City	0.8	0.1	2.1	0.3
Bay of Plenty	0.6	0.1	1.8	0.3
Rest of Waikato	16.8	3.5	25.9	5.2
Rest of New Zealand	62.0	5.9	114.7	11.6
Total	84.3	n/a*	149.5	n/a*
Recapitalisation				
Waikato District	0.3	0.0	0.4	0.0
Hamilton City	0.0	0.0	0.1	0.0
Bay of Plenty	0.0	0.0	0.1	0.0
Rest of Waikato	0.6	0.1	0.9	0.1
Rest of New Zealand	4.3	0.5	7.7	0.8
Total	5.3	n/a*	9.3	n/a*
Nursery				
Waikato District	627.1	26.1	733.1	30.5
Hamilton City	18.6	0.8	34.4	1.4
Bay of Plenty	16.2	0.7	32.5	1.3
Rest of Waikato	13.4	0.6	28.7	1.2
Rest of New Zealand	457.5	19.0	950.1	39.5
Total	1,133	n/a*	1,779	n/a*

Figures are rounded so might not sum perfectly

87. Recapitalisation supports a smaller, ongoing employment impact of 5.3 job-years (Type I) or 9.3 job-years (Type II) over the period. As with capex, this employment is concentrated in Rest of New Zealand (around 81% Type I, 83% Type II), reflecting the specialised nature of reinvestment activities. The spatial patterns mirrors those seen for capex
88. Ongoing operation of the nursery itself supports 1,133 job-years (Type I) or 1,779 job-years (Type II). Unlike capex and recapitalisation, farming activity employment has a direct local link with the direct and indirect level employment impacts felt in the Waikato District (55%). If the wider flows are considered then wider Waikato region accounts for 41% of the employment impacts. The regional pattern shifts towards the rest of New Zealand if the induced effects are added.

3.2.5.2 Facilitated impacts

89. The facilitated effect of the project is the main economic benefit i.e., supporting a lift in aquaculture development by removing a crucial bottleneck. Providing spat will support the growth of aquaculture farming and mussel processing (and exports). The employment that is supported by the facilitated activity is materially larger than the immediate impact's. Considering the facilitated impacts separately highlights the scale of the associated employment impacts (see Table 3-9).

Table 3-9: Facilitated employment impacts

Region	Type 1 Direct and indirect		Type 2 Direct, indirect and induced	
	Job-years	Peak	Job-years	Peak
Waikato District	113	5	217	10
Hamilton City	252	11	820	37
Bay of Plenty	264	12	738	33
Rest of Waikato	17,887	811	30,484	1,381
Rest of New Zealand	7,872	357	24,414	1,106
Total	26,388	n/a*	56,672	n/a*

Default (production in Coromandel), Figures are rounded so might not sum perfectly

90. The employment supported by the production activity (facilitated) is substantially greater than the immediate employment impacts: The direct and indirect jobs are estimated at 26,388 job-years (Type I), and up to 56,672 job-years (Type II) if the wider supply chain effects are included (over the 30-year period). This is twenty to thirty times greater than the job-years generated by farming activity.
91. The wider Waikato region captures the largest portion of the facilitated employment (around 68% Type I, 54% Type II). This is driven by the assumption that the processing will occur within the region. If processing happens in the Bay of Plenty, then the total job-years associated with the processing is 48,547 of which 67% will be in the Bay of Plenty.

3.2.5.3 Key points - Employment

92. Regardless of the category that is considered, there is a consistent split between where the nursery's own economic footprint falls and where the wider economic activity it enables and supplies falls:
- Capex and recapitalisation employment is dominated by Rest of New Zealand (75–83% of job-years; in terms of Type 1 impacts),

- b. Farming activity employment is the only category where Waikato District itself captures a leading share at the direct and indirect level, consistent with the nursery's own on-site operations
- c. Facilitated production, the largest category, is concentrated in Rest of Waikato (Coromandel) or the Bay of Plenty depending on which scenario is considered.

93. Table 3-10 summarises total job-years supported by each category, Type I and Type II, across all five regions combined. Total employment impact across all four categories is between 27,610 job-years and 28,351 job-years (Type I) or 50,484 job-years to 58,610 job-years (Type II) over the 30-year evaluation period.

Table 3-10: Key points (Employment)

Category	Type 1 Direct and indirect	Type 2 Direct, indirect and induced
Capex (construction)	84.3	149.5
Recapitalisation	5.3	9.3
Farming activity	1,133	1,779
Production	26,388-27,129	48,547-56,672
Total (all categories)	27,610-28,351	50,484-58,610

94. The facilitated employment effects are the largest part of the supported employment impacts. This underscores that the nursery's greatest employment contribution comes from the wider aquaculture activity it facilitates, rather than from its own construction, reinvestment or on-site farming operations.



4 Concluding remarks

95. The proposed mussel spat nursery near Whāingaroa/Raglan was assessed from an economic perspective using two tools: a benefit-cost style assessment and an economic impact assessment. The project's immediate and facilitated benefits were considered separately. Crucially, the project's direct/immediate benefits are material and positive. However, the project's true economic value is in contributing towards addressing a known constraint in New Zealand's mussel production – i.e., accessing spat. Including the wider facilitated effects of the project sees the benefits increase, delivering regionally significant benefits.
96. The assessment highlights that:
 - a. The economic benefits outweigh the economic costs, for the project on a standalone basis as well as the wider view with the facilitated project included.
 - b. The economic benefits of the wider, facilitated activity are regionally significant.
 - c. The project's own economic footprint (capex, recapitalisation and farming activity) generates substantial economic impacts, with total GDP impacts estimated at \$144.9m (2%) and \$45.4m of income returned to households. Over the assessment period, the project will support 1,938 job-years (total across the wider economy).
 - d. Facilitated production impacts (the wider mussel farming and processing activity the nursery enables) will deliver the largest positive economic impacts with total GDP impacts of \$3.4bn to \$3.9bn (2%) and income of \$1.6bn to \$2.1bn. The total number of supported jobs will range between 48,547 to 56,672 job-years with the range due to the processing location scenario.
97. Crucially, the project's economic significance under the FTAA is illustrated by the activity it facilitates in the overall aquaculture supply chain, rather than on its own, direct footprint. The facilitated production impacts are, by a considerable margin, the largest component of the project's benefits and impacts, reflecting the nursery's role in addressing a binding constraint.
98. Consequently, the assessment finds that the project is likely to generate regional benefits of a scale consistent with clause 81(4) of the FTAA, and that these benefits are proportionate to the project's economic costs, satisfying clause 85(3) from an economic perspective. This conclusion holds under both the 2% and 8% discount rates tested, although the margin of net benefit narrows considerably at the higher rate.
99. Overall, the proposed spat nursery is assessed as economically viable and beneficial under both discount rates tested, with the economic assessment highlighting the role of the nursery in facilitating activity in the wider aquaculture sector.



Appendices

Appendix 1: IO modelling

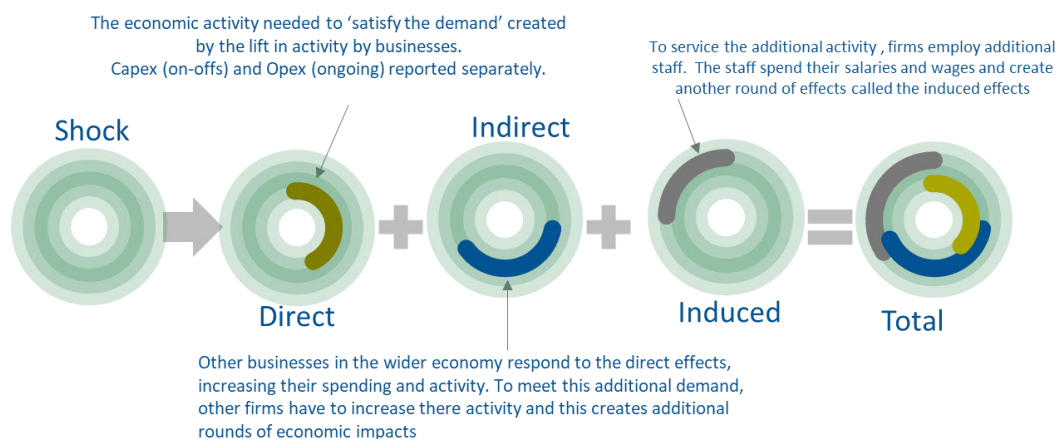
One of Input-Output modelling's strengths is that the results are easy to interpret. Similarly, IO models are easy to use and cost effective to develop for different areas. However, IO analysis is not without limitations, despite being widely applied in New Zealand and around the world. The most common limitations relate to the historical nature of IO Tables. We use IO tables derived from recent Supply and Use Tables. Therefore, they may not accurately reflect the current sectoral relationships in the economy.

With reference to IO modelling in general, a key assumption is that input structures of all industries (i.e. technical relationships) are fixed. In the real world, however, technical relationships will change over time. These changes are driven by new technologies, relative price shifts, product substitutions and the emergence of new industries. For this reason, IO analysis is generally regarded as suitable for short-run analysis, where economic systems are unlikely to change greatly from the initial snapshot of data used to generate the base IO tables. In addition to the 'fixed structure' assumption, other important assumptions (and limitations) of IO models are:

- **Constant return to scale:** This means that the same quantity of inputs is needed per unit of output, regardless of the level of production. In other words, if output increases by 10 per cent, input requirements will also increase by 10 per cent.
- **No supply constraints:** IO assumes there are no restrictions to inputs requirements and assumes there is enough to produce unlimited products.
- **The model is static:** No price changes are built in meaning that dynamic feedbacks between price and quantity (e.g. substitution between labour and capital) are not captured.

The following indicators are used to measure economic impact:

- **Value added** measures all payments to factors of production (land, labour and capital), and excludes all purchases of intermediate inputs. It broadly equates with gross domestic product (GDP) as a measure of economic activity on the national level, and gross regional product on the regional level.
- **Employment** is measured in Modified Employee Count years (MECs). This is the number of full-time and part-time employees as well as working proprietors on an annual basis. This provides a measure of the labour demand associated with the estimated level of economic activity. Note that additional MEC-years do not necessarily require that additional persons be actually employed. It may mean existing employees or proprietors work longer hours to complete the additional work.





A common critique that is often levelled against IO modelling is that it overstates the economic impacts because it does not capture price changes, substitution and capacity constraints in the economy and crowding out impacts (i.e., the limitation mentioned above). Other modelling structures, such as Computable General Equilibrium (CGE) can model such effects and are often used to model behaviour change, resource reallocation, and how businesses/households adjusted to price changes. However, CGE modelling is not without its own limitations. There are limited NZ studies that directly compare the results of IO and CGE models (for the same project). M.E's experience suggest that CGE modelling returns impacts that are in the order of 40% to 60% of those estimated using IO approaches. However, the range is highly sensitive to the type of project. If a more conservative position is sought (in the IO results), then the reader could focus on the direct and indirect impacts (as these reported separately).



Appendix 2: Māui Dolphin – Value studies

Hoyt, E., McGrath, G., Bossley, M. and Knowles, T. (2014) *Assessing New Zealanders' Willingness-to-Pay to Protect the Endangered New Zealand Dolphin (Cephalorhynchus hectori): A Benefit-Cost Analysis Comparing Three Scenarios*. Economists at Large, Melbourne, Australia, and Critical Habitat Marine Protected Areas Programme, Whale and Dolphin Conservation, Chippenham, UK.

Market Economics Limited (Yeoman, R., Rodriguez, A. and Fairgray, D.) (2018) *Hector's Dolphin Eco-Tourism Economic Impact Assessment*. Prepared for Black Cat Cruises, 13 December.

Department of Conservation Te Papa Atawhai and Fisheries New Zealand Tini a Tangaroa (2021) *Hector's and Māui Dolphin Threat Management Plan 2020*. December. ISBN 978-1-99-115299-2 (online).