

Singleton Project Economic Impact Analysis: Review in reference to the Connor *et al.* (2022) critical review

Executive Summary

This document provides findings from a critical review of an Economic Impact Assessment (EIA) supporting the business case for the Singleton Horticulture Project conducted by GHD Pty Ltd (GHD) on behalf of Fortune Agribusiness Funds Management Pty Ltd (FAFM) on 25 October 2022. In an earlier report, Connor *et al.* (2022), provided an initial critical review of the proposed Singleton Horticulture Project business case based on information that FAFM made publicly available at that time.

The authors of this report have been requested by the Central Land Council to provide an updated review of the proposed Singleton Horticulture Project to inform a rigorous Environmental Impact Assessment process, considering that new reporting on the Singleton Business case has now been made available by FAFM. The questions guiding this additional review are:

1. What new information has been provided since we published Connor *et al.* (2022) specifically through the FAFM EIA and SIA referral documents?
2. Does the new material lead us to change the conclusions provided in Connor *et al.* (2022)?
3. Does the new material raise any additional concerns about the accuracy, methodology, assumption, data, or interpretation of data that warrant further investigation?
4. What tier of assessment is appropriate from an EIA perspective?

We found that GHD provided significant additional information and analysis, including further details on assumptions and methods used to estimate project costs and benefits. However, we also found that many of the assumptions used to estimate costs and benefits remain implausible, with minimal evidence provided to support the assumptions based on the performance of past similar enterprises. We also found that the EIA failed to satisfy a number of the NTG's own guidelines for benefit cost analysis for this type of project. We conclude that the bulk of additional information does not change the conclusions provided in Connor *et al.* (2022). Indeed, there are clear incentives for optimism bias in the EIA through implausible assumptions that bias project benefits upward, and this finding supports the key conclusion from Connor *et al.* (2022) that the project will provide substantially less benefit than FAFM contends and involve significant public costs that are not accounted for. We, therefore, submit that GHD's EIA does not meet the NT and Commonwealth governments' standards expressed in its benefit cost analysis guidelines for EIAs of proposed projects.

We found that costs to the environment and local Aboriginal wellbeing were not adequately accounted for, and a large, unstated, subsidy in the form of a transfer of water owned by the

NT public to Fortune Agribusiness was neither acknowledged nor quantified in the assessment. This leads us to believe that the FAFM EIA referral documents, in their current form, are not consistent with the NT's own guidelines for best practice in EIA.

Further, a major proposed benefit of the project is associated with job creation for Barkly Region residents. This claim is unrealistic and cannot be expected to be fulfilled if this project were to progress. This is primarily because the work force in the region is limited, with few appropriately skilled people currently unemployed or under-employed. All evidence indicates that regional labour shortages are generally not filled by regional residents as indicated by reporting on labour constraints by the NT Farmers' Association (2019). Furthermore, the Social Impact Assessment (SIA) for this project indicates a material likelihood that the project would displace employees from other businesses more than it would create new jobs in the region. This is likely to generate negative social and economic development outcomes by reducing the ability of locally-owned businesses to grow.

The reported data basis for the model is neither sufficient nor transparent enough to enable a critical review of the assumptions used. Unsubstantiated assumptions about unlimited labour supply in the region are likely to exaggerate job creation impacts. This deficiency should be addressed by using appropriate modelling methods that regional economics regularly uses to adjust for small region limited labour supply contexts. The EIA was also devoid of scenario analysis, probabilistic calculations and other widely applied tools typically employed when conducting a social benefit cost analysis of a proposed project. Most importantly, not all of the modelling assumptions and results seem to be available for public review.

Furthermore, whilst FAFM proposes that adaptive management will be used for this resource there is no provision for independent assessment of negative impacts over the course of the project. Nor is there provision for ensuring appropriate governance around that adaptive management. It is unlikely that self-regulation would work in this context where cost of sustainable management will be experienced by local NT citizens not FAFM, who stands to gain financially from the implicit subsidies. Therefore, self-regulation should be rejected as an option. Several corporate behavioural studies have showed that liability threats and pressures from consumers, investors and the public are more effective than self-regulation when it comes to adaptive environmental management, particularly when there is a significant financial disincentive ([e.g. Anton *et al.* 2004](#)). Therefore, if this project were to proceed, the adaptive management strategies proposed by FAFM should be enforced through an independent (not associated with FAFM or the NTG) body conducting annual impact reviews, making all impact results public, and retaining decision making power over continuation of the irrigation development plan for Singleton.

The concerns outlined in this report, similar to those outlined in the original Connor *et al.* (2022) review, lead us to question FAFM's seriousness about seeking to provide a clear, and unbiased, analysis of project impacts particularly regarding regional environmental, cultural, and economic development outcomes. Given these concerns, we can only conclude that the most detailed possible review for the Environmental Impact Assessment (i.e. a Tier 3 assessment) is required. To comply with the NT's own requirements, this would require accounting for the large public subsidy in the order of \$70-\$300 million dollars of the NT public's assets implicitly paid to FAFM, and a much more serious effort to value

environmental and social costs currently omitted in the EIA documents. In addition, further evidence is required to support assumptions, methods and input data used to forecast project costs and benefits to enable credible estimation of the net benefit of the project, including social and environmental impacts. Given repeated concerns around unrealistic assumptions applied to current FAFM project reviews, any future reviews for Environmental Impact Assessments should be undertaken by an entirely independent body with models and results provided for public review.

Key findings from our review of the GHG EIA are:

1. The EIA does not meet the NT and Commonwealth governments' standards, nor does it adhere to guidelines for EIAs of proposed projects
2. Optimistic assumptions were used in estimation of public benefits, leading to overstated public benefit forecasts
3. The assessment omits social costs, including potential loss of groundwater-dependent cultural and spiritual benefits, thereby effectively assigning them a value of 'zero'
4. The EIA did not account for the value of water entitlements that would be provided free of charge to FAFM
5. The EIA uses unsubstantiated assumptions about potential flow-on benefits, which suggests exaggerated flow-on impact estimates
6. The EIA overstates employment benefits, which questionably assumes that there is, currently, a large pool of available skilled labour in the Barkly Region
7. The assessment contains vague statements about the project's public service and benefit provision without providing any financial commitment to support the claims

Report overview

Organisation of reporting is as follows. First, key findings from Connor *et al.* (2022) are summarised, then a description of new material included in the EIA is provided. Next, key findings from a critical review of the EIA are outlined in reference to NT (and Commonwealth) Government economics assessment standards, particularly, the NTG Environmental Protection Authorities own Guidelines for the Preparation of an Economic and Social Impact Assessment V2.0 (2013)

Key findings from Connor *et al.* (2022)

Key findings provided by the Connor *et al.* (2022) review of the business case for the Singleton Horticulture Project show that first, there is a large implicit subsidy to FAFM who would extract groundwater for the project free of charge and second, estimates of economic benefits, operating costs of production and local expenditure and employment are overstated.

Nonadherence to the NTG Environmental Protection Authority's own Guidelines

It is evident that the assessment flouted the NTG Guidelines, which stipulates, for example, that:

“investment should provide the highest net benefit of all options available to increase access to water, taking into account economic, social and environmental impacts; Projects should .. provide a demonstrable public benefit and address a community need; Projects should align with the National Water Initiative principles including appropriate cost recovery and, where full cost recovery is not deemed feasible, any subsidies are fully transparent to the community”.

Most notably, the EIA of the proposed Singleton Horticulture Project is inconsistent with NTG Guidelines, having significant implicit (in-kind water allocation) and a cash subsidy that is not counted as a cost despite the NT's own guidance indicating that it should be.

Large implicit subsidy to FAFM

The business case includes a large, unstated, subsidy in the form of a transfer of water owned by the NT public to Fortune Agribusiness, with a maximum value of over \$300 million. In other states, consistent with NWI principles, the project proponent would have to incur this cost. In this case however, it is an implicit subsidy that should be represented as a cost in a social benefit cost analysis (BCA). Implications of public subsidisation of a private entity's groundwater extraction activities may include over extraction of scarce groundwater resource with multiple competing uses due to absence of an effective incentive to use water efficiently and a missed opportunity to recover costs for improved governance and resource management.

Overstated economic benefits

The claimed economic benefits of Singleton are overstated when compared with reported industry performance in similar enterprises. For example, the EIA found that the project would create 110 new permanent local jobs and 1,350 seasonal jobs (Pp 16 Section 2.3.2). Considering current labour market conditions in the Barkly region are characterised by a tight local skilled labour market, the project would more likely displace local labour from other competing sectors than create new jobs. Especially considering that the EIA does not provide a detailed plan for training the unemployed subpopulation, which is, in itself, limited.

Overstated operating costs of production

Based on comparisons with findings from assessments of similar horticultural enterprises in the region, it is likely that the project's operating costs of production are overstated by 10%-35% (Connor *et al.* 2022, p12)

Overstated local expenditure values

Expenditures on local and regional inputs are likely to be substantially overstated, noting that FAFM has not provided any new information, grounded in empirical evidence, to justify applying a greater than typical assumption in relation to local expenditure.

Overstated local employment forecasts

Local and regional employment estimates are likely to be grossly overstated. For example, the business case estimates that the project would employ 1,350 seasonal workers and create 110 FTE positions. These estimates are not consistent with calculations provided in Connor *et al.* (2022), which suggest that the expected contribution of the Singleton project, in terms of **local** job creation, would in-fact, be much lower than suggested in the business case, noting that Connor *et al.* (2022) based their calculations on data from the NT Farmers Association average proportions of local versus seasonal international and FIFO labour in the sector (2019).

Error! Not a valid bookmark self-reference. provides a summary of key findings from our review of the business case for the Singleton Horticulture Project.

Table 1. Omitted public cost and potentially overstated benefits identified in Connor *et al.* (2022)

Purported economic benefits from the Singleton Horticulture Project	Estimates from the GHD business case	Findings from our own analysis
1. Value of the water entitlement	Provided free of charge by the NT Government	The entitlement is worth between \$70 million and over \$300 million
2. Employment for local communities and Northern Territory residents	110 permanent jobs and 1,350 seasonal jobs, with opportunities for local employment	A large proportion of NT agricultural jobs go to overseas workers and interstate fly-ins. Seasonal jobs are only available through short-term contracts, ranging between one to three weeks and a few months. We estimate that only 26-36 full time equivalent (FTE) jobs will likely be filled by residents of the Northern Territory, of which only 5-8 FTE jobs would be expected to go to Aboriginal communities in the Barkly region.
3. Economic activity through operating expenditures	\$110 million a year, much of this spent within the Northern Territory	Operating costs appear to be inflated by between 10%-35%. The true expenditure figure is likely to be between \$70-\$110 million per year, with \$13-\$28 million expected to be spent in the NT.

Based on the limited information available, and with plausible adjustment to reflect past performance in similar projects, we conclude that scaling up may be more difficult and limited than suggested and that:

Taking into account the apparent over-statement of operating costs of 10-35% as applying equally to the labour force (Section 4.1) the total employment of NT residents could reasonably be expected to be only 26-36 FTE jobs of which only 5-8 jobs are expected to include local Aboriginal people.

Connor et al. (2022, p21)

Updated information provided by FAFM

We note that since our original analysis, which was based on limited publicly available information, FAFM commissioned GHD to produce a detailed EIA on 25 October, 2022.

The EIA provides further detail and more clarity about calculations behind benefit and cost estimates than we had access to when we released Connor *et al.* (2022), including data and assumptions underpinning the business case as summarised in Table 2.

Table 2: New material included in the EIA of the Singleton Horticulture Project

Item	Section
EIA overview of methods, results, assumptions, limitations and the scope of evaluation. Details of accommodation, extraction staging, and development work steps	Section 1, Table 1
A profile of the regional economy	Section 2
indirect flow-on economic impact assessment with input-output (IO) modelling assumptions	Section 3
Indirect flow-on economic impact results	Section 4
Combined direct and indirect economic impact assessment results	Section 5
A crop attractiveness and market analysis selection, based on factors such as horticultural suitability, market capacity to take up more without adverse price collapse and returns per ha	Appendix D

Apparent contradictions, poorly validated assumption and other issues that require further attention

To judge the quality and adequacy of the information provided, we evaluated the EIA in reference to NTG Environmental Protection Authority's own Guidelines for the Preparation of an Economic and Social Impact Assessment V2.0 (2013) (hereafter, *NTG Guidelines*).

NT (and Commonwealth) governments' economics assessment standards

The objectives of the NTG Guidelines are to:

- *document the economic and social impacts of a proposed development on the locality and region;*
- *mitigate negative economic and social impacts on the locality and region;*
- *encourage development of new and/or expansion of existing businesses in the locality;*
- *and*

- *foster sustainable development and community wellbeing* (NTG, 2013).

The intent and content of this guidance is very similar and related to national guidelines such as the Commonwealth White Paper on Irrigation (2015), which states that agri-water “**investment should provide the highest net benefit of all options available to increase access to water, taking into account economic, social and environmental impacts; Projects should .. provide a demonstrable public benefit and address a community need; Projects should align with the National Water Initiative principles including appropriate cost recovery and, where full cost recovery is not deemed feasible, any subsidies are fully transparent to the community; If providing capital, a consistent robust analysis of costs and benefits is used and assessment is undertaken by Infrastructure Australia or similar experts.**”

Similarly, the NTG Guidelines state that *Accelerated development places a premium on provision of accurate and comprehensive impact assessment and where appropriate mitigation of project specific economic and social risks.* (page 1). In addition, Section 5 of the NTG Guidelines provides specific requirements for what should be included in economic impact assessments including:

5.1.1 Contribution to the NT and Australian Economy

- estimated total project revenue for the planned project duration (to provide the economic scale of the project)*
- expected project duration*
- value of any value-adding in the NT and Australia*
- estimated overall tax and royalty payments, showing the NT proportion, if available*
- expected value of exports and any imports*
- estimated capital expenditure for the whole project, identifying construction cap ex*
- expected annual operational expenditure, showing the proportion in the NT*
- impacts if any of neighbouring businesses or projects (costs and benefits)*
- any overall direct and indirect economic impact data if available*
- specific regional resources, constraints and opportunities*
- historical and current economic trends in the Territory/regional economy including projects being developed or to be developed in the near future*
- previous resources or other major development in the region and their effects including long and short term incomes and employment, business development, and estimates of lost and gained opportunities and landscape services e.g. reduction in the quality of the water supply.*

5.1.2 Contribution to Business Development

- expected value of NT/Australian business supply and service participation during construction and operations*
- Contribution through an agreed industry participation plan if required (usually required for all projects over \$5m in value which receive ‘substantial’ NT government assistance).*

5.1.3 Contribution to Employment and Training

- expected direct and indirect project employment during construction and operations*
- estimated workforce/contractor numbers by occupational classification if available*
- overall employment training proposed during commencement, construction and operations*

- d) *planned Indigenous employment, training and other project participation*
- e) *expected level of overseas recruitment*

5.1.4 Contribution to Regional Development

- a) *value of the proposed Community Benefit arrangements (already included)*
- b) *estimated overall regional economic benefits*
- c) *other contributions to local communities, including Indigenous traditional owners community value of any residuals infrastructure, such as roads, camps, lakes, etc*
- d) *assessment of deficiencies / issues that require further attention in Economic impact*

The highlighted text draws attention to the items that, in our assessment, do not meet the NT and Commonwealth governments' standards for economic impact assessments of proposed projects in the EIA prepared for FAFM by GHD. Most notably, the EIA of the proposed Singleton Horticulture Project is inconsistent with NTG Guidelines, having significant implicit (in-kind water allocation) and potentially other subsidy that is not counted as a cost despite the NT's own guidance indicating that it should be.

In the following sections, we provide further description of how the EIA is inconsistent with NTG Guidelines due to overstated public benefit estimates, arising from errors or purposeful misrepresentation of economic assessment methods, data and assumptions. The two main potential sources of error discussed include use of optimistic assumptions that overstate public benefit estimates and omission of social costs of the project.

1. Optimistic assumptions that create overstated public benefit estimate remain

The essence of points 2 and 3 in Table 1 from our original critique still hold. The new detailed EIA provides further detail on estimates of local input spending and employment. However, as in the previous publicly available information we based Connor *et al.* (2022) on, the proportion of highest value crops assumed in the business case's crop mix exceeds what has been achieved in similar past projects on a sustained basis. Input use expenditure also remain higher than is suggested by data for similar projects from publicly available information sources. This implies that the public is being asked to provide hidden cash subsidies for less public benefit than is stated and that the public benefit cost ratio for the project would likely be overstated based on this information.

The potential to create local employment seems particularly overstated as noted in Connor *et al.* (2022)

“The NT Farmers Association reported that in 2019 only 11% of total horticultural labour was supplied locally. Overseas workers represented 63% of total labour, particularly during the harvest season, and the remaining 28% was supplied from interstate workers. Many producers find it difficult to attract Australian workers due to the seasonal nature of the roles offered, remote locations and lack of contract security. Evidence of this can be seen on mango plantations in the NT, where producers report nearly no local seasonal workers.

The above evidence raises serious doubts about the true employment impacts of Singleton for the NT and Barkly region economy. Given the significant labour shortages for horticulture in Australia, it is likely that a

large proportion of the permanent and seasonal work will be from overseas or interstate. Seasonal workers will most likely be sourced from the existing pool of employed seasonal workers in the NT economy. In the absence of Singleton, these workers would find alternative opportunities in the NT or elsewhere.”

Connor et al. (2022, p19)

The updated assessment assumes high proportions of local labour supply and input expenditures. This is contradictory with evidence showing low unemployment in the regions' small work forces, especially in appropriately skilled categories. This issue is evident in the GHD's EIA regional economic profile (Page 16), which provides graphs that contradict some of the reported numbers and census data. GHD's graph shows that 10.8% of the work force in the Barkly local government area (LGA) are technicians and trades workers, 16% are labourers in a total work force population of 2,700, with only a small fraction available for employment, or not fully employed. Further, there are significant contradictions between assumptions, data and comments by other concerned regional businesses in the SIA carried out by GHD about the potential for “crowding out” of local existing demand. Our submission is that a Tier 3 assessment is needed, including calibration of impact estimates such as expected local employment outcomes based on empirical evidence, to test/check forecasts provided in GHD (2022).

2. Failure to include social cost despite purported public net benefit in assessment

There is vague discussion/acknowledgement of potential loss of cultural and spiritual benefits for First Nations groups, but not serious effort to evaluate the scale of these values at risk, nor is there meaningful evaluation of investments required to mitigate or avoid these negative impacts on wellbeing of NT citizens. Though, as outlined in Connor *et al* (2022) Sections 5.1 and 5.2, estimating the value of potential losses in cultural, spiritual and environmental values of water is difficult, potential negative impacts of groundwater extraction on flow and flood-dependent cultural and spiritual values must still be recognised as a cost. Further, implications of omitting potential negative cultural and spiritual impacts should be made clear and transparent in discussion of EIA limitations and interpretation of EIA outcomes, consistent with best practice guidelines (DoFA, 2006; DTF, 2008) to ensure that limited water resources are distributed equitably and justly (Nikolakis & Grafton, 2022). Failure to acknowledge these values at risk from the project effectively assumes that they have a value of ‘zero’ in the EIA.

The plan suggests that an adaptive management approach will be taken, involving reduced water extraction and production scale (a traffic light approach), yet no probabilities of this kind of outcome or financial planning with contingencies for such eventualities is offered (e.g. how any potential risks of environmental damage from groundwater extraction will be mitigated). This leads us to question the robustness of the economic analysis and whether there is a serious intention to scale back should it prove environmentally and socially unsustainable.

3. *Failure to account for the value of water entitlements provided free of charge to FAFM*

This is a cost to the people of the Northern Territory. The Northern Territory does not charge when it allocates water because it assumes there will be significant economic development benefits and the “trade-off is worth it”. However, the NT government’s own BCA guidelines require that all public and implicit subsidy costs should be acknowledged.

4. *Unsubstantiated assumptions about flow-on benefits, suggesting exaggerated flow-on impact estimates*

GHD use the Input-Output (IO) methodology to estimate impacts of the project for the regional economy. As stated in the GHD report itself, IO analysis assumes:

“that the economy has no supply-side constraints. That is, it is assumed that extra output can be produced in an area without taking resources away from other activities, thus overstating economic impacts. The actual impact is typically dependent on the extent at which the economy is operating at or near capacity”
(GHD 2023 p20)

Evidence from both the regional economy profile (EIA section 2) and the SIA provided by GHD illustrate that this assumption is not valid in the context of Barkly LGA, which is characterised by low unemployment rates (PP 16), particularly in the absence of a plan to offer training to the already limited unemployed subpopulation.

5. *Overstated employment benefits*

Despite a tight and small local skilled labour market in the Barkly LGA, the EIA claims that large job creation benefits are expected (Pp 16 Section 2.3.2). SIA comments by other local businesses, and empirical economic evidence from similar small local labour force settings, suggest displacement or poaching from other local employers is more likely than creation of new local jobs.

The following statement, which is the core basis for the use of the IO methodology to estimate economic impacts, is clearly contradicted by several sources, but most notably by the NT Farmers Association itself:

“The NT Farmers Association reported that in 2019 only 11% of total horticultural labour was supplied locally. Overseas workers represented 63% of total labour, particularly during the harvest season, and the remaining 28% was supplied from interstate workers. Many producers find it difficult to attract Australian workers due to the seasonal nature of the roles offered, remote locations and lack of contract security. Evidence of this can be seen on mango plantations in the NT, where producers report nearly no local seasonal workers.

The above evidence raises serious doubts about the true employment impacts of Singleton for the NT and Barkly region economy. Given the significant labour shortages for horticulture in Australia, it is likely that a large proportion of the permanent and seasonal work will be from overseas

or interstate. Seasonal workers will most likely be sourced from the existing pool of employed seasonal workers in the NT economy. In the absence of Singleton, these workers would find alternative opportunities in the NT or elsewhere.”

Connor et al. (2022, p19)

This contradiction indicates that the application of the IO methodology in this case is deeply inappropriate and is highly likely to substantially overstate the value of the Singleton project given major and unavoidable supply chain constraints that characterise production in northern Australia, and more so in regional areas of northern Australia.

This concern is magnified by the fact that IO methodologies are not typically regarded as appropriate for ‘small’ regions – where ‘small’ refers to the size and scope of economic activity. The Barkly region, in this context, would typically be considered as falling in the ‘very small’ category, indicating that the IO methodology is not a valid method for estimating regional economic impacts in this case ([ABS, 2023](#)).

It is unclear how the IO is applied. It appears to be applied to the Barkly region based on IO specification appropriate to larger regions, and not to the Barkly region but this is not explicitly stated. Nor is there any explanation of how the issue of limited local responding opportunity and employable workforce in very small regions is treated methodologically. We suspect improper application of the model and resultant interpretation of results and suggest the issue should be further clarified in Tier 3 assessment.

6. Vague statements without any commitment to public service and benefit provision

In the information provided we see no budget items that focus on any form of social benefits, no committed funding to training or employee wellbeing. While infrastructure is vaguely discussed, there is no budgeted investment in broader public benefit. It seems to be implied that public subsidy should provide significant benefit to FAFM and that others will benefit as well. If there is a public subsidy provided to FAFM in any form it should be costed to determine true net public benefit in line with NT guidance.

7. Inadequate consideration of climate liability

Inadequate consideration of climate liability of the project as stipulated in Australian Prudential Regulation Authority (APRA)'s Prudential Practice Guide - CPG 229 Climate Change Financial Risk ([APRA, 2021](#))

APRA has recently ruled that company directors and by extension ministers cannot plead ignorance of significant adverse greenhouse gas impacts of their business plans and risks that this creates. Carbon cost and liabilities for Australia in meeting its UN net emission reduction targets would likely arise from this project, as has been found in similar large horticultural operations for example [Martin-Gorriz et al. \(2020\)](#). The NT and FAFM are aware of these and should include, at a minimum, the cost of covering this liability with carbon credits if not the broader social cost of the emissions.

Table 3. Review details and comparisons

Attribute	Original	Updated (GHD EIA)	Details	Significance
Operating costs	Operating costs were estimated at \$110 million AUD per year.	Updated operating costs are estimated at 'over \$94 million' AUD per year.	The lower end of the updated operating costs (\$94 million) is ~15% lower than the original estimate. This accounts for the lower end of over-estimation of operating costs described by Connor <i>et al.</i> (2022) being estimated at 10%-35% over-estimation of operating costs. NT expenditures are broken down by category into percentage of expenditure within the NT in Table 15 (page 25 of GHD report) as follows (percentages reflect stated percent of all expenditure that will be spent in the NT). Bracketed [%] values indicate the percentage of all costs that each category is calculated to be (i.e the cost share): Crop variable costs: 70% [78%] Permanent employee costs: 80% [15%] Management fees: 50% [1.6%] General repairs and maintenance: 50% [<1%] Sundries/contingencies: 70% [<1%] Electricity: 100% [<1%] Insurance: 50% [<1%] Vehicle operating costs: 100% [<1%] Plant and equipment: 50% [1.7%] Overheads: 80% [1.7%]	Estimates for overall operating costs have been substantially reduced to be within a potentially reasonable range based on other farming activities. The new estimates remain at the upper end of expectations for operating costs, based on similar projects, and are likely to be lower than stated, possibly substantially lower. This indicates that there is a strong likelihood that the total operating cost of the project will be substantially lower than stated. Crop variable costs make up the highest proportion of operational costs of the project at 78% of all costs. This cost estimate includes seasonal labour for crop production activities. Average total expenditures estimates add up to over \$75 million per year over 30 years. The percentage of crop variable costs forecast to be expended in the NT is estimated at 70%
Local procurement	No clear statement	Clear statement on locally-focused procurement: “procurement preference is clearly local Barkly region first, Territory second, elsewhere third. Where firms outside the Territory may be needed, FAFM will actively encourage these to function as close to the site as possible and to employ locally” (EIA page v)	There is no detail available on how this procurement preference will be applied. Given limitations facing local procurement there is no evidence that the Singleton project will be able to achieve substantial local, or even Territory, procurement for either the investment or operational phases.	There is no additional evidence that changes the results outlined by Connor <i>et al.</i> (2022).

Attribute	Original	Updated (GHD EIA)	Details	Significance
Revenues and gross margins	Not reviewed in Connor <i>et al.</i> (2022)	Stated to be an expected final revenue of \$200 million AUD per year.	This represents a \$100 million annual gross profit (EBITDA) on operating costs of approximately \$100 million – or a margin of 50% on all costs.	This assumption represents an extraordinary divergence from any existing horticultural project known. For example the NSW DPI estimates that rockmelons have a 14% margin while seedless watermelons have a 9% margin not including interest, tax, depreciation and amortization. Taking out water costs only changes the margin by 1-2%. There is no detail on the source of these differences but some basic calculations indicate a very large over-estimation of expected revenues. For example, the expected revenue per hectare on the basis outlined within the GHD EIA report is equal to an average of over \$57,000 revenue per hectare. Even taking a high estimate of gross margins from revenues at 20%, and retaining the high operating cost estimates for Singleton (at \$100 million AUD) these values indicate a revenue expectation of \$125 million AUD – an over 35% reduction in stated margins. If operating costs, and likely associated revenues, were strongly overstated (as indicated as a possibility) these values would be even lower at approximately \$90 million AUD total revenue (or over 50% lower than stated in the GHD EIA documents). Given the extraordinary overstatement of expected revenues per hectare, combined with no evidence provided to justify such an expectation, there is a strong indication that total economic values would be substantially lower than stated – possibly half of what has been stated.
Employment (operating)	Connor <i>et al.</i> (2022) calculated that the project statements indicate that a total of 368 FTE positions would be created comprising of 110 true	The GHD EIA review indicates a substantial increase in expected employment levels to a total of 426 FTE positions	The GHD report uses FTEs as a measure instead of statements of seasonal and permanent positions making comparisons to standard farm models and data more direct.	This is a dramatic increase on estimated FTEs from the original proposal details (as calculated by Connor <i>et al.</i> 2022). It represents an increase of 15% on those original employment expectations – employment expectations that were shown to be likely to be inflated compared to labour usage

Attribute	Original	Updated (GHD EIA)	Details	Significance
	FTE positions and 1350 seasonal places (average employment length assumed at 8 weeks).		The composition of employment is described in the GHD EIA as: • 122 direct farm full time equivalent positions • 37 full time equivalent seasonal positions • 170 indirect full time equivalent positions • 97 indirect supply chain full time equivalent positions The IO analysis of GHD implies an employment multiplier of over 100% for operating activities – 159 FTEs generate 170 additional (indirect) FTE positions in the broader economy. For the construction phase the multiplier is lower, but still large (80%) for indirect jobs.	expectations for intensive horticulture in areas with greater labour availability, even with the original lower detail. These new estimates represent an inflation factor of over 50% compared to rockmelon labour use as estimated by the NSW Department of Primary Industries at 0.12 FTE per hectare (compared to 0.077 FTE per hectare for rockmelon in NSW). There is no detail to support these estimated labour usage data for Singleton whilst existing comparisons, in areas with high labour availability, indicate substantially lower labour usage (over 50% lower than stated per hectare for the Singleton project).
Construction estimates	Total construction value only provided	Detailed construction value across a number of activities provided along with a percentage allocation to expenditure within the NT. No detail provided that can support claims on % NT expenditures.	Total capital expenditure is estimated at ~ \$252m AUD. Of this ~\$167m is stated to be spent within the Northern Territory (66% of all capital expenditures).	It is not possible to consider the validity of the total expenditure estimates with available data. However, the proposed proportion of expenditure in the Northern Territory of 66% of total capital expenditures, amounting to \$167 million appears highly optimistic. For each category, other than land clearing, the expectation that the Singleton project would seek to purchase capital inputs from the Northern Territory, a region with a small, and declining manufacturing sector, is unrealistic. Other indicators also raise questions over this assumption – for example the 3.3% unemployment rate in greater Darwin and 4.8% in regional areas of the Northern Territory are strongly indicative of an economy that is at capacity. In combination with the small size of the economy and population, this indicates substantial difficulties in the capacity of the NT economy to provision services/inputs to the construction phases of the Singleton project.

Authors' biographies

Professor Jeffery Connor

Jeff Connor specialises in quantitative economic, environmental and social integrated systems modelling often working closely with governments at local, state, national and international levels to provide economic policy advice based on rigorous economics. Jeff worked as an economist and group leader at CSIRO from 2001-2016 where he provided research and advice to the Murray Darling Basin Authority, natural resource management boards and state departments for water, agriculture and natural resource management in South Australia, Victoria, and Western Australia and in Bangladesh, Indonesia, China and Laos. He has secured and/or managed over \$6 million worth of externally funded research and published over 60 peer reviewed articles and book chapters in water resource and environmental economics.

Dr Daniel Gregg

Daniel Gregg is Principal Economist at Heuris. Daniel has led several reports into farming systems risks and strategic initiatives, including a recent report for the OECD on agro-food systems resilience in which price and input risks were reviewed alongside market and other risks. This report focused on the importance of price risks in the COVID era and due to the emergence of geo-political tensions such as from the Russian invasion of Ukraine. Daniel has ongoing work with the OECD focusing on farm productivity measurement, leads the economic analysis of a large national sustainable farming initiative, and is an Associate Editor of the Australian Journal of Agriculture and Resource Economics focusing on farm analysis efforts.

Dr John Kandulu

John Kandulu is a Senior Research Economist at the School of Economics and Public Policy at the University of Adelaide. John has over 15 years of work experience as an applied economist in education, not-for-profit and government sectors focusing on natural resource management policy design and evaluation. He has contributed to projects addressing aid for development programs, policy-, program- and project impact evaluation, food and water security and water quality management. John applies various analytical techniques to inform policy- and investment decisions, including evaluating the effectiveness of new policy-, program- and project options, and the expected net return on prospective investment options. John's current research area of interest is design and evaluation of effective diversity and inclusion policies to inform inclusive natural resource management.