Appendix W Economic Assessment

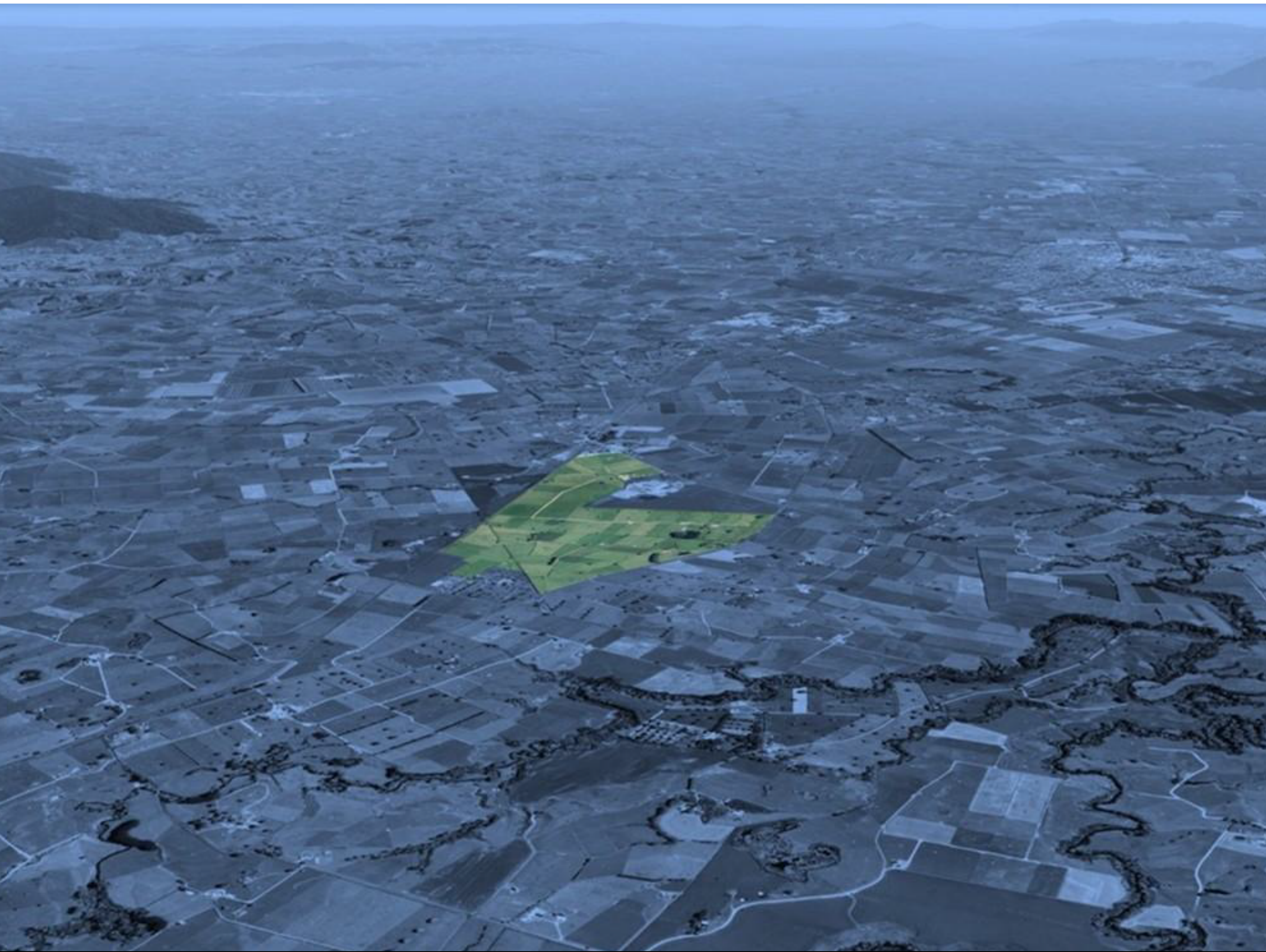
Fast-Track Approvals Act 2024 Substantive Application

Hinuera Solar Farm

Harmony Energy NZ #6 Limited

SLR Project No.: 880.016894.00001

19 August 2026



Final Report: 5 August 2026

Economic Assessment of Proposed Solar Farm in Hinuera for Fast-track Substantive Application

Prepared for:
Harmony Energy NZ #6 Limited

Authorship

This document was written by Fraser Colegrave, Danielle Chaumeil, and Nic Keith.

Contact Details

For further information about this document, please contact us at the details below:

Fraser

Phone: [redacted]

Email: [redacted]

Nic

Phone: [redacted]

Email: [redacted]

Disclaimer

This report has been prepared for the applicant in respect of its application for all approvals under the Fast-track Approvals Act 2024 for the Hinuera Solar Farm. The Panel appointed to consider the application for the Hinuera Solar Farm may rely on this report for the purpose of making its decision.

Compliance

The authors have read the Expert Witness Code of Conduct set out in the Environment Court Practice Note 2023. The authors have complied with the Code of Conduct in preparing this report. The content of the report is within the authors' area of expertise, and the authors have not omitted to consider material facts known to them that might alter or detract from the opinions expressed in the report.

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Contents

1. Statement of Qualifications & Experience

Fraser Colegrave

I am the Founder and Managing Director of Insight Economics, one of New Zealand's leading economic consultancies on resource management, property development, and local infrastructure. Prior to that, I was a founding director of another economics consultancy – Covec Limited – for 12 years.

I hold a first-class honours degree in economics from the University of Auckland, where I received numerous prizes and scholarships for academic excellence. Over the past 25 years, I have successfully completed more than 600 consulting projects across a wide range of sectors, including dozens of large-scale commercial, industrial, and residential developments, and have appeared as an expert witness at more than 150 hearings before various judiciaries including in the High Court.

Danielle Chaumeil

I am a Consultant at Insight Economics. I have been employed at Insight Economics since 2020. I hold a BCom (Actuarial Studies) / BAppFin from Macquarie University and a BDes (Architecture) from the University of Sydney.

I have 20 years of professional experience in insurance, consulting, and architecture, including roles as an Actuary in both Australia and France. My experience includes economic and retail impact assessments, market supply and demand studies, resource consents, and plan changes.

Nicholas Keith

I am a Consultant at Insight Economics, where I have been employed since 2023. I hold a BSc in Statistics from the University of Auckland and a first-class honours MSc in Analytics from Massey University.

I have three years' professional experience in economic consulting, with prior experience in statistical analysis. Since joining Insight Economics, I have contributed to a range of significant projects across the commercial, residential, tourism, industrial, energy, and local infrastructure sectors, including economic input to Fast-track applications for some of New Zealand's largest energy providers.

We are collectively responsible for preparing this report on behalf of Insight Economics. We confirm that, in our capacities as authors of this report, we have read and agree to abide by the Environment Court of New Zealand's Code of Conduct for Expert Witnesses contained in the Practice Note 2023.

For more information about Insight Economics, including our extensive experience with helping to secure planning approval for major projects (including numerous Fast-track applications), please visit our website: www.insighteconomics.co.nz

2. Executive Summary

Context

Harmony Energy NZ #6 Limited (**HENZ**) seeks substantive consent under the Fast-track Approvals Act 2024 (**FTAA**) for the Hinuera Solar Farm (the **proposal**), a utility-scale solar and battery energy storage facility located at the corner of State Highway 27 and State Highway 29 near Hinuera in the Matamata-Piako District, Waikato (the **subject site**). The subject site comprises four titles with a combined area of approximately 154 hectares and currently supports two adjacent dairy farms. The proposal involves the installation of up to approximately 170,000 ground-mounted photovoltaic panels on single-axis tracking structures, together with a battery energy storage system, a grid connection to the adjacent Powerco substation, and supporting operational infrastructure. The solar farm is expected to have an installed capacity of approximately 68 MW AC (88 MW DC) and generate approximately 147 GWh of renewable electricity per year. This report assesses the economic effects of the proposal to inform consideration of its significance and merits under the FTAA.

Electricity Market and Emissions Benefits

The proposal's most significant contributions are national in scope and primarily qualitative in nature. They include benefits – most notably the displacement of greenhouse gas emissions, improved competition in the wholesale electricity market, and electricity system flexibility and resilience – which, while not readily expressible in dollar terms, are nevertheless substantial and material to the Panel's consideration. Their omission from the monetised total economic value (**TEV**) framework below reflects the difficulty of robust valuation, not an assessment that they are immaterial; in our view, these qualitative benefits are the most consequential effects of the proposal. For instance, the solar farm's annual generation of approximately 147 GWh would:

- Lift national solar generation by approximately 147 GWh per annum, from a 2024 base of 595 GWh to 742 GWh per annum – an increase of around **25 percent**. This significant increase reflects New Zealand's relatively early stage of utility-scale solar deployment; on an absolute basis, the proposal's contribution is consistent with the step-change in renewable generation identified as necessary under all of MBIE's demand scenarios to meet projected electricity demand growth of 57 percent by 2050, driven primarily by population growth, electrification of transport and industrial processes, and new demand from datacentres;

- On an indicative basis, avoid approximately **72,711 tonnes of CO_2-equivalent emissions per year**, calculated by reference to the emissions intensity of gas-fired generation – the marginal thermal fuel in the New Zealand electricity system. This is comprised of around 71,838 tonnes from displaced gas-fired electricity generation and a further 873 tonnes from reduced on-farm emissions through the transition from dairy to lower-intensity pastoral use;[1]

[1] The actual displacement mix will depend on system conditions at the time of generation; gas is adopted here as a transparent benchmark to contextualise the scale of the proposal's emissions benefit, rather than to imply that gas-fired generation is displaced one-for-one.

- Generate sufficient electricity to meet the annual needs of approximately **21,050 New Zealand households**, or to power approximately **94,510 electric vehicles** per year;

- Improve competition in the wholesale electricity market through the addition of significant low-marginal-cost generation, placing downward pressure on wholesale prices and moderating the rate of retail electricity price growth over time; and

- Enhance system flexibility and resilience, with solar output complementing existing hydro generation by effectively storing water in southern hydro lakes for deployment during evening peaks and winter periods, and reducing system exposure to gas supply and hydrology risks.

TEV Summary

In addition to the national-scale qualitative benefits described above, we have also quantified the directly measurable economic costs and benefits of the proposal using the TEV framework. This monetised analysis is necessarily narrower in scope than the qualitative effects, because the proposal's most significant benefits – its contribution to renewable generation and emissions displacement – are not readily expressible in dollar terms. The quantified results are best read as a supporting line of evidence that confirms the proposal also delivers a positive net benefit on the measurable economic activity it directly generates and displaces. The results are summarised below:

Table 1: Summary of Quantified TEV Costs and Benefits (NPV, $m)

Direct Use Values	Costs	Benefits	Net Benefits
NPV of Construction GDP		$42.6	$42.6
NPV of Future Onsite GDP		$32.9	$32.9
NPV of Foregone Rural GDP	-$13.0		-$13.0
Direct Use Sub-Totals	**-$13.0**	**$75.5**	**$62.5**
Indirect Use Values	**Costs**	**Benefits**	**Net Benefits**
Loss of Ecosystem Services	-$5.0		-$5.0
Non-use Values	**Costs**	**Benefits**	**Net Benefits**
Loss of option/bequest value	-$5.0		-$5.0
Total Economic Values	**Costs**	**Benefits**	**Net Benefits**
TEV Summary	**-$23.0**	**$75.5**	**$52.4**

Under the baseline scenario, the quantified TEV analysis returns a positive net benefit of approximately $52 million in NPV terms (benefits of $75 million against costs of $23 million). Benefits are split between one-time construction-phase GDP over the 18 to 24-month build period and ongoing onsite GDP from solar farm operations over the balance of our 34-year analysis period. Quantified costs comprise foregone dairy production, loss of ecosystem services, and loss of option and bequest value. The quantified benefits exceed the quantified costs by a ratio of more than three to one.

Importantly, these figures are inherently conservative. They exclude the ongoing value of agrivoltaic sheep grazing (permitted, but not required, under the easement arrangements), the contracted and seasonal workforce supporting operations, the separate construction impacts of on-site operations and maintenance buildings, and the significant monetary value of displaced greenhouse gas emissions. Each of these is discussed further in the body of the report.

One-Time Economic Impacts

Total capital investment in the proposal is estimated at approximately $150 million, of which approximately half ($75 million) is expected to be spent domestically on scheme finalisation, site-wide enabling works, civil and electrical construction, on-site installation labour, and locally supplied materials and services. The balance reflects imported components such as solar panels, inverters, trackers, and transformers, which are excluded from modelling as they do not generate direct domestic economic activity.

Construction is expected to occur over approximately 18 to 24 months. Under the baseline scenario, this activity is estimated to support approximately 267 FTE-years of employment, generate approximately $42.6 million in GDP, and contribute approximately $21 million in wages and salaries. These impacts accrue across a range of sectors, including heavy and civil engineering construction, specialised electrical trades, professional and engineering services, transport and logistics, and wholesale supply of plant and materials.

Ongoing Economic Activity

Once operational, the solar farm will sustain approximately 7-10 permanent on-site FTEs, comprising a site manager, administrator, operators, technicians, and security personnel. Including indirect supply-chain effects, this equates to approximately 350 FTE-years of employment and approximately $33 million in GDP over the balance of our 34-year analysis period (32 years) in NPV terms. In addition, operations will generate ongoing demand for contracted services such as vegetation management, panel cleaning, electrical testing, and civil maintenance, which have not been quantified but will provide further employment opportunities for regionally based contractors and trades.

By comparison, the counterfactual (continued dairy farming) will sustain less than two direct FTEs per annum. On a net basis, the proposal delivers an increase of approximately 212 FTE-years of ongoing employment and approximately $20 million in additional GDP relative to the counterfactual over the 34-year easement period.

Wider Economic Benefits and Alignment

Beyond the quantified and electricity-system effects, the proposal delivers a range of additional economic benefits:

- It strengthens workforce capability in the renewable energy sector through on-the-job training in photovoltaic systems and electrical infrastructure, and provides stable long-term employment in a predominantly rural labour market;

- It represents a $150 million private-sector commitment in nationally significant renewable energy infrastructure, delivering positive investment signal effects that may help reduce perceived market risk and bring forward complementary renewable investment in the Waikato region;

- It is strongly aligned with the *National Policy Statement for Renewable Electricity Generation 2011 (Amended December 2025)*, the *Emissions Reduction Plan 2026-2030*, and the Government's *Going for Growth* agenda, particularly its pillars on competitive business settings, trade and investment, and infrastructure for growth;

- It is being delivered by an experienced developer with a proven pipeline of utility-scale solar and battery storage projects in New Zealand (including the Tauhei Solar Farm currently under construction) and internationally, which strengthens confidence that the enabled generation capacity will be realised in practice; and

- The FTAA provides a streamlined approvals pathway that materially accelerates delivery of all of these benefits relative to standard RMA processes, bringing forward the commencement of construction, the realisation of ongoing generation, and the associated emissions displacement.

The identified adverse economic effects are limited in scale, localised, and, in the case of the productive land, reversible at the conclusion of the easement term. None are considered material in the context of the benefits delivered.

Conclusion

From an economic perspective, the proposal delivers clear and significant regional and national benefits. It provides a material addition to national renewable generation capacity at a time when the electricity system requires a step-change increase in solar and wind generation to meet projected demand growth. It displaces substantial greenhouse gas emissions, strengthens competition in the wholesale electricity market, and enhances the flexibility and resilience of the national generation system. It generates meaningful construction-phase employment and GDP, sustains stable long-term operational employment in a rural labour market, and delivers a quantified net benefit of approximately $52 million in NPV terms at a benefit-to-cost ratio of more than three to one. The proposal is strongly supported on economic grounds.

3. Introduction

3.1. Context

Harmony Energy NZ #6 Limited (**HENZ**) seeks substantive approval under the Fast-track Approvals Act 2024 (**FTAA**) for the Hinuera Solar Farm (the **proposal**), a utility-scale solar and battery energy storage project located at the corner of State Highway 27 and State Highway 29 in Hinuera, near Matamata (the **subject site**). The concept design statement describes the proposal as an approximately 68 MW AC / 88 MW DC solar development, with electricity to be exported via a nearby Powerco substation.

The Hinuera Solar Farm is identified as a listed project in Schedule 2 of the FTAA, enabling it to proceed directly through the Fast-track approvals pathway. Accordingly, HENZ is now making its substantive application for all necessary approvals for the proposal under the FTAA.

3.2. Criteria for Assessing Substantive Applications

The FTAA establishes a permanent approvals regime designed to expedite projects that deliver significant regional or national benefits. When considering substantive applications, the Expert Panel is guided by the provisions in sections 81 to 85 of the FTAA, together with the matters set out in Schedule 5. Key provisions relevant from an economic perspective are provided in Table 2 below.

Table 2: Economic matters relevant to substantive assessment under the FTAA

Provision	Relevance to this assessment
Purpose of the Act (s3; s43(1)(b)(i); s81(2)(b))	The central purpose of the FTAA is *"to facilitate infrastructure and development projects with significant regional or national benefits."* The Panel must have particular regard to whether projects achieve that purpose.
Balancing Benefits and Adverse Effects (s83(1)(b); s85)	The Panel may decline an approval if it considers the adverse impacts are out of proportion to regional or national benefits.
Nature and Scale of Benefits (s81(4))	The Panel must consider the extent of the project's regional or national benefits.
Consistency with National Direction (s81(2)(aab))	The Panel must also consider the extent to which a project aligns with a relevant Government policy statement, including those under the Resource Management Act 1991 (**RMA**), such as the National Policy Statement on Urban Development (**NPS-UD**).
Schedule 5, Clause 7	Requires an assessment of economic effects as part of the Assessment of Environmental Effects (**AEE**).
Schedule 5, Clause 17	Directs that greatest weight be given to the purpose of the FTAA when considering consent applications.

Taken together, these provisions confirm that substantive applications are to be assessed primarily on the extent to which they deliver significant regional or national benefits, and whether those benefits outweigh any adverse effects.

3.3. Scope & Purpose of Report

This report assesses the likely economic effects of the proposal against those criteria. It focuses on the proposal's capacity to generate employment, contribute to New Zealand's renewable electricity supply and climate objectives, and produce positive regional and national economic outcomes, including impacts on GDP, household incomes, and wider economic outcomes. The assessment is intended to assist the Panel in determining whether the proposal provides sufficient benefit to justify approval under the FTAA.

3.4. Structure of this Document

The remainder of this document is structured as follows:

- **Section 4** describes the subject site, its surrounding environment, and other relevant context.
- **Section 5** sets out the two options assessed: the proposal and the counterfactual.
- **Section 6** describes the analytical framework and methodology used in the assessment.
- **Section 7** presents the key inputs and assumptions underpinning the analysis.
- **Section 8** estimates the one-time impacts of construction activity on GDP, jobs, and wages.
- **Section 9** compares ongoing onsite economic activity under the proposal and counterfactual.
- **Section 10** assesses the proposal's electricity market effects.
- **Section 11** discusses wider long-term economic impacts, including strategic alignment.
- **Section 12** considers the effects of accelerated delivery through the FTAA.
- **Section 13** presents the overall conclusion, including an assessment against the FTAA criteria.

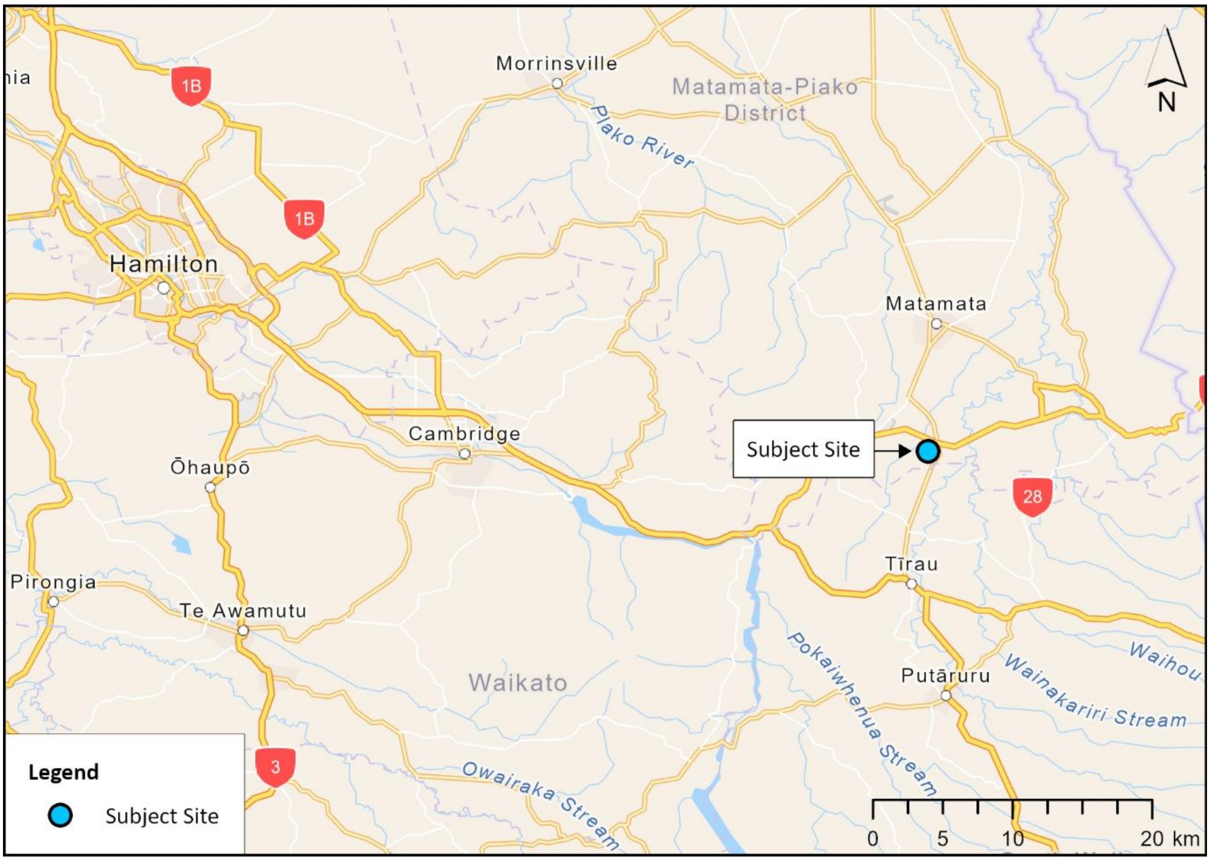
4. Subject Site

4.1. Subject Site Location and Description

The subject site for the proposal is located in a rural area near Hinuera in the Matamata-Piako District, Waikato. The site extends across four titles with a combined area of approximately 154 hectares. The site currently operates as dairy farmland, with associated farm infrastructure including dwellings, farm buildings, and other supporting agricultural infrastructure.

The site is situated adjacent to the district's southern border, near the intersection of State Highway 27 and State Highway 29, approximately 10 kilometres south of Matamata and around 10 kilometres north of Tirau. Its location is denoted by the blue dot in Figure 1 below. In terms of electricity infrastructure, the site benefits from proximity to an existing Powerco substation located near the corner of Lake Road and State Highway 27, which provides a point of connection for the proposed generation facilities.

Figure 1: Location of the Subject Site

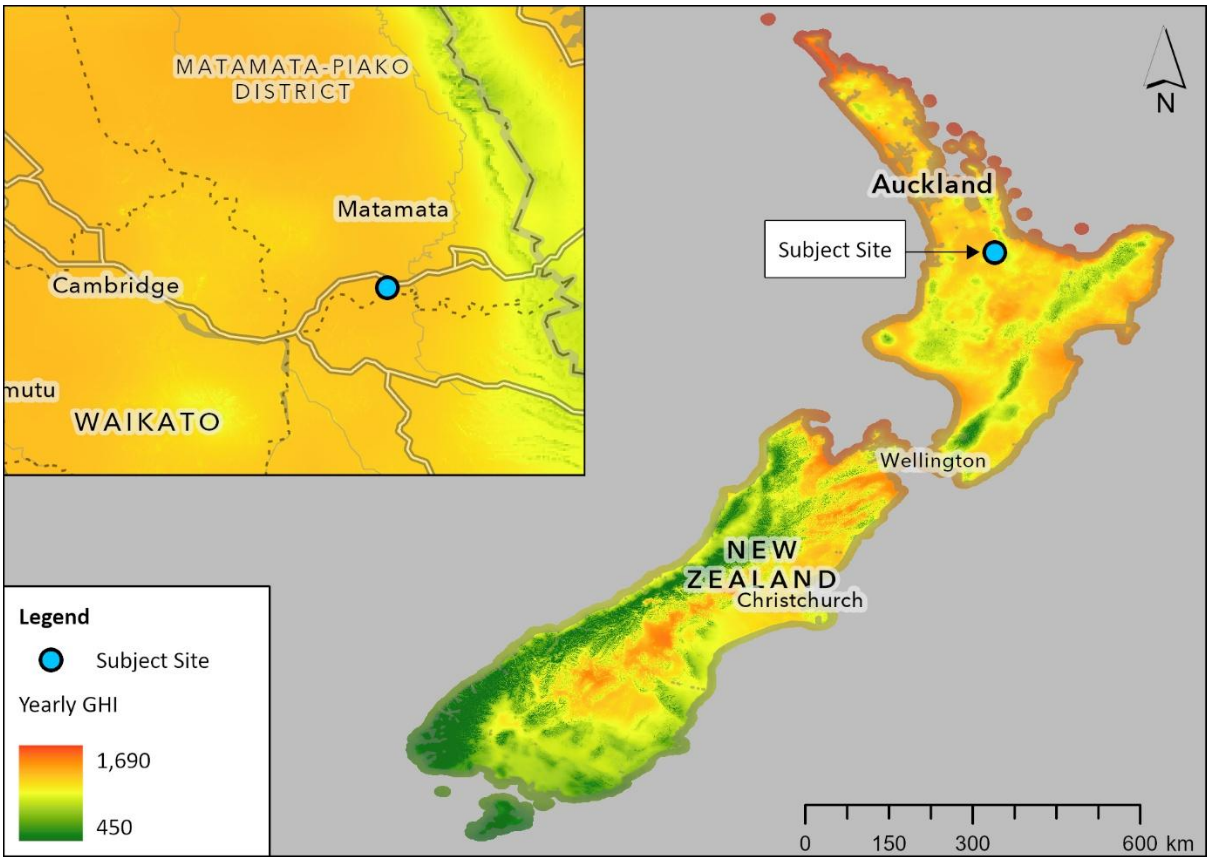


4.2. Solar Irradiation at the Site

The site receives high levels of solar irradiation – a key determinant of solar farm efficiency – relative to other areas in New Zealand. Solar irradiation refers to the amount of solar energy received at a given location over a specified period, commonly expressed as global horizontal irradiation (**GHI**) in kilowatt-hours per square metre per year (**kWh/m²/year**). It is one of the key physical determinants of electricity generation, alongside panel efficiency, system performance, and the area of panels installed. Sites with higher irradiation generally achieve higher capacity factors, meaning a greater share of their installed capacity is converted into electricity per year. Higher capacity factors increase annual generation and reduce the cost per MWh for a given capital investment.[2] Even modest differences in solar resource can therefore have a material effect on the commercial viability and long-term productivity of a solar farm.

A desktop review of publicly available data from Solargis indicates that the Hinuera site receives average annual GHI of approximately 1,430 kWh/m²/year.[3] As shown in Figure 2, the site is centrally located within one of the higher GHI zones in New Zealand, where GHI levels range from approximately 450 to 1,690 kWh/m²/year nationally.

Figure 2: Global Horizontal Irradiation (GHI) across New Zealand



[2] National Renewable Energy Laboratory (NREL). *PVWatts Calculator Documentation and Solar Resource Fundamentals*. Available here: https://docs.nrel.gov/docs/fy14osti/62641.pdf

[3] Available here: www.solargis.com/resources/free-maps-and-gis-data?locality=new-zealand

5. Development Options

This section describes two options for the site's future use: the proposal, or the most likely use without the proposal. The latter is known as the "counterfactual", and it provides the benchmark against which the proposal's net economic effects are assessed in this report.

5.1. Option 1: Proposal

The proposal comprises a utility-scale solar generation facility and associated supporting infrastructure. The development will include up to approximately 170,000 ground-mounted photovoltaic panels installed on single-axis tracking structures across the site, together with a battery energy storage system (**BESS**).

Electricity generated by the solar arrays will be transmitted through underground cabling to inverter and transformer equipment before being collected at an on-site switching station for export to the nearby Powerco network via a 33 kV connection. The BESS will enable electricity generated during periods of high solar production to be stored and dispatched at times when electricity demand is higher, thereby improving the flexibility and reliability of the electricity supply.

In addition to the solar arrays and electrical infrastructure, the proposal includes a range of operational buildings and ancillary structures required to support the construction and long-term operation of the facility. These include an operations and maintenance building, a storage building, storage containers, internal access tracks, security fencing, and associated electrical infrastructure.

The operational buildings anticipated within the development include:

- One operations and maintenance building of approximately 180 m²;
- One storage building of approximately 180 m²; and
- Up to five storage containers of approximately 28 m² each.

Construction is expected to take approximately 18 to 24 months. HENZ holds easement agreements over the land granting the option to take a 34-year registered easement for development, construction, and operation of the solar farm. At the end of that period, the facility could either be decommissioned and the site reinstated to pasture, or repowered through the replacement of key equipment such as the photovoltaic modules. Solar panels typically retain a high proportion of their generating capacity over time (often around 85 percent of their initial output after 35 years), meaning the site could continue to operate with upgraded equipment if desired.

For the purposes of our analysis, the proposal's ongoing onsite economic activity is modelled over a 32-year period, reflecting the assumption that operational activity does not commence in earnest until the conclusion of the 18 to 24-month construction phase. In practice, some on-site operational employment would be expected during the latter stages of construction, so this approach likely understates the proposal's ongoing benefits.

Indicative Site Layout

The indicative layout provides for photovoltaic array blocks spread across the developable parts of the site, while excluding existing dwellings and farm buildings. Ancillary infrastructure, including inverters, batteries, transformers, the switching station, operations and maintenance facilities, storage areas, water tanks, access roads, and temporary construction areas, is incorporated within the overall layout.

The concept design allocates the site area as summarised in Table 3.

Table 3: Indicative Site Area Allocation

Land Use	Area (ha)	Share
Solar panels	95.0	62%
Open pastoral grazing	41.2	27%
Roading and BESS	9.4	6%
Dwellings and buildings	5.0	3%
Drains and wetlands	3.1	2%
Total	**153.7**	**100%**

Internal access tracks and cable routes are integrated with the site layout to support construction, maintenance, and operations over the life of the proposal.

Under the terms of the easement agreements, the landowners retain the right to farm beneath the panels, which provides scope for continued compatible rural use alongside electricity generation (discussed further below).

An indicative layout of the proposed development is provided in Figure 3 below.

Figure 3: Indicative Site Layout

Anticipated Generation

Based on the current concept design, the Hinuera Solar Farm is expected to have an installed capacity of approximately 68 MW AC (88.4 MW DC). The indicative P50 annual energy yield for the project is approximately 147 GWh per year. This implies a capacity factor of approximately 25 percent on an AC basis,[4] which is consistent with expectations for a well-sited single-axis tracking solar installation in the Waikato region.

Agricultural Land Use (Agrivoltaics)

During the operation of the solar farm, agricultural use of the site can continue through sheep grazing beneath and between the solar panel arrays, an approach commonly referred to as *agrivoltaics*. The panels are designed with a minimum ground clearance of 500 mm (300 mm at minimum tolerance) and row spacing of between 4.5 and 7.0 metres, which provides sufficient space for livestock to graze freely beneath the structures and for vehicles and machinery to operate between rows.

The pastoral assessment prepared by Pastoral Consultancy Ltd has modelled a self-contained sheep grazing system for the site, comprising approximately 1,600 ewes and associated progeny across an effective grazing area of approximately 136 hectares.[5] This system would operate at a stocking rate of approximately 14.9 stock units per hectare, producing approximately 401 kg of product per hectare (comprising meat and wool) with an estimated gross margin of approximately $3,226 per hectare.

This agrivoltaic arrangement provides several benefits. It enables continued productive use of the rural land alongside electricity generation, reduces the need for mechanical mowing and weed management, and represents a lower-intensity agricultural land use than the existing dairy operation, with materially lower greenhouse gas emissions.

The panels also create micro-climate benefits for livestock, including shade and shelter from wind and rain, reduced heat stress in summer, and frost protection in winter. These benefits can improve animal growth rates and welfare outcomes, and may partially offset the reduction in pasture production.

While sheep grazing is the most appropriate and commercially proven agrivoltaic use for the site at this time, alternative agricultural activities may emerge over the course of the solar farm's operation as the agrivoltaic sector develops. Internationally, a range of crops are being trialled within operating solar farms, and HENZ and the landowners may explore complementary primary production opportunities as they become viable.

5.2. Option 2: Counterfactual

The counterfactual represents the most plausible future use of the subject land in the absence of the proposal.

Current Site Use

The site currently comprises two adjacent dairy farms under separate ownership, with a combined total site area of approximately 154 hectares (of which approximately 147 hectares is effective grazing

[4] Calculated as 147,000 MWh ÷ (68 MW × 8,760 hours) ≈ 25%

[5] Peacocke, D. (2026), *Change in Productivity Analysis: Current Dairy Farms vs Proposed Solar Farm Development*, Pastoral Consultancy Ltd.

area). The northern dairy farm extends across approximately 89 hectares and the southern dairy farm across approximately 65 hectares, with both properties having road frontage along State Highway 27 and State Highway 29.

Both farms operate conventional seasonal dairy systems with similar calving dates, milking regimes, and grazing policies. Production data for both properties has been verified via Fonterra's annual Farm Insights Reports, and an integrated Farmax model based on an average of the last three years' production and inputs has been developed by Pastoral Consultancy Ltd to assess the total productive capability across the proposed solar site.

The key physical parameters of the current dairy operation are summarised in Table 4.

Table 4: Current Dairy Farm – Key Physical Parameters

Parameter	Value	Unit
Site area	154	ha
Effective grazing area[6]	147	ha
Herd size (1 July)	440	cows
Stocking rate	2.8	cows/ha
Peak cows milked	431	cows
Days in milk	260	days
Total milksolids (to factory)	148,119	kg
Milksolids per hectare	1,005	kg MS/ha
Milksolids per cow	344	kg MS/cow
Potential pasture growth	13.2	t DM/ha
Average stock units	24.2	SU/ha

Greenhouse Gas Emissions Under Current Use

The pastoral assessment estimates that the current dairy operation generates greenhouse gas emissions of approximately 10.60 tonnes of CO_2-equivalent per hectare per year. This is slightly above the reported national dairy farm average of 9.6 tonnes of CO_2-equivalent per hectare per year, but remains well within the range reported (approximately 3.1 to 18.8 tCO_2e/ha). Farm-level emissions will vary by factors including stocking rate, supplementary feed use, nitrogen fertiliser use, and the wider farm system.[7]

Rationale for the Counterfactual

The counterfactual assumes that, absent the proposal, the site would continue to operate as a dairy farm at approximately the current level of production. This is a conservative assumption for the purposes of economic assessment, as it attributes the full current productive value of the land to the counterfactual and thereby maximises the estimated opportunity cost of the proposal.

[6] Effective grazing area is not reported directly in the pastoral assessment but is implied by the Farmax model outputs: total milksolids production of 148,119 kg ÷ 1,005 kg MS per grazing hectare ≈ 147 ha. The difference from the 154 ha site area likely reflects land occupied by races, yards, buildings, and other non-grazeable areas within the farm footprint.

[7] https://www.agmatters.nz/farm-types/dairy/

In practice, the counterfactual may overstate the productive value of the site over the longer term, given the increasing regulatory costs and environmental constraints facing the dairy sector, including freshwater quality regulations, greenhouse gas reduction obligations, and rising compliance costs. The site falls within the Waihou Piako Catchment Management Zone and the Hauraki Freshwater Farm Plan Catchment, both of which are subject to evolving environmental management requirements.

The counterfactual is modelled over a 34-year NPV period, consistent with the term of the registered easement granted by the landowners. The conservatism of the counterfactual derives from:

i. applying dairy production values across the full site rather than the effective grazing area;

ii. attributing the full dairy productive value over the entire analysis period, despite the likelihood of increasing regulatory costs and environmental constraints on the dairy sector;

iii. assuming that the proposal precludes rural production across the entire site from day one, rather than reflecting a tapering off of activity; and

iv. excluding the offsetting effect of permitted agrivoltaic sheep grazing under the proposal.

5.3. Key Differences

The two options represent materially different trajectories for the subject land, both in the nature and intensity of economic activity they would support and in their contributions to the national economy and climate objectives.

Under the counterfactual, the site would continue to support conventional dairy farming, generating modest economic output relative to the land area involved. While dairy production is an established and valued rural land use, the site's contribution to employment, GDP, and wages is limited in absolute terms; a function of the relatively low labour intensity of modern dairy farming at this scale.

Under the proposal, the site would transition to a dual-use solar energy and pastoral land use, combining utility-scale renewable electricity generation with the scope for continued low-intensity pastoral use beneath and between the panel arrays. This transition would generate substantial one-time economic activity during the construction phase followed by long-term ongoing economic contributions through electricity generation and operational employment.

6. Approach to Assessment

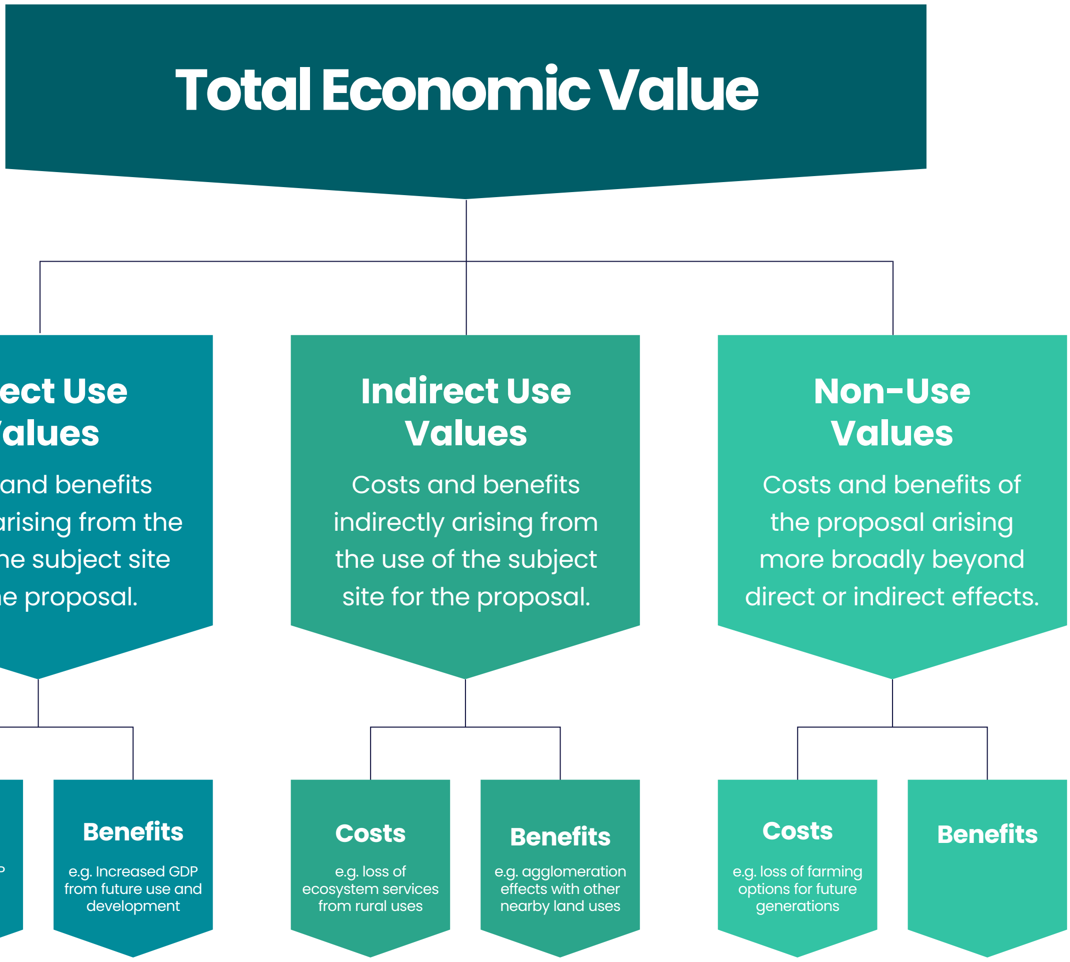
This section sets out the analytical framework and methodology used to assess the proposal.

6.1. Summary of Overall Approach

Our assessment adopts the total economic value (**TEV**) framework to quantify the *monetised* costs and benefits of the proposal relative to the counterfactual. The analysis spans the 34-year term of the registered easement granted by the landowners. The counterfactual is modelled across the full 34-year period, while the proposal's ongoing onsite economic activity is modelled over a 32-year period to allow for the 18 to 24-month construction phase before operational activity commences. All costs and benefits are converted to net present values (**NPV**) at an 8 percent discount rate.

The TEV framework classifies monetised economic values as direct use, indirect use, or non-use values. An overview of this framework is illustrated in Figure 4, with further detail provided in **Appendix A**.

Figure 4: Overview of the TEV Framework



By way of scope, this report does not assess the proposal's broader environmental effects (such as effects on biodiversity, soils, ecology, landscape and visual amenity, water quality, freshwater, and cultural values) which are addressed in separate technical reports prepared by the relevant experts. We expressly acknowledge that the proposal will give rise to a range of environmental impacts, both positive and adverse. Their absence from the monetised TEV total should not be interpreted as an assessment that they are immaterial; the Panel should consider the findings of this report alongside the conclusions of the other technical assessments.

6.2. Mapping of Monetised Costs & Benefits to TEV Framework

Table 5 below maps the monetised costs and benefits of the proposal to the TEV categories outlined above. In summary, the key monetised benefits comprise construction-phase economic activity and ongoing onsite economic activity. The principal monetised cost is the loss of rural production (partially offset by the scope for continued sheep grazing as an agrivoltaic co-use), along with associated indirect use (ecosystem services) and non-use (option and bequest) values.

Table 5: Mapping of Proposal Economic Costs and Benefits to TEV Elements

TEV Category	BENEFITS of Proposal vs Counterfactual	COSTS of Proposal vs Counterfactual
Direct Use Value	Construction-phase economic activity (GDP)	Loss of rural production (dairy)
	Ongoing onsite economic activity (solar)	None considered
Indirect use value	None considered	Loss of ecosystem services (e.g., regulating functions)
Non-use value	None considered	Loss of option and bequest values associated with rural land

6.3. Treatment of Employment and Qualitative Effects

While wages and salaries associated with employment are reflected within the GDP-based measures included in the monetised analysis, employment itself (measured in FTEs) is assessed separately from the TEV framework. Other economic effects that are not readily monetised are assessed qualitatively. Together, these approaches ensure that all material economic effects are captured in the analysis.

6.4. Use of Multiplier Analysis

We use a widely known technique called multiplier analysis to quantify the proposal's one-off effects on GDP, jobs, and wages (plus the effects of foregone rural production). It exploits the supply chains that comprise an economy so that a change in one sector can be traced through to estimate its overall impacts, including flow-on (i.e., supply chain) effects. Multiplier analysis is particularly well-suited to assessing construction projects like the proposal, because much of the work is usually subcontracted out, rather than being done by the main contractor, which multiplier analysis is designed to address.

The economic impacts derived via multiplier analysis comprise three parts, namely:

- **Direct effects** – which capture the economic impacts of entities directly engaged to complete the project (e.g., the main building contractor); plus
- **Indirect effects** – which arise when the main contractor sources goods and services from their suppliers (i.e., subcontractors), who in turn may need to source goods and services from their own suppliers, and so on; and

- **Induced effects** – which occur when a share of the additional wages and salaries generated by the project (either directly or indirectly) are spent in the local/regional economy and therefore give rise to additional rounds of economic impacts

Despite the intuitive appeal and widespread use of multiplier analysis, it does face some limitations. Our assessment recognises these and seeks to mitigate them in several ways so that the proposal's economic benefits are not systematically overstated. See **Appendix B** for further details.

7. Key Inputs & Assumptions

This section sets out the key inputs and assumptions that underpin the economic assessment. Where possible, inputs have been drawn from project-specific information provided by the applicant. All cost figures are expressed in current (2026) dollars unless otherwise stated.

7.1. Staging & Timing

The Hinuera Solar Farm is to be delivered as a single construction programme over an anticipated period of approximately 18 to 24 months. Unlike staged residential or commercial developments, which are typically delivered in sequential phases over multiple years in response to market absorption, utility-scale solar farms are constructed as integrated projects with overlapping work streams, including civil works, mechanical installation, electrical works, grid connection, and commissioning, progressing concurrently across the site.

7.2. Construction Costs

Our analysis incorporates various assumptions about the likely scale and composition of development expenditure. The project team has advised that the total capital cost of the proposal is expected to be approximately $150 million.[8] Of this, approximately 50 percent (or $75 million) is expected to be spent domestically on scheme finalisation, site-wide enabling works, civil and electrical construction, on-site installation labour, and locally supplied materials and services. The balance reflects imported components such as solar panels, inverters, trackers, and transformers, which are excluded from modelling as they do not generate direct domestic economic activity (although associated freight, port handling, and inland transport within New Zealand is captured in the domestic share).

7.3. Other Development Costs

The development will require significant upfront investment in site-wide enabling works before installation can commence, including bulk earthworks, trunk stormwater infrastructure, and utilities. This suite of broader costs was estimated using project-specific information provided by HENZ wherever possible, with any gaps filled via broad industry averages gleaned from our experience with similar developments across New Zealand.

7.4. Total Estimated Domestic Project Cost

Table 6 brings together the domestic component of the estimated development cost of the proposal. This expenditure forms the basis for the one-time economic impact assessment presented in the following section.

Table 6: Summary of Estimated Domestic Project Investment

Cost Category	Estimated Cost ($m)	Share of Cost
Scheme finalisation	$1.5	2%
Site-wide enabling works	$6.0	8%
Solar installation	$67.5	90%
Total estimated project cost	**$75.0**	**100%**

[8] The capital cost estimates provided by HENZ are high-level and have been informed by the applicant's involvement in other large-scale projects of a similar nature, which provides a basis for estimating both the overall and domestic components of expenditure.

8. One-Time Impacts on GDP, Jobs & Wages

As outlined above, the proposal involves approximately $75 million of domestic expenditure. This section estimates the one-time economic impacts of this expenditure on GDP, employment, and wages and salaries.

8.1. Estimated Gross Impacts

The table below presents the estimated one-off (gross or unscaled) direct and indirect economic impacts of the proposal's development, broken down by development stage, for each of the three key impact metrics: employment, wages and salaries, and GDP.

Table 7: Estimated Gross One-Time Economic Impacts by Stage

Employment (FTE-Years)	Direct	Indirect	Total
Upfront/Site-wide Works	14	16	30
Solar Installation	79	225	304
Project Totals	**93**	**241**	**334**
Wages & Salaries (NPV $m)	**Direct**	**Indirect**	**Total**
Upfront/Site-wide Works	$1.5	$1.5	$3.0
Solar Installation	$6.0	$17.6	$23.6
Project Totals	**$7.5**	**$19.0**	**$26.6**
GDP (NPV $m)	**Direct**	**Indirect**	**Total**
Upfront/Site-wide Works	$2.9	$3.0	$5.9
Solar Installation	$12.6	$34.8	$47.3
Project Totals	**$15.4**	**$37.8**	**$53.2**

In gross terms, the proposal's construction activity is estimated to support a total of approximately 334 FTE-years of employment, generate around $53 million in GDP, and contribute approximately $27 million in wages and salaries over the construction period. This is equivalent to an average of approximately 165 to 220 full-time positions sustained at any given time across an 18 to 24-month programme.

Indirect effects account for approximately 70 percent of the total impact across all three metrics, reflecting the significant upstream demand that utility-scale solar construction generates for manufactured components, transport and logistics, professional and engineering services, and specialised electrical and civil trades.

8.2. Scaled Impacts

As discussed in **Appendix B**, we scale down the direct and indirect effects presented above to reflect the extent to which they represent genuinely net-additional economic activity rather than activity displaced from other uses of the same labour, capital, and supplier capacity. Three scenarios are run:

- a low scenario (50 percent scaling, reflecting a high degree of displacement);

- a baseline scenario (20 percent scaling, our best estimate); and
- a high scenario (no scaling, reflecting fully additional activity).

The estimated net impacts under each scenario are summarised in the table below.

Table 8: Scaled One-Time Economic Impacts by Scenario (NPV $m)

Low Scenario	Direct	Indirect	Total
Employment (FTE-Years)	47	121	168
Wages & Salaries ($m)	$4	$10	$14
GDP ($m)	$8	$19	$27
Baseline Scenario	**Direct**	**Indirect**	**Total**
Employment (FTE-Years)	74	193	267
Wages & Salaries ($m)	6	15	$21
GDP ($m)	12	30	$42
High Scenario	**Direct**	**Indirect**	**Total**
Employment (FTE-Years)	93	241	334
Wages & Salaries ($m)	$8	$19	$27
GDP ($m)	$15	$38	$53

Under the baseline scenario, the proposal is estimated to generate one-time impacts of approximately 267 FTE-years of employment, $42 million in GDP, and $21 million in wages and salaries. This is equivalent to approximately 135 to 180 full-time positions sustained across the construction period.

Even under the low scenario, net impacts remain material, with approximately 168 FTE-years of employment, $27 million in GDP, and $14 million in wages and salaries. The range across scenarios reflects uncertainty about the extent to which construction activity represents net-additional economic output as opposed to activity displaced from other uses of the same labour and capital.

8.3. Summary

The proposal will generate substantial one-time economic impacts during the 18 to 24-month construction period. Under the baseline scenario, construction activity is estimated to support approximately 267 FTE-years of employment, contribute around $42 million in GDP, and generate about $21 million in wages and salaries. These impacts will accrue to the Waikato region and the wider New Zealand economy during the delivery phase, with the majority of the employment supported through supply-chain (indirect) activity.

9. Future Onsite Economic Activity

This section compares the ongoing economic activity that would be generated onsite under the proposal with the activity that could hypothetically be sustained under the counterfactual. The difference represents the opportunity cost of the proposal in terms of foregone productive output.

9.1. Future Activity Under Proposal

The proposal supports two distinct streams of ongoing onsite economic activity: the operation and maintenance of the solar farm, and continued agricultural production through sheep grazing beneath and between the panel arrays.

To adopt a conservative position, we have excluded the economic contribution of agrivoltaic sheep grazing from our quantified modelling. Under the easement arrangements between HENZ and the underlying landowners, sheep grazing is permitted but not required, and the final decision on whether and how to graze the site will rest with the landowners. While the pastoral assessment prepared by Pastoral Consultancy Ltd demonstrates that sheep grazing is commercially viable under the proposed layout, we consider it appropriate to exclude these impacts from the monetised modelling so that the assessment does not rely on agricultural activity that may or may not occur in practice. The qualitative benefits of agrivoltaic co-use are discussed in Section 5.1.

The operational phase of the solar farm will sustain a permanent onsite workforce comprising a site manager, administrator, operators, technicians, and security personnel. Based on the concept design statement and operational benchmarks from comparable Harmony Energy projects, the solar farm is expected to support approximately 7-10 full-time equivalent roles on an ongoing basis, plus seasonal and specialist contractors for activities such as vegetation management, panel cleaning, and electrical testing. Adopting a conservative approach, we have excluded the ad hoc and seasonal workforce from our modelling and quantified the low end of the direct permanent on-site employment.

Table 9: Estimated Annual Onsite Economic Activity – Proposal

Impact	FTEs	Wages ($m)	GDP ($m)
Direct	7	$0.7	$1.9
Indirect	8	$0.8	$2.3
Direct + Indirect	**15**	**$1.5**	**$4.2**

32-Year NPV Summary

While we recognise that some operational employment would in practice be in place before construction of the solar farm is completed, ongoing economic activity is conservatively modelled as commencing at the end of the construction phase rather than ramping up across it. Consistent with the approach set out in **Appendix B**, a baseline scaling factor of 80 percent is also applied to account for the possibility that not all gross activity represents net additional economic output.

On this basis, the net present value of ongoing onsite economic activity under the proposal is summarised in Table 10 below.

Table 10: Activity Sustained by the Proposal – 32-Year NPV Summary

Metric	Direct	Indirect	Total
FTE-Years	170	180	**350**
NPV Wages ($m)	$5.3	$6.4	**$11.8**
NPV GDP ($m)	$15.0	$17.9	**$32.9**

In net present value terms, the proposal is estimated to support approximately 350 FTE-years of employment over the analysis period, contribute around $33 million in GDP, and generate more than $11 million in wages and salaries.

9.2. Future Activity Under Counterfactual

As set out in Section 5.2, the counterfactual assumes that dairy farming would continue to operate at approximately its current level of production. We conservatively model production across the site's full area of 154 hectares. This approach overstates the productive area and thereby maximises the estimated opportunity cost of the proposal.

Table 11 below shows the estimated annual per hectare rural production for the subject site under the dairy farming scenario.

Table 11: Estimated Rural Production for Subject Site

Metric	Per Hectare
Milksolids (kg)	1,005
Milksolids ($/kg)	$9.7
Gross Output ($)[9]	$9,749
GDP ($)	$3,990
FTEs	0.01
Wages and Salaries ($)	$890

Estimated Annual Production

Applying these metrics to the 154-hectare dairy farming area yields the total estimated annual economic activity that the site could hypothetically sustain under the counterfactual. The results are presented in Table 12 below.

Table 12: Estimated Annual Production of Counterfactual Activity

Impact	FTEs	Wages	GDP
Direct	1.6	$136,795	$613,265
Indirect	2.5	$228,175	$492,505
Direct + Indirect	**4.1**	**$364,970**	**$1,105,770**

Accordingly, the counterfactual could theoretically sustain total employment of approximately four FTEs per annum, generate around $1.1 million in GDP, and support wages and salaries of approximately $365,000.

[9] The assumed dairy output of $9,749 per hectare is based on the latest farmgate price of $9.70 ($9.40 - $10.00 range midpoint) per kg of milk solids. Lower prices will lead to lower output per hectare, and vice versa.

As discussed in **Appendix A**, the IO-based estimates of GDP, employment, and wages capture approximately two-thirds of the total economic value for the agriculture ecosystem. To account for the additional regulating and other ecosystem service values not reflected in standard economic output metrics, an uplift of approximately 49 percent is applied to the GDP estimates for the dairy farming scenario. This adjustment is reflected in the *indirect use value* row in Table 13 below.

34-Year NPV Summary

Modelling the counterfactual over a 34-year period yields the following net present value estimates. Note that this 34-year horizon is two years longer than the 32-year horizon applied to the proposal's ongoing onsite activity, which excludes the construction phase. This asymmetric treatment deliberately gives the counterfactual the benefit of the full easement period while denying the proposal credit for any operational activity that may occur during construction. The effect is to overstate, rather than understate, the opportunity cost of the proposal.

Table 13: Counterfactual Production – 34-Year NPV Summary

Metric	Direct	Indirect	Total
FTE-Years	53	85	**138**
NPV Wages ($m)	$1.6	$2.7	**$4.3**
NPV GDP ($m)	$7.2	$5.8	**$13.0**
NPV Indirect Use Value ($m)	$2.8	$2.2	**$5.0**

In net present value terms, the counterfactual could theoretically support approximately 138 FTE-years of employment over the 34-year easement period, $13 million in GDP, and $4 million in wages. The indirect use value uplift, capturing the broader ecosystem service values, adds a further $5 million.

9.3. Net Future Onsite Activity

The table below compares the ongoing economic activity generated under the proposal at full build out with the foregone rural production under the counterfactual, to derive the net change in future onsite economic activity.

Table 14: Net Future Onsite Economic Activity – NPV Summary

Activity	FTEs	Wages ($m)	GDP ($m)
Future Onsite Activity	350	$11.8	$32.9
Foregone Rural Production	-138	-$4.3	-$13.0
Net Future Onsite Activity	**212**	**$7.5**	**$19.9**

On a net basis, the proposal results in a transformative change in the economic productivity of the site. The solar development is estimated to generate nearly $20 million more in GDP, support more than 210 more FTE-years of employment, and produce approximately $7.5 million more in wages and salaries than would be sustained under continued dairy farming over the easement period.

10. Electricity Market Impacts

This section assesses the electricity market effects of the proposal.

10.1. Overview of NZ's Electricity Supply & Demand

New Zealand's electricity system is characterised by a high share of renewable generation, driven primarily by hydroelectric assets concentrated in the South Island. Electricity generated in the South Island is transmitted nationally, including to the North Island via the High-Voltage Direct Current link. In 2024, renewable sources accounted for approximately 86 percent of net electricity generation, with hydro the dominant contributor, supported by growing wind, geothermal, and solar capacity.[10]

Thermal generation (i.e., from fossil fuels) continues to play an important system role by providing baseload, backup, and peaking capacity when renewable output is constrained, such as during dry years or periods of peak demand. Most thermal generation capacity is located in the North Island, close to domestic coal, gas, and oil resources.

Electricity demand is broadly distributed across sectors. Households account for around one-third of total demand, with a further third consumed by industrial users. Tiwai Point aluminium smelter is the single largest electricity user, accounting for approximately 10 to 15 percent of national consumption. Commercial users account for around one-quarter of demand, with the balance attributable to transport, agriculture, forestry, and fishing activities.

10.2. The Role & Importance of Solar

New Zealand's electricity system faces a substantial capacity challenge. The Ministry of Business, Innovation and Employment's (**MBIE**) latest projections (July 2024)[11] forecast that total electricity demand will increase by 57 percent by 2050, driven by population growth, electrification of transport and industrial processes, and new demand from datacentres. Generation capacity will need to almost double to meet this growth and offset the retirement of ageing plants.

Across all five of MBIE's demand scenarios, solar and wind account for the majority of the required new capacity. Under the reference scenario, solar capacity is projected to increase more than 11-fold, from 0.4 GW to 4.7 GW by 2050, while wind capacity is expected to grow nearly five-fold to 4.6 GW. Even under the most conservative scenario, solar capacity is expected to reach 2.7 GW. This confirms that large and sustained increases in utility-scale solar generation are required regardless of which demand pathway eventuates.

Accommodating this expansion will require significant additional land. International benchmarks indicate that utility-scale solar farms typically require approximately 2-3 hectares per megawatt of installed capacity.[12] Applied to MBIE's reference scenario, this implies an additional 8,600 to 12,900

[10] Renewable shares vary from year to year depending on hydrological conditions. In 2023, for instance, wetter conditions pushed the renewable share to approximately 88 percent.

[11] Available here: www.mbie.govt.nz/assets/electricity-demand-and-generation-scenarios-report-2024.pdf

[12] Ong, S., Campbell, C., Denholm, P., Margolis, R., & Heath, G. *Land-Use Requirements for Solar Power Plants in the United States*. National Renewable Energy Laboratory. 2013.

hectares nationally.[13] Regions with high solar resources and proximity to existing grid infrastructure, including the Waikato, are well positioned to support this rollout.

Expanding renewable generation also addresses structural vulnerabilities in the electricity system. New Zealand remains exposed to hydro-lake variability, declining domestic gas reserves, and global fuel price volatility,[14] risks that were underscored during the 2024 winter period, when constrained gas supply and low hydro storage drove sharp spikes in wholesale electricity prices.[15] Increasing the diversity and scale of low-marginal-cost renewable supply reduces exposure to these shocks.

The Hinuera Solar Farm, with an indicative P50 yield of approximately 147 GWh per year, would represent a material addition to national solar capacity. Total solar generation in New Zealand was approximately 595 GWh in 2024 (the latest year for which MBIE annual electricity generation data is available); the proposal alone would lift national solar output to approximately 742 GWh per annum – an increase of approximately 25 percent relative to the 2024 baseline.

The relative size of this percentage reflects the small absolute base from which utility-scale solar in New Zealand is currently deployed. New Zealand has historically been a low-solar-deployment jurisdiction by international standards, with most of its renewable generation coming from hydro, geothermal, and wind. The proposal should therefore be understood as an early contributor to the step-change in solar deployment that MBIE's projections require, rather than as a uniquely large project relative to a mature solar market.

10.3. Improved Competition in the Wholesale Electricity Market

While no single generation project will materially shift wholesale price formation in isolation, the proposal forms part of a wider pipeline of new renewable generation entering the New Zealand electricity market, and the cumulative effect of these additions is to enhance competition among wholesale generators and place downward pressure on wholesale prices over time. By adding significant low-marginal-cost generation to the grid, the proposal contributes to this transition by reducing collective reliance on higher-cost thermal peaking plants and broadening the diversity of the generation stack. This contribution holds whether the project's output is dispatched into the wholesale market or contracted under power purchase arrangements (**PPA**): PPA-backed generation reduces the contracting party's residual demand on the wholesale market, and merchant generation bids directly into the spot market – in either case displacing higher-cost generation at the margin.

The Electricity Authority has emphasised that increasing generation capacity is critical for fostering competition and improving price outcomes, noting in a 2023 paper[16] that a more dynamic generation market is essential to counteract high and volatile electricity prices and that the shift toward renewables can reduce barriers for new entrants. The proposal aligns with the work of the newly

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[13] Calculated by applying an indicative land requirement of 2-3 hectares per MW of installed utility-scale solar capacity to MBIE's projected increase in solar capacity of 0.4 GW to 4.7 GW by 2050. This implies an additional 4.3 GW (4,300 MW) of solar capacity, requiring approximately 8,600 to 12,900 hectares nationally.

[14] Source: Ministry of Business, Innovation and Employment. *Electricity Demand and Generation Scenarios*. 2024.

[15] More information available here: https://www.ea.govt.nz/news/eye-on-electricity/what-was-behind-high-wholesale-electricity-prices/

[16] Available here: www.ea.govt.nz/documents/3017/Decision_paper_promoting_competition_through_the_transition.pdf

established Energy Competition Taskforce,[17] which is focused on enabling greater participation from independent generators and retailers.

10.4. Reduction in Rate of Retail Electricity Price Growth

Wholesale electricity costs are a significant component of retail electricity prices. By moderating wholesale price volatility, as described in the preceding section, the proposal helps to mitigate flow-through effects on retail pricing over time. This is particularly relevant as electricity demand grows with the electrification of transport, industrial heat, and household energy use, placing sustained upward pressure on the generation system. Additional low-cost renewable capacity helps to absorb this demand growth without a proportionate increase in retail prices.

10.5. Support for Well-functioning Urban Environments

The NPS-UD defines well-functioning urban environments as those that, among other things, support reductions in greenhouse gas emissions and are resilient to the likely current and future effects of climate change. While the proposal is located in a rural area and does not involve the construction of housing or other urban activities, reliable and affordable electricity supply is a fundamental enabling input for households, businesses, and urban infrastructure. By increasing the availability of domestically generated renewable electricity at a time of declining gas supply and elevated wholesale prices, the proposal supports the ongoing functioning of urban environments while contributing to reductions in greenhouse gas emissions, consistent with Objective 8(a) and Policy 1(e) of the NPS-UD.

[17] A jointly established task force between the Electricity Authority and the Commerce Commission to investigate ways to improve the performance of the electricity market.

11. Other Long-term Impacts

This section considers a range of wider long-term economic impacts of the proposal.

11.1. Displacement of Greenhouse Gas Emissions

One of the most significant long-term benefits of the proposal is the displacement of greenhouse gas emissions from fossil fuel electricity generation. To quantify this effect, we have developed an emissions displacement model that estimates the net emissions avoided by the solar farm on an annual basis.

Approach

The model is intended to provide an indicative measure of the proposal's emissions benefit, calculated by reference to the emissions intensity of New Zealand's gas-fired electricity generation. It does not assume that the proposal's output displaces gas-fired generation on a one-for-one basis. Rather, gas is adopted as a transparent benchmark for two reasons:

- Gas is the marginal thermal fuel in the New Zealand electricity system, accounting for the majority (~80%) of electricity generation emissions; and

- Gas peaker plants are the primary generation source that ramps up and down to cover shortfalls in renewable generation, such as during dry hydro years, and are therefore the generation type most directly affected at the margin by new renewable capacity entering the grid.

The actual displacement mix in any given period will depend on system conditions, the merit order at the time of generation, hydrology, and the broader pipeline of renewable additions; the figures presented in this section should accordingly be read as a contextualised estimate of the order of magnitude of the proposal's emissions benefit, not as a precise forecast.

The model also accounts for the lifecycle emissions of the solar farm itself (encompassing manufacturing, construction, and eventual decommissioning of panels and infrastructure) to arrive at a net displacement figure. The key inputs and results are summarised in Table 15 below.

Table 15: Emissions Displacement – Key Inputs and Results

Parameter	Unit	Value
Annual generation (P50)	GWh p.a.	147
Emissions intensity - NZ gas generation	g CO_2-eq / kWh	536.7
Gross emissions displaced (gas equivalent)	tonnes CO_2-eq p.a.	78,894
Lifecycle emissions - solar PV (IPCC median)	g CO_2-eq / kWh	48
Annualised project lifecycle emissions	tonnes CO_2-eq p.a.	7,056
Net emissions displaced	**tonnes CO_2-eq p.a.**	**71,838**

The gas generation emissions intensity of approximately 537 g CO_2-eq/kWh is derived from New Zealand's actual gas-fired electricity generation and associated emissions data, as published by MBIE.[18] The solar lifecycle emissions figure of 48 g CO_2-eq/kWh is the median estimate from the IPCC's comprehensive review of lifecycle assessments for utility-scale crystalline silicon photovoltaic systems.[19]

Results

On a net basis, the Hinuera Solar Farm is estimated to displace approximately **71,838 tonnes of CO_2-equivalent emissions per year**. To contextualise the scale of this displacement:

- New Zealand's total electricity generation emissions from gas were approximately 2.20 million tonnes of CO_2-equivalent in 2023. The proposal's net annual displacement represents approximately **3.3 percent** of that total.[20]
- Approximately **31 projects** of equivalent size would therefore be required to fully offset New Zealand's gas-fired electricity generation emissions.
- The proposal's annual generation of 147 GWh would be sufficient to power approximately **94,510 electric vehicles** per year, based on average New Zealand fleet energy consumption of approximately 154 Wh/km and average annual distance travelled of approximately 10,110 km per vehicle.[21] [22]
- Equivalently, the generation would meet the annual electricity needs of approximately **21,050 New Zealand households**, based on average household consumption of approximately 6,983 kWh per year.[23] For context, this is roughly equivalent to powering every household in the neighbouring Waipa District (approximately 21,624 households as at the 2023 Census), or more than 1.5 times the household count of the Matamata-Piako District itself (approximately 13,965 households).

On-farm Emissions Reduction

In addition to displacing grid-level emissions from fossil fuel generation, the proposal also delivers a material reduction in on-farm greenhouse gas emissions. The pastoral assessment estimates that the transition from dairy farming to sheep grazing under the solar arrays would reduce on-farm emissions from approximately 10.60 tonnes CO_2-equivalent per hectare per year to approximately 4.66 tonnes

[18] Gas emissions intensity calculated from MBIE Electricity Statistics and Energy Sector Greenhouse Gas Emissions data. Available here: www.mbie.govt.nz/building-and-energy/energy-and-natural-resources/energy-statistics-and-modelling/energy-statistics

[19] Source: *Solar lifecycle emissions from IPCC AR5 Working Group III, Annex III, Table A.III.2, median estimate for utility-scale crystalline silicon PV.*

[20] Source: MBIE, *Energy Sector Greenhouse Gas Emissions* (YE 2023) and *Electricity Statistics* (YE 2023). Available at: www.mbie.govt.nz/building-and-energy/energy-and-natural-resources/energy-statistics-and-modelling/energy-statistics/new-zealand-energy-sector-greenhouse-gas-emissions

[21] Source: EVDB.nz, average WLTP energy consumption across the 50 most popular EV models in New Zealand (~154 Wh/km fleet average, 2026). Available at: https://evdb.nz/l/efficient

[22] Source: Flip the Fleet, average monthly distance data (year ended February 2026), annualised to approximately 10,110 km per vehicle. Available at: https://flipthefleet.org/

[23] Source: Electricity Authority / EMI, average New Zealand household electricity consumption of approximately 6,983 kWh per annum (YE December 2025). Available at: https://www.emi.ea.govt.nz/r/vvb0r

CO_2-equivalent per hectare per year, a reduction of approximately 56 percent. Across the site's effective grazing area of 147 hectares, this equates to a reduction of approximately 873 tonnes of CO_2-equivalent per year in on-farm agricultural emissions alone.

Taken together, the combined effect of grid emissions displacement and on-farm emissions reduction means the proposal would avoid approximately **72,711 tonnes of CO_2-equivalent emissions per year**, representing a significant and enduring environmental benefit.

11.2. Impacts on Renewable Energy Infrastructure

The proposal strengthens the resilience and efficiency of New Zealand's electricity system by adding large-scale solar generation that is complementary to existing renewable assets, particularly the existing hydro generation fleet. Solar has a distinct production profile, with output concentrated during daylight hours and typically strongest in summer months. This profile differs from, and usefully complements, both hydro and wind generation.

Within the national system, daytime solar generation reduces the need to dispatch hydro generation during periods of strong solar output. This allows water to be retained in southern hydro lakes during daylight hours and summer periods, effectively increasing stored energy available for later use. That stored water can then be utilised during evening peaks and winter periods when electricity demand is higher and solar generation is limited. In this way, solar generation acts as a form of "virtual rain", enhancing the effective storage value of existing hydro infrastructure.

This interaction improves overall system flexibility and supports more efficient utilisation of existing generation and transmission assets. Rather than displacing hydro generation, the proposal enables hydro resources to be deployed more strategically across time, reducing reliance on higher-cost or higher-emissions generation during peak demand or dry-year conditions.

The proposal also contributes to greater technological and geographic diversity within the national generation mix. Increasing diversity reduces exposure to correlated risks associated with reliance on a narrower set of generation types or climatic conditions. As electricity demand grows and the system transitions toward higher shares of variable renewable generation, the ability to combine complementary technologies becomes increasingly important.

11.3. Reduction in Reliance on Higher Carbon Alternatives

According to the Ministry for the Environment's *Greenhouse Gas Inventory Snapshot 1990-2023*,[24] the energy sector is the second-largest contributor to New Zealand's gross greenhouse gas emissions, accounting for 38 percent of the total in 2023. These emissions are primarily carbon dioxide, originating from the combustion of fossil fuels across electricity generation, transport, and industrial processes. Between 2021 and 2023, however, energy emissions decreased by nearly nine percent, largely due to wetter conditions boosting hydro generation and the displacement of coal and gas use in the electricity sector.

[24] Available here: www.environment.govt.nz/assets/publications/GhG-Inventory/GHG-Inventory-2025/GHG-inventory-2025-Snapshot.pdf

The proposed solar development supports this emissions trajectory by further reducing the need for fossil fuel-based electricity generation. Displacing this with solar generation provides a direct emissions benefit, while also having positive implications for other industries. For instance, sectors like fertiliser production, exemplified by companies such as Ballance Agri-Nutrients, depend on natural gas as a feedstock. By decreasing the electricity sector's gas consumption, more natural gas becomes available for these industrial processes, supporting their operations and contributing to economic stability.

More broadly, expanding renewable capacity improves energy security and reduces exposure to volatile fossil fuel markets, especially as domestic gas reserves continue to decline.[25] Projects like the proposal therefore contribute not only to emissions reductions, but also to long-term system resilience and industrial continuity.

11.4. Ongoing Employment Impacts

The jobs enabled by the proposal will sustain a diverse and stable local workforce. Beyond direct employment, solar activities generate broader economic benefits through skills development, supply chain linkages, and workforce participation. Key benefits include:

- **Skill Development and Training:** The operation of a utility-scale solar facility requires a combination of electrical, mechanical, and digital monitoring capabilities. Operational roles such as technicians, operators, and maintenance personnel will involve on-the-job training in photovoltaic systems, electrical infrastructure, remote monitoring platforms, and preventative maintenance practices. Over time, this contributes to the development of long-term specialised technical capability within the regional workforce.

- **Pathways into the Renewable Energy Sector:** Operational roles associated with the solar farm will span a range of skill levels, from entry-level activities such as vegetation management and routine inspections through to specialised electrical and technical servicing. These roles provide practical pathways for workers to enter the renewable energy sector, which is expected to expand nationally as electricity demand increases and generation capacity grows as part of New Zealand's transition toward a low-emissions energy system.

- **Stable, Long-Term Employment:** Unlike construction activity, which is temporary in nature, the operational roles associated with the proposal will persist throughout the project's operating life, which is expected to extend for more than 30 years, with the potential for repowering beyond that period. These ongoing roles provide stable employment opportunities in a predominantly rural labour market where employment can otherwise be strongly influenced by seasonal agricultural cycles.

- **Support for Local Service Providers:** A number of operational activities are typically delivered through contracted service providers. These include vegetation management, panel cleaning, electrical testing, equipment servicing, and civil maintenance. Where possible, these services

[25] Source: www.argusmedia.com/en/news-and-insights/latest-market-news/2691119-new-zealand-to-invest-119mn-in-gas-fields

are often delivered by locally based contractors and trades, providing ongoing work opportunities for regional businesses and trades.

- **Broader Economic Linkages:** The solar farm will also generate indirect economic activity through its demand for goods and services such as equipment maintenance, monitoring systems, spare parts, consumables, professional services, and compliance activities. These supply-chain linkages create additional employment opportunities beyond those located directly on the site.

Collectively, these effects enhance the region's employment diversity and resilience, generating tangible and long-lasting social and economic benefits.

11.5. Alignment with Government Growth Agenda

The Government's *Going for Growth* agenda, launched in early 2025, sets out a long-term strategy to lift national productivity and living standards. It is structured around five interrelated pillars: developing talent; building competitive business settings; promoting trade and investment; driving innovation, science and technology; and investing in infrastructure for growth.

The proposal aligns well with several of these priorities:

- **Developing Talent**: The construction and operation of a utility-scale solar farm will support skilled employment across civil works, electrical installation, engineering, and asset management. Construction activity will generate significant on-site employment over the build period, while ongoing operations will sustain a permanent on-site workforce covering site management, plant operations, technical maintenance, and security, with further employment generated for regionally based contractors and trades providing vegetation management, panel cleaning, electrical testing, and civil maintenance services. These roles contribute to workforce capability in renewable energy and associated infrastructure, supporting the development of transferable skills that are increasingly in demand as electrification accelerates.

- **Building Competitive Business Settings**: By adding low-marginal-cost generation to the national grid, the proposal supports competition in the wholesale electricity market and helps reduce reliance on higher-cost generation during peak and dry-year conditions. This contributes to a more competitive energy input for businesses, which is a key determinant of productivity across the wider economy.

- **Promoting Trade and Investment**: The proposal represents a total private-sector capital commitment of approximately $150 million to nationally significant renewable energy infrastructure. Delivery of this scale of capital-intensive renewable generation provides a positive investment signal, demonstrating confidence in the electricity market and in New Zealand's capacity to support large-scale infrastructure development within a stable regulatory environment.

- **Driving Innovation, Science and Technology**: Utility-scale solar development incorporates advanced generation, monitoring, and grid-integration technologies, including single-axis tracking systems, battery energy storage, and SCADA-based plant management. The proposal contributes to the deployment and normalisation of these technologies within New Zealand's electricity system, supporting innovation in energy system management and renewable integration.

- **Investing in Infrastructure for Growth**: Electricity generation is foundational infrastructure. The proposal directly expands national generation capacity by approximately 147 GWh per year in a location with strong solar resources and existing transmission assets, supporting future growth in electricity demand driven by electrification of transport, industry, and households.

11.6. Alignment with National and Regional Strategies

The proposal is strongly aligned with the Government's strategic direction for decarbonisation, energy security, and renewable generation. The *Emissions Reduction Plan 2026-2030* identifies electricity generation as one of four priority areas for emissions reduction, recognising that decarbonising the electricity system is critical to achieving New Zealand's climate target of net zero by 2050.[26] The Plan makes a commitment to increasing the share of renewable generation and investing in the infrastructure needed to meet rising electricity demand while phasing down fossil fuels.

The proposal also gives effect to the *National Policy Statement for Renewable Electricity Generation 2011* (**NPS-REG**),[27] which provides clear guidance on the national significance of renewable electricity generation, including solar. It requires that all decision-makers provide for the development, operation, maintenance, and upgrading of such generation activities, acknowledging their national and regional benefits.

While the *New Zealand Energy Strategy* is still under development, MBIE has made clear that the transition to a modern, secure, and affordable energy system will depend on large-scale investment in renewable generation, particularly wind and solar, to meet future demand.[28] This includes ensuring sufficient generation during periods of low hydro and variable renewables, and addressing infrastructure bottlenecks to enable rapid rollout. The Government's approach is centred on removing barriers and aligning incentives to accelerate this transition.

At the regional level, the proposal aligns with the Waikato Regional Council's strategic priorities for renewable energy development and climate change mitigation. The Waikato region has been identified as having strong solar resources, and the growth of utility-scale solar generation in the region contributes to the diversification and resilience of the national electricity system.

At the district level, the Matamata-Piako District is well positioned to accommodate utility-scale solar development given its flat topography, high solar irradiation, and proximity to existing electricity transmission infrastructure. The proposal represents a significant infrastructure investment within the district and supports the broader economic development objectives of the Matamata-Piako District

[26] Available here: https://environment.govt.nz/publications/new-zealands-second-emissions-reduction-plan/

[27] Available here: https://environment.govt.nz/publications/national-policy-statement-for-renewable-electricity-generation/

[28] Available here: https://www.mbie.govt.nz/building-and-energy/energy-and-natural-resources/energy-strategies-for-new-zealand/new-zealand-energy-strategy

Council, including the renewable energy provisions set out in Section 2.3.8 of the Matamata-Piako Proposed District Plan.

By delivering new solar generation capacity within one of the higher GHI zones in the country and in close proximity to an existing Powerco substation, the proposal supports these national, regional, and district-level objectives.

11.7. Investment Signal Effects

Finally, the development will provide a clear signal of confidence in the region's medium- to long-term economic outlook. Large, capital-intensive projects typically require extensive due diligence, long investment horizons, and confidence in future population growth, labour supply, and infrastructure provision. Their delivery can therefore signal to other investors that underlying economic conditions are sufficiently robust to support further activity.

These signalling effects are particularly relevant in sectors with high upfront costs and long payback periods, where investment decisions are sensitive to perceptions of risk and uncertainty. By demonstrating that funding, consenting, and delivery barriers can be navigated, the project may reduce perceived market risk. Over time, this can help bring forward complementary investment. While indirect and not readily quantifiable, such effects are widely recognised in economic development literature as a secondary benefit of major private investment and contribute to broader economic momentum.[29]

[29] See, for example, Porter, M.E. (2000) *Location, Competition, and Economic Development: Local Clusters in a Global Economy*, and Turok, I. (1992) *Property-led urban regeneration: panacea or palliative?*, which discuss how large or "anchor" investments can reduce perceived risk, alter market perceptions, and catalyse follow-on private investment through "demonstration effects".

12. Project Acceleration

This section describes how the FTAA process would accelerate delivery of the proposal.

12.1. Timing of Economic Benefits

The proposal will progress considerably faster through the FTAA than would otherwise be the case. The FTAA establishes a streamlined approvals pathway with tighter statutory timeframes, coordinated decision-making, and, importantly, no merits-based appeals on decisions made by Fast-track Panels.

In contrast, obtaining consent via the standard RMA pathways would likely involve a multi-stage process that includes public notification, hearings, and Environment Court appeals, resulting in substantially longer delivery timeframes.

The FTAA (as strengthened by the Fast-track Approvals Amendment Act 2025) is specifically designed to accelerate nationally and regionally significant projects, reduce consenting uncertainty, and bring forward the timing of economic activity. For the proposal, this means enabling the project to commence much sooner than under a conventional consenting pathway, thereby bringing forward the one-off construction-related stimulus and any wider economic benefits outlined in this report.

12.2. Feasibility and Delivery of Enabled Capacity

In addition, the proposal is being advanced by HENZ, a subsidiary of Harmony Energy NZ Holdings Limited, which is in turn linked to Harmony Energy (UK), an experienced developer of utility-scale solar and battery energy storage projects. Developer capability is relevant to energy infrastructure outcomes because consented generation capacity only translates into actual electricity supply if it is delivered, commissioned, and connected to the network in a timely and coordinated manner.

Harmony has an established track record internationally, including the development and commissioning of large-scale battery energy storage systems, and is actively progressing a portfolio of solar projects in New Zealand. This includes the Tauhei Solar Farm (150 MW AC), which is currently under construction, along with a broader pipeline of projects.

An experienced developer is better positioned to manage the technical, regulatory, and commercial complexities associated with utility-scale energy projects, including design optimisation, procurement, grid connection, and construction sequencing. This reduces the risk of delays or under-delivery and increases confidence that the generation capacity and associated benefits enabled by the proposal will be realised in practice.

13. Summary and Conclusion

13.1. Summary

This report has assessed the economic effects of the Hinuera Solar Farm against the criteria the Panel must consider under sections 81 to 85 and Schedule 5 of the FTAA. Drawing the analysis together, the proposal's economic effects fall into four categories, summarised below.

National-scale qualitative benefits

The proposal's most consequential effects are national in scope and arise from its contribution to New Zealand's renewable generation system. The 147 GWh of annual generation would lift national utility-scale solar output by approximately 25 percent from its 2024 base, displace approximately 72,711 tonnes of CO_2-equivalent emissions per year, improve competition in the wholesale electricity market through the addition of significant low-marginal-cost generation, and enhance system flexibility and resilience by complementing existing hydro generation. These benefits persist for the full operational life of the facility and are, in our view, the most material economic effects of the proposal – notwithstanding that they sit outside the monetised TEV framework.

Quantified net economic benefit

The monetised TEV analysis provides a supporting line of evidence on the directly measurable economic activity the proposal generates and displaces. Under the baseline scenario, it returns a net benefit of approximately $52 million in NPV terms, with quantified benefits ($75.5 million) exceeding quantified costs ($23.0 million) by a ratio of more than three to one. These figures are conservative, in that they exclude the value of agrivoltaic sheep grazing, the contracted and seasonal workforce supporting operations, the construction of on-site O&M buildings, and the monetary value of displaced greenhouse gas emissions.

Employment and regional activity

Construction over the 18 to 24-month build period is estimated to support approximately 267 FTE-years of employment, $42.6 million in GDP, and $21 million in wages and salaries, distributed across heavy and civil engineering construction, specialised electrical trades, professional services, transport and logistics, and wholesale supply. Once operational, the facility will sustain 7-10 permanent on-site FTEs together with ongoing contracted demand for vegetation management, panel cleaning, electrical testing, and civil maintenance – delivering a net increase of approximately 212 FTE-years of ongoing employment and $20 million in additional GDP relative to the dairy counterfactual over the 34-year easement period.

Wider benefits and strategic alignment

The proposal represents a $150 million private-sector commitment in nationally significant renewable infrastructure, with associated investment signal effects in the Waikato region. It is strongly aligned with MBIE's direction on the future energy system, and the Government's *Going for Growth* agenda. The developer's established pipeline strengthens confidence that the enabled generation capacity will be realised in practice. The FTAA pathway materially accelerates delivery of these outcomes relative to the standard RMA process.

13.2. Conclusion

As set out in Section 3.2, substantive FTAA applications are to be assessed primarily on the extent to which they deliver significant regional or national benefits, and whether those benefits outweigh any adverse effects. The economic evidence set out in this report answers both questions in the affirmative.

The proposal delivers benefits that are both significant and national in scope. Its contribution to renewable generation, emissions displacement, wholesale market competition, and system flexibility goes directly to the priorities identified in the *Emissions Reduction Plan* and the directive requirements of the NPS-REG. These benefits are reinforced, not exhausted, by a positive quantified net economic benefit of approximately $52 million in NPV terms, meaningful construction-phase employment and GDP, stable long-term operational employment in a rural labour market, and a $150 million private-sector capital commitment with associated investment-signalling effects.

The identified adverse economic effects, such as foregone dairy production, loss of ecosystem services, and loss of option and bequest value, are limited in scale, localised, and, in the case of the productive land, reversible at the conclusion of the 34-year easement term. They are, in our view, not out of proportion to the benefits delivered.

The FTAA pathway materially accelerates the realisation of these benefits relative to standard RMA processes, bringing forward construction, generation, and emissions displacement by a period likely measured in years.

On balance, and having regard to the purpose of the Act and the matters the Panel must consider under sections 81 to 85 and Schedule 5, the proposal delivers significant regional and national economic benefits that substantially outweigh its adverse economic effects. It is strongly supported on economic grounds.

14. Appendix A: Methodology Description

14.1. Summary of Overall Approach

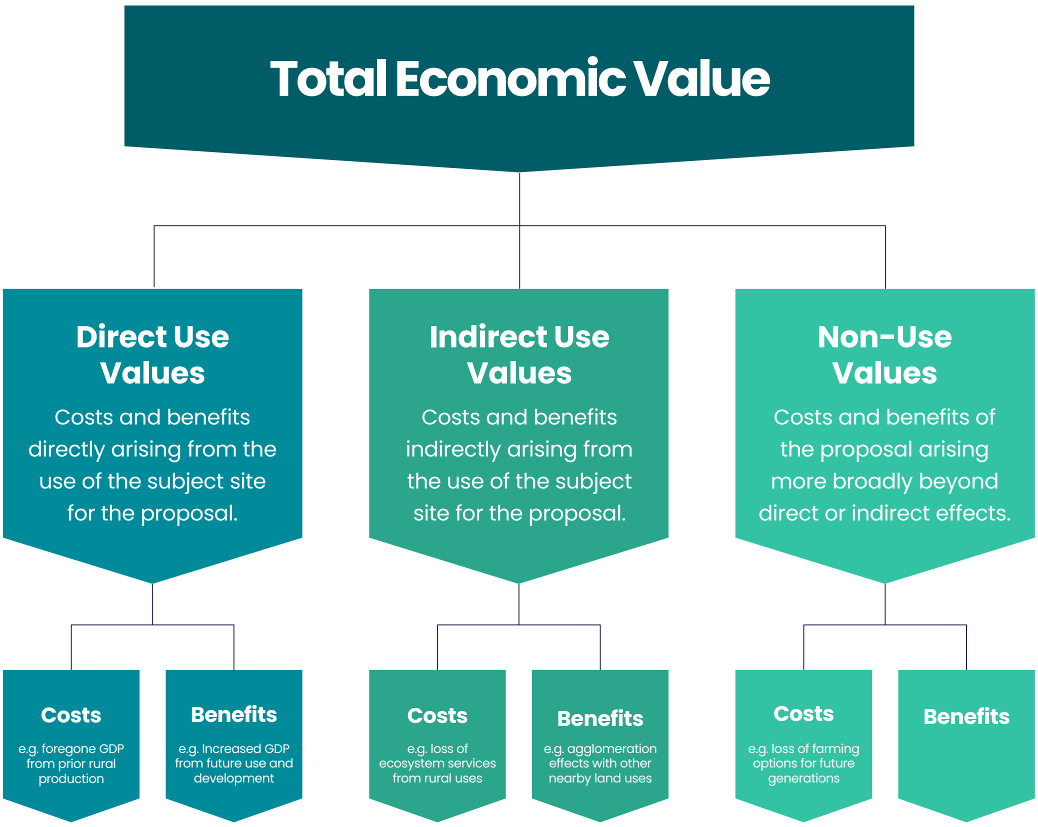
Our assessment adopts the total economic value (**TEV**) framework to compare all relevant economic costs and benefits of the proposal to the most likely use of the site absent it, which is called the counterfactual. To keep the analysis as conservative as possible, amongst other things, we assume that the proposal precludes rural production across the entire site from day one, rather than in a phased manner, as usually occurs with staged build outs in large-scale developments. We also account for the time value of money by converting quantified costs and benefits to net present values before weighing them up to assess the regional and/or national significance of the proposal's economic benefits.

14.2. Introduction to the TEV Framework

The TEV framework has been widely used since the 1980s to capture the full spectrum of economic effects associated with changes in land use, not just those readily quantifiable. By structuring the analysis around TEV, we ensure that all relevant economic effects are identified and considered, irrespective of the extent to which they can be quantified.

The TEV framework splits all relevant economic costs and benefits into those driven either directly or indirectly by the proposal, plus 'non-use' impacts arising more generally. The figure below illustrates this classification of effects within the TEV framework.

Figure 5: Overview of the TEV Framework



14.3. Mapping of Monetised Costs & Benefits to TEV Framework

The table below shows how the key option differences identified in Section 5 are mapped to the various TEV cost and benefit categories illustrated in Figure 5 above.

Table 16: Mapping of Proposal Economic Costs and Benefits to TEV Elements

TEV Category	BENEFITS of Proposal vs Counterfactual	COSTS of Proposal vs Counterfactual
Direct Use Value	Construction-phase economic activity (GDP)	Loss of rural production (dairy)
	Ongoing onsite economic activity (solar)	None considered
Indirect use value	None considered	Loss of ecosystem services (e.g., regulating functions)
Non-use value	None considered	Loss of option and bequest values associated with rural land

Several observations can be made about this mapping. First, the proposal's **direct use** values are broad and, for the most part, readily quantifiable. They therefore form the quantitative focus of this assessment, including one-time construction impacts and ongoing onsite economic activity (both estimated via multiplier analysis). Direct use costs are centred on foregone rural production, which is similarly quantified via multiplier analysis in Section 9.

Second, the **indirect use** values are more mixed and less readily quantifiable. Costs include that the change from dairy pasture to solar-dominant land use reduces the site's contribution to certain regulating and supporting ecosystem services; these costs are quantified using the method described in Section 14.4 below.

Third, the **non-use** values are inherently difficult to quantify with precision. The theoretical loss of the option for future generations to use the land for farming is acknowledged and quantified (again using the method set out in Section 14.4), but is tempered by two features of the proposal. The first is that the site's productive potential is not extinguished during the operational period — the easement arrangements permit continued pastoral use beneath and between the panel arrays. The second is that the land is capable of being reinstated to its previous state following decommissioning of the solar farm at the conclusion of the 34-year easement term.

In summary, the TEV framework confirms that the proposal's monetised benefits are concentrated in direct use values that are both significant and quantifiable, while its monetised costs are modest in scale and spread across direct, indirect, and non-use categories. The most substantial benefits of the proposal — its contribution to renewable electricity supply and the associated emissions displacement — are treated qualitatively rather than monetised, which reinforces the conservative nature of the quantified TEV result.

14.4. Indirect Use & Non-use TEVs of Rural Production

To calculate the indirect and non-use values of foregone rural production, we rely on a seminal New Zealand study by Patterson and Cole,[30] which itemises the indirect and non-use values of various rural land uses per hectare basis across various ecosystem services, which are grouped into four types:

- **Provisioning services**: the direct production of goods such as food, fibre, and fresh water;
- **Regulating services**: the regulation of biophysical and ecological processes, including climate regulation, flood control, waste treatment, and biological pest control;
- **Cultural services**: non-material benefits including recreation, aesthetic value, spiritual fulfilment, and contributions to cultural identity; and
- **Supporting services**: foundational ecological processes such as nutrient cycling, soil formation, and pollination that underpin the delivery of all other services. Because supporting services are already reflected in the value of provisioning, regulating, and cultural services, they are excluded from the aggregation of TEV to avoid double counting.

Overlaying our independent estimates of foregone rural output with these values, we fully capture the economic values of rural production foregone by development proposals. The counterfactual for this site involves dairy farming only (no horticulture or cropping), so the relevant Patterson and Cole values are those for agriculture ecosystems, as set out in the table below.

Table 17: Use Value of Ecosystem Services Derived from **Agriculture** Ecosystems ($2012 million)

Ecosystem service	Supporting value	Regulating value	Provisioning & cultural value	Provisioning & cultural excl. GDP	Gross value	Net value
Water provisioning			85	68	85	85
Food production			8,363		8,363	8,363
Raw materials			514		514	514
Recreation			57	57	57	57
Cultural			57	57	57	57
Gas regulation		200		200	200	200
Waste treatment		2,488		2,488	2,488	2,488
Biological control		657		657	657	657
Soil formation	28			28	28	0
Erosion control	7,008			7,008	7,008	0
Pollination	715			715	715	0
Total	**7,751**	**3,345**	**9,076**	**11,278**	**20,172**	**12,421**

According to Table 17, food production accounts for approximately 67 percent of net TEV.[31] The remaining third is attributable to regulating services, principally waste treatment ($2,488m), biological control ($657m), raw materials production ($514m), and gas regulation ($200m), as well as smaller contributions from water provisioning, recreation, and cultural services. This means that the GDP,

[30] Patterson & Cole. (2013). *Total Economic Value of New Zealand's Land-Based Ecosystems and Their Services*.

[31] Calculated as 8,363 net value of food production divided by 12,421 total net value.

employment, and wage estimates for the dairy farming counterfactual capture around two-thirds of the total ecosystem service value of those land uses. To derive the full TEV of those counterfactual scenarios, the production estimates need to be scaled up by approximately 49 percent to account for the additional regulating and other service values not captured in standard economic output metrics.[32]

14.5. Analysis Horizon & Time-Value of Money

The analysis spans 34-years from the day that FTAA approval is (assumed to be) granted. This time horizon is longer than the 30-year long-term planning period required under the NPS-UD, and ensures that the full stream of costs and benefits, including those associated with long-term foregone rural production, are adequately captured. All quantified effects are expressed in NPV terms to account for the time value of money. A discount rate of 8 percent is applied, consistent with the rate commonly used for public sector cost-benefit analysis and infrastructure investment appraisal.[33]

[32] The scalar equals the total net value of 12,421 for agriculture ecosystems divided by the net value of food production of 8,363. This results in a scalar of 48.5 percent to capture the other elements of TEV over and above our estimates of food production.

[33] While Treasury's current guidance for CBA is a real discount rate of around 2-5% depending on the context (lower for long-horizon policy, higher for commercial projects), we have adopted a discount rate of 8 percent, consistent with rates typically applied in commercial infrastructure investment appraisal. This is a conservative choice for the present assessment as the proposal's ongoing operational benefits accrue over the balance of the analysis horizon and are therefore more heavily discounted at higher rates. A lower discount rate would materially increase the net present value of net benefits.

15. Appendix B: About Multiplier Analysis

15.1. Introduction

Our assessment uses a widely known technique called multiplier analysis to estimate the GDP, jobs, and wages/salaries associated with one-time and ongoing economic activity enabled by the proposal, plus the GDP, jobs, and wages/salaries lost via foregone rural production. The underlying economic multipliers come from detailed matrices called input-output (**IO**) tables, which show the interrelated supply chains comprising an economy. Specifically, IO tables show both:

- the set of inputs that each industry needs to produce one unit of its output, plus
- the industries and end-users to which each sector sells its output.

By leveraging these supply-chain relationship, IO tables enable the effects of a change in one sector to be traced throughout the economy to estimate its overall impacts, including flow-on effects.

15.2. Example

Consider the following example. Suppose a local construction company wins a new building contract. In addition to boosting its own workforce to complete the job, the company will also need to engage various subcontractors and to source building products from its own suppliers. However, some of those suppliers, in turn, may then need to source various inputs from their suppliers, and so on. Multiplier analyses trace all these supply-chain interdependencies so that the wider economic effects of the new building work can be properly estimated, including all flow-on effects.

15.3. Types of Effects Estimated

The economic impacts derived via multiplier analysis comprise three parts, namely:

- **Direct effects** – which capture the economic impacts of entities directly engaged to complete the project (e.g., the main building contractor); plus

- **Indirect effects** – which arise when the main contractor sources goods and services from their suppliers (i.e., subcontractors), who in turn may need to source goods and services from their own suppliers, and so on; and

- **Induced effects** – which occur when a share of the additional wages and salaries generated by the project (either directly or indirectly) are spent in the local/regional economy and therefore give rise to additional rounds of economic impacts

As alluded to above, these effects are typically measured in terms of:

- **Contributions to value-added (or GDP).** GDP measures the difference between a firm's outputs and the value of its inputs. It captures the value that a business adds to its own inputs to produce its outputs. From an accounting perspective, GDP equals a firm's earnings before interest, tax, depreciation, and amortisation (EBITDA), plus the wages and salaries paid.

- **The number of FTEs employed** – this is measured in terms of full-time employees, which include both part-time and full-time workers.

- **Total wages and salaries paid to workers**, which are sometimes called 'household incomes.'

15.4. Importance for Assessing Construction Projects

Multiplier analysis is particularly useful for assessing the economic impacts of construction projects, because such a large proportion of the work is typically subcontracted to third parties, rather than all being done by the main contractor itself. Multiplier analysis therefore enables all the supply chain activity initiated by the main contractor to be properly captured to provide a comprehensive picture of overall economic impacts associated with its activities.

For context, according to the latest multipliers, for every dollar of GDP generated by the building construction sector, an extra $2.76 of GDP is generated in the industries supporting it.[34] Similarly, for every FTE directly employed in building construction, an extra 2.82 FTEs are employed in the sectors that comprise its supply chain. Accordingly, multiplier analysis is critical to capturing the overall effects of economic activity enabled (or forgone) by large-scale development proposals.

15.5. Multiplier Analysis Limitations & Mitigation Strategy

Despite the intuitive appeal and widespread use of multiplier analysis, it does face some well-known limitations. They include that it:

- **Assumes that businesses use inputs in fixed proportions,** i.e., without substituting towards more efficient options if/when they become available.

- **Ignores capacity constraints.** It assumes that labour, materials, and other inputs are always available when needed, which may be unrealistic in a tight economy.

- **Does not capture price effects.** Multiplier models are fixed-price frameworks, which ignore cost inflation, wage pressures, and so on.

Consequently, multiplier analysis is useful for showing how spending ripples through an economy's supply chains to produce both direct and flow-on economic impacts, but it is not – on its face – a precise forecast of real-world net benefits. To help address these limitations and ensure that our analysis is as robust as possible, we adopted the following mitigation strategies and measures. They seek to moderate the raw outputs of the multiplier analysis to provide more robust and defensible estimates of overall economic impacts.

Strategy 1: Ignoring Induced effects: Induced effects are – in our view – the least reliable of the three types of economic impact estimated by multiplier analysis, because much of that spending would have likely occurred regardless of the proposal. Moreover, including induced effects can cause multiplier

[34] As measured by the indirect effect, i.e., excluding induced effects.

analyses to produce implausible results, e.g., every $1 spent generates more than $1 of GDP. This is impossible, especially over the longer run, so we exclude induced effects entirely in our assessments.

Strategy 2: Scaling direct & indirect effects: We also scale down the estimated direct and indirect impacts of the proposal (on GDP, jobs, and wages) to reflect the impacts of potential capacity or resourcing constraints on their realisation**.** Specifically, three scenario-based scaling factors are applied to account for the likely effects of capacity and resource constraints, namely a:

- Low scenario, which scales direct and indirect effects down by 50 percent;
- Baseline scenario, which scales direct and indirect effects down by 20 percent, and is our 'best guess' estimate of likely impacts; and
- High scenario, which assumes no scaling down of direct and indirect effects.

Strategy 3: Using the most up-to-date multipliers: We regularly revise the industry-level multipliers used in our assessments to ensure they always reflect the latest official data, rather than relying on the 'official' IO tables from Stats NZ, which are for the year ended March 2020. Our multipliers, conversely, were derived from data covering the year ended September 2025.

Strategy 4: Maximising the value of foregone production: While not a direct response to the limitations of multiplier analysis *per se*, we further assume that foregone rural production ceases immediately sitewide under the proposal. In practice, however, former rural production is usually phased out in a staged manner as the site is developed. This assumption helps maximise the estimated opportunity cost of the proposal and therefore adds another layer of conservatism.

Strategy 5: Using applicant-provided cost estimates: Our cost inputs are based on HENZ's own capital cost estimates for the project. These have been prepared by an experienced utility-scale solar developer familiar with delivering comparable projects, but have been further de-risked by excluding imported components from the domestic expenditure base. This yields conservative estimates of one-time economic activity.

Collectively, these mitigation measures make our analysis inherently conservative, which we consider appropriate to avoid the inadvertent overstatement of proposal benefits.