Vanessa Langtry

From: Category C - (47(3)(b) RTI Act)
Sent: Tuesday, 21 December 2021 3:05 PM
To: Chris Sampson
Cc: Category C
Subject: FW: Bundaberg Aquatic Centre - Economic Appraisal
Attachments: Bundaberg Aquatic Centre Economic Analysis Draft v2.0.docx; Bundaberg Aquatic Centre Economic Analysis Draft v2.0.pdf

Hi Chris

Please find attached the updated economic analysis.

Cheers

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Cardno's management systems are certified to ISO9001 (quality) and AS/NZS4801/OHSAS18001 (occupational health and safety)

From: Category C - (47(3)(b) RTI Act)
Sent: Tuesday, 21 December 2021 2:29 PM
To: Category C - (47(3)(b) RTI Act)
Cc: Category C - (47(3)(b) RTI Act)
Subject: Bundaberg Aquatic Centre - Economic Appraisal

Hi Category C

Please find the attached updated economic analysis report (in both PDF and word format), with the inclusion of the economic impact assessment. Feel free to reach out if you have any questions.

Hope you have a lovely Christmas and New Year, we will touch base again in the new year!

Kind regards,
Cat C

AEC Group offices will officially close over the Christmas period from COB Wednesday 22 December 2021 and reopen SOB Monday 10 January 2022.

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BUNDABERG AQUATIC CENTRE ECONOMIC ANALYSIS

XYPHER SPORT + LEISURE
DECEMBER 2021

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Job ID:	J002233
Job Name:	Bundaberg Aquatic Centre
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Client Contact:	Category C
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Version	Date	Reviewed	Approved
Draft v1.0	13th December 2021	KM	KL
Draft v2.0	21st December 2021	KM	KL

EXECUTIVE SUMMARY

PROJECT OVERVIEW

Background & Purpose

Bundaberg Regional Council (Council) has previously investigated the possibility of developing a new Aquatic Facility (the Facility) to replace the existing aging ANZAC pool located in the Bundaberg Central Business District (CBD). AEC previously undertook an economic and financial appraisal for the facility based on initial designs in 2019. An update of the economic appraisal is now required, based on updated designs for the facility which have been developed.

Approach

Utilising the design, demand and financial appraisal by the broader project team, AEC has undertaken a cost benefit analysis (CBA) and economic impact assessment (EIA) of the preferred design option. The CBA has been undertaken in line with Queensland and Australian guidelines for project appraisal. The CBA quantifies and values the annual financial, economic, and social benefits and costs of the project. A discounted cash flow analysis has been used to convert each benefit and cost to present value terms across a range of discount rates. Outputs include Net Present Value (NPV), Benefit Cost Ratio (BCR) and Internal Rate of Return (IRR). In addition to examining the sensitivity to the discount rate, sensitivity analysis has been conducted on key parameters using Monte Carlo analysis. The EIA quantifies the construction and operations activity using Input-Output modelling, to provide the output, Gross Regional Product (GRP), employment, and income outcomes of the project.

KEY FINDINGS

Cost Benefit Analysis

The CBA examined the costs and benefits associated with the Facility over a 32-year time frame (including 2 years of construction and 30 years of operations, coinciding with the asset life of the majority of infrastructure), commencing from year ending December 2022 to 2053.

The Facility will be a public good and a catalytic investment which could see further investment, developments, and enhancements across the surrounding region. As a project providing a social good to the community, it is considered that commercial discount rates (i.e., rates above 7%) are likely inappropriate for assessing the desirability of the project. A 4% discount rate will likely better reflect the nature of the project due to the large social benefits, long time period over which the benefits are accrued, and current low interest rate environment. Where a 4% discount rate is used, the CBA modelling for the project produces a positive NPV of $23.1 million and a BCR of 1.21. This indicates the project is economically desirable, with the benefits outweighing the costs.

The table below presents the summary of the overall CBA.

Table ES. 1. Summary of Costs and Benefits

Real Discount Rate	PV Costs ($M)	PV Benefits ($M)	NPV ($M)	BCR
4%	$111.9	$135.0	$23.1	1.21
7%	**$97.1**	**$88.5**	**-$8.7**	**0.91**
10%	$88.2	$62.1	-$26.1	0.70

Source: AEC.

Sensitivity analysis was undertaken using a Monte Carlo analysis on project costs and benefits (assuming a discount rate of 4%) highlighted the Facility is robust, providing a positive NPV and BCR above 1 across 97.4% of the 5,000 iterations. The results were most sensitive to the estimated health benefit followed by construction costs.

Economic Impact Assessment

The EIA examined the economic impact of the Facility during both construction and year ten of operations (i.e., steady state operations). The EIA identified construction of the facility will support approximately 106 full time equivalent (FTE) jobs, output of $82.0 million, $32.8 million in gross regional product (GRP), and wages and salaries of $22.6 million (through the initial stimulus and flow on activity). Approximately four of the 225 FTE jobs supported during construction may provide a job for a person of indigenous heritage (through the initial stimulus and flow on activity).

Figure ES. 1. Economic Activity Supported During Construction, Bundaberg LGA

Impact	Output ($M)	Gross Regional Product ($M)	Incomes ($M)	Employment (FTEs)
Initial Stimulus	$49.6	$17.6	$12.4	106
Production Induced	$21.2	$8.9	$6.6	72
Consumption Induced	$11.2	$6.3	$3.5	48
Total	**$82.0**	**$32.8**	**$22.6**	**225**

The EIA identified operations of the Facility in year ten will support approximately 17 FTE jobs, output of $3.4 million, $1.6 million in GRP, and wages and salaries of $1.7 million (including through the initial stimulus and flow on activity). It is not anticipated any of the 16 FTE positions will provide a job for a person of indigenous heritage (including through the initial stimulus or through flow on activity).

Figure ES. 2. Economic Activity Supported During Operations, Year Ten, Bundaberg LGA

Impact	Output ($M)	Gross Regional Product ($M)	Incomes ($M)	Employment (FTEs)
Initial Stimulus	$2.3	$1.1	$1.3	13
Production Induced	$0.5	$0.3	$0.2	2
Consumption Induced	$0.5	$0.3	$0.2	2
Total	**$3.4**	**$1.6**	**$1.7**	**17**

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1. INTRODUCTION

1.1 BACKGROUND & PURPOSE

Bundaberg Regional Council (Council) has a vision to build "Australia's best regional community" and considers the provision of high-quality sporting facilities an essential component of this vision (Bundaberg Regional Council, 2021a). Council has identified the need for a new, regional level aquatic facility to meet growing community demand for aquatic facilities as well as meet the currently unmet demand for regional level aquatic events. The new regional facility will replace the aging ANZAC Park Olympic Pool (ANZAC pool) located in the CBD, which no longer adequately services the growing regional population and requires significant refurbishment and modernisation if it is to continue operation. Council has already identified and is progressing an opportunity to redevelop the ANZAC pool site for a waterfront recreation park as part of the Riverside Masterplan, which will result on the closure of this facility.

The Bundaberg Sports and Recreation Strategy (2018) outlines that Bundaberg should maintain public pools to meet the required service provision standards. These considerations drive the need to replace the ANZAC pool with a facility which meets the service needs and delivers year-round recreational, fitness, education, and therapy services.

Council has previously investigated the possibility of developing a new Aquatic Facility (the Facility) to replace the existing ANZAC pool. AEC previously undertook an economic and financial appraisal for the facility based on initial designs in 2019. With updated designs now available, an update of the economic appraisal is required. As such, this report builds on the previous investigations for the development of the Facility and prepares the Facility for a funding submission to State and/or Commonwealth Government grant programs.

The updated Aquatic Facility design features a new FINA standard 50 metre heated competition pool, which will act as an attractor for regional and state level competition events. Additional fitness, teaching and therapy rooms will also be provided to offer a holistic fitness and wellness service.

1.2 APPROACH

Utilising the design, demand and financial appraisal by the broader project team, AEC has undertaken a cost benefit analysis (CBA) and economic impact assessment (EIA) of the preferred design option. The CBA has been undertaken in line with Queensland and Australian guidelines for project appraisal. The CBA quantifies and values the annual financial, economic, and social benefits and costs of the project. A discounted cash flow analysis has been used to convert each benefit and cost to present value terms across a range of discount rates. Outputs include Net Present Value (NPV), Benefit Cost Ratio (BCR) and Internal Rate of Return (IRR). In addition to examining the sensitivity to the discount rate, sensitivity analysis has been conducted on key parameters using Monte Carlo analysis. The EIA quantifies the construction and operations activity using Input-Output modelling, to provide the output, Gross Regional Product (GRP), employment, and income outcomes of the project.

2. FACILITY OVERVIEW & DEMAND

The Facility is a component of a broader mixed-use precinct masterplan, and it is anticipated the Facility will act as a catalyst towards the development of the overall precinct. Detail surrounding the mixed-use precinct masterplan is provided in the following section, in addition to an overview of the design, capital costs, and operating activity associated with the Facility itself.

2.1 BROADER MIXED USE PRECINCT MASTERPLAN

The site of the Old Showgrounds in Bundaberg (Burrum Street) has been selected as the preferred site of the new regional aquatic centre and broader mixed-use precinct. The preferred option of the mixed-use precinct master plan has been selected due to a number of reasons including:

- The Facility will be located adjacent to the TAFE campus on Walker Street. It has been envisioned that the proposed Facility will have a strong connection TAFE. The Facility is expected to generate an increase in enrolments for sports-related vocational courses. There is also a potential for shared parking.
- Relationship between the Facility and the existing Multiplex building.
- Potential for short-term accommodation for regional swimming competition and events visitors.
- Large green space which will provide a community focus.
- Space for potential commercial and residential zoning mix.

For the purposes of this study, it has been assumed the commercial areas of the precinct will primarily be operational by January 2026.

2.2 BUNDABERG AQUATIC CENTRE (THE FACILITY)

The Facility will be located adjacent to the recently completed Multiplex & Convention Centre on Civic Avenue, Bundaberg West. Two design options have been investigated to date:

- **Option A:** Removal of the existing contaminated site filling to the designated dump site, with payment of dump fees advised, and replacement of the contaminated material removed with approved imported filling material.
- **Option B:** The existing contaminated site fill material remains, and a piled foundation design is adopted for all building and pool structures.

Option B was selected as the preferred option, and as such the remainder of this report refers to this design. The proposed Facility will be developed over two stages, including the following components:

- **Stage One:**
  - A covered FINA standard, 10 land, 50 metre heated swimming pool including ramp and sling equitable access.
  - Entrance station and staff administration area.
  - Covered space for marshalling, timing, and judge's area.
  - A café, open space, and playground.
  - Grassed spectator seating area.
  - Toilets and amenities to support stage one elements and subsequent stages.
  - Plant and pool infrastructure to support stage one elements and subsequent stages.
  - Carparks and driveways and general landscaping.
- **Stage Two:**
  - Indoor 25 metre pool.

- Indoor program/ learn to swim pool.
- Steam and sauna.
- Plunge pools.
- Multipurpose, meeting and club rooms.
- Consulting rooms.
- Additional amenities/ change.

The facility mix above takes into consideration planning for a water play or splash park proposed for ANZAC Park and the location of the adjacent Multiplex which includes a PCYC facility housing a gymnasium and sports courts. The figure below demonstrates how the Facility fits in with the broader mixed-use precinct masterplan.

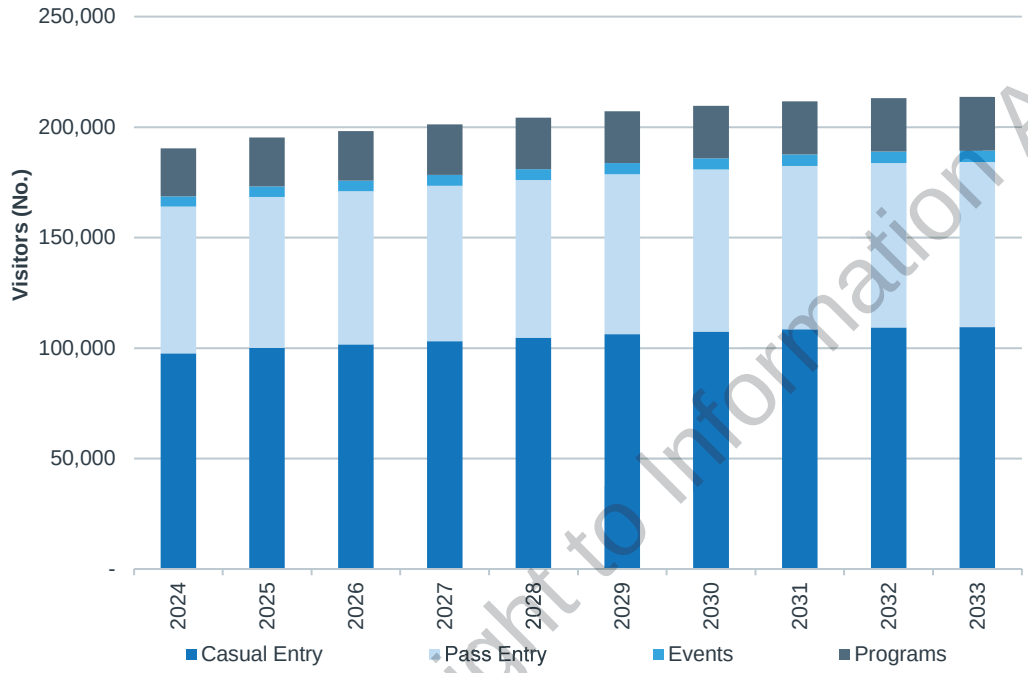
Figure 2.1. Broad Masterplan of Site

Source: Bundaberg (unpublished).

2.3 FACILITY DEMAND PROJECTIONS

Demand projections for the Facility were developed by Xypher Sport + Leisure on behalf of Bundaberg Regional Council. The demand projections were developed utilising information from the National Sport Infrastructure database, Council's *id.profile* platform, community engagement findings, and Queensland Department of Planning population projections. The demand projections take into consideration the location of the Facility, potential competition, relevant population catchment and growth (in consideration of the distance people are willing to travel for aquatic and health facilities), demographics of the relevant population catchment, market trends, and comparative benchmarks. These demand projections are summarised in the table below.

Figure 2.2. Demand Forecast, The Facility



Source: Xypher Sport + Leisure (2021).

In breaking down the event visitation into participants and spectators, AEC assumed 60.0% of event visitors are comprised of participants whilst 40.0% of event visitors are comprised of spectators. This is consistent with the average visitation for key regional swimming events, informed by Swimming Queensland (unpublished). AEC has assumed the total number of the visits to the Facility remains constant from year 10 (i.e., 2033) onwards.

2.4 FACILITY CAPITAL COSTS

The capital costs for the project have been estimated to total approximately $71.9 million. The table below provides a detailed breakdown of this total across each capital expenditure item. Construction of the Facility is anticipated to commence in July 2022 and be completed by December 2023.

Table 2.1. Facility Capital Costs ($M)

Item	Cost ($M)
Site establishment, demolition, bulk earthworks, site services	$4.9
Filtration and pools' construction	$11.7
Roof, screens, enclosure, concourse - pools	$15.2
Multi-purpose and hire rooms	$1.3
Front of house and spectator amenities	$1.9
Café	$1.0
Western amenities	$1.0
Central amenities	$1.7

Item	Cost ($M)
Plant and store	$2.5
Stands	$0.8
Car park and driveways	$1.3
Landscaping, paving and spectator seating	$1.4
Preliminaries and overheads (12%)	$5.4
Locality factor (5%)	$2.5
Design development and construction phase contingency allowance (10% overall - 5% each)	$5.3
Design and management costs (consultants' fees, 10%)	$3.0
Statutory authority and sundry costs (3%)	$1.8
Client's project contingency & project management allowance (10%)	$6.3
Contaminated materials removal - dump fees to local tip - separate contract	$2.3
Landfill gas management - allowance	$0.8
Estimated Project Construction Total Excl GST	**$71.9**

Source: Hoverly Pty Ltd (2021).

The above capital expenditure items will require capital renewal over the course of the assessment period. The de-escalated capital renewal schedule for the facility is provided in the table below, based on information from Hoverly Pty Ltd (2021).

Table 2.2. Capital Renewal Costs (de-escalated to 2021 dollars, $M)

Indicator	2033	2038	2043	2048	2053	2063	2068	2073
Total	$1.4	$0.5	$12.3	$3.4	$2.4	$13.2	$0.5	$4.8
Cumulative Total	$1.4	$1.9	$14.2	$17.6	$20.0	$33.2	$33.6	$38.5

Source: Hoverly Pty Ltd (2021).

2.5 FACILITY OPERATING COSTS & REVENUES

Operational estimates were developed for the Facility by Cardno on behalf of Bundaberg Regional Council, based on a series of business model assumptions (such as operating hours, fee schedules, visitation, management and staffing, energy, business growth, price growth, recurrent operating expenditure, staff costs, asset management and renewal allowances and debt services/ loan repayments) and demand assumptions (see Section 2.3). The Facility is anticipated to receive operating revenues stabilising at approximately $1.5 million by 2033 (year 10), with operational costs of approximately $2.0 million, resulting in an operating deficit. Operating costs and revenues have been assumed to remain constant at this level beyond 2033.

Table 2.3. Facility Operating Activity (de-escalated to 2021 dollars, $M)

Item	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Revenues										
General Aquatic	$0.6	$0.7	$0.7	$0.7	$0.7	$0.7	$0.7	$0.7	$0.7	$0.7
Aquatic Education	$0.5	$0.5	$0.5	$0.5	$0.6	$0.6	$0.6	$0.6	$0.6	$0.6
Café and Merch	$0.2	$0.2	$0.2	$0.2	$0.2	$0.2	$0.2	$0.2	$0.2	$0.2
Total Revenue	**$1.4**	**$1.4**	**$1.4**	**$1.4**	**$1.5**	**$1.5**	**$1.5**	**$1.5**	**$1.5**	**$1.5**
Operating Costs										
Staff	$1.2	$1.2	$1.2	$1.2	$1.2	$1.2	$1.2	$1.2	$1.2	$1.2
Operating Costs	$0.6	$0.6	$0.6	$0.6	$0.6	$0.6	$0.6	$0.6	$0.6	$0.6
Energy	$0.1	$0.1	$0.1	$0.1	$0.1	$0.1	$0.1	$0.1	$0.1	$0.1
Marketing	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Total Expenditure	**$2.0**	**$2.0**	**$2.0**	**$2.0**	**$2.0**	**$2.0**	**$2.0**	**$2.0**	**$2.0**	**$2.0**

Source: Xypher Sport + Leisure (2021).

3. COST BENEFIT ANALYSIS

3.1 METHOD & APPROACH

This CBA provides an overview of the net economic costs and benefits associated with the development of the Facility. Additional details regarding the approach used for this CBA is presented in Appendix A. The key assumptions that have been used in this economic analysis, which are consistent with national and state guidelines for CBA are discussed in the following sections.

3.1.1 Modelling Timeframe

A modelling period of 32 years has been examined, from the year ending December 2023 to the year ending December 2053 (accounting for the construction period across 2 years and a 30-year operations assessment period, reflecting the anticipated life of key components of the asset before major replacement and maintenance works are required).

Note: All dollar values presented in this section are expressed in 2021 Australian dollars.

3.1.2 Choice of Discount Rates

A base discount rate of 7% has been used for demonstration purposes (in line with many State and national standards for real discount rates used in economic appraisal of projects), with additional discount rates also examined (4% and 10%). As all values used in the CBA are in real terms, the discount rate does not incorporate inflation (i.e., it is a real discount rate, as opposed to a nominal discount rate).

Whilst a standard discount rate of 7% is generally recommended, a lower discount rate may be reasonable for projects which have large social benefits (i.e., community services/ infrastructure) and a strategic focus which may place more emphasis on the project's value to society in the future (TfNSW, 2021). High discount rates understate the potential longer-term benefits of a project and thereby prompt decision makers to prioritise short term benefits over longer term benefits, resulting in longer term outcomes (such as meeting the future needs of the Bundaberg population) appearing less desirable than shorter term projects (Grattan Institute, 2018). Furthermore, interest rates are currently low (i.e., the opportunity cost of capital is low), and so a lower discount rate may better reflect the existing environment. As such, while results have been assessed using the 7% discount rate, the results using a 4% discount rate are also considered.

3.1.3 Decision Criteria

The Net Present Value (NPV) and Benefit Cost Ratio (BCR) will be the primary decision criteria for the economic appraisal. The NPV of a project expresses the difference between the present value (PV) of future benefits and PV of future costs, i.e.: NPV = PV Benefits – PV Costs. The BCR provides the ratio between the PV of benefits and PV of costs, i.e., BCR = PV Benefits / PV Costs.

Where the economic appraisal results in a:

- Positive NPV and BCR above 1: the project will be deemed as being desirable.
- NPV equal to zero and BCR of 1: the project will be deemed neutral (i.e., neither desirable nor undesirable).
- Negative NPV and BCR below 1: the project will be deemed undesirable.

3.1.4 Geography

As the findings of this analysis are designed to inform a funding application under State and/or Commonwealth Government grant programs, which are typically designed to assist regional communities and economies, costs and benefits assessed in this analysis relate to the costs and benefits accruing to stakeholders of the Bundaberg LGA.

3.1.5 With Project & Base Case Scenarios

CBA examines the benefits and costs of a project compared (a "With Project" scenario) to what would otherwise be expected to occur (a "Base Case" scenario). Descriptions of the With Project and Base Case scenarios are presented below.

3.1.5.1 With Project Scenario

Section 2 provides an overview of the proposed Facility being considered as part of this assessment. It is assumed the Facility will be constructed over an 18-month period commencing July 2022, with operations commencing January 2024. Projections of anticipated demand for the new Facility are outlined in Section 2.3.

Additionally, the Facility will be a key component of a master-planned mixed-use precinct within the Old Showgrounds site that will combine sports, education, commercial and residential areas. The Facility is considered to be critical to realising the full potential of the precinct and co-location with other sports facilities, education and commercial activities is expected to drive higher rates of patronage to and expenditure within the precinct than would otherwise occur, as well as act as a facilitator to growing demand for sports-related vocational education. An overview of the master-planned precinct and the importance of the Facility as part of this precinct is presented in Section 2.1.

3.1.5.2 Base Case

In a CBA, a Base Case provides the basis against which project options are compared and is designed to reflect an anticipated state of the world should the project being examined not proceed. For this study, the Base Case assumes a new aquatic facility is not developed in Bundaberg in the foreseeable future. Further, as described in Section 1.1, the existing ANZAC Pool is at the end of its useful life and Council has identified an opportunity to redevelop the site currently occupied by the ANZAC Pool as part of its Riverside Masterplan meaning the pool will be closed and decommissioned. This analysis has assumed that, without the new Aquatic Facility, existing ANZAC Pool users will either transfer to the nearby Norville Park Pool or travel to the beach for swimming activity, seek an alternative fitness/ sporting activity, seek an alternative events facility, or become physically inactive. A summary of alternative uses assumed in the Base Case for this assessment is outlined in the following table.

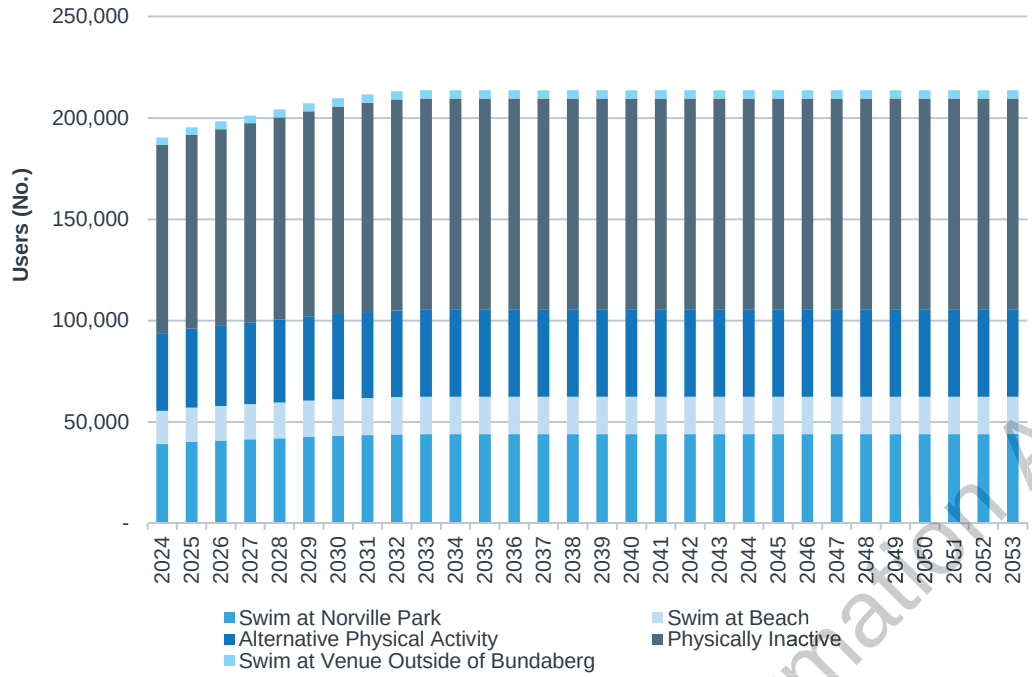
Table 3.1. Shares of Alternative Activity by Core User Group if Project Does Not Proceed

Alternative Activity	Casual Entry	Pass Entry	Events	Programs
Swim at Norville Park	20.0%	20.0%	20.0%	25.0%
Swim at Beach	10.0%	10.0%	0.0%	0.0%
Alternative Physical Activity	20.0%	20.0%	0.0%	25.0%
Physically Inactive	50.0%	50.0%	0.0%	50.0%
Swim at Venue Outside of Bundaberg	0.0%	0.0%	80.0%	0.0%
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**

Source: AEC.

The above assumptions were applied to the demand projections for each core user group, outlined in Section 2.3. Based on these assumptions, the following figure outlines the anticipated users of the Facility split by the alternative activity users are assumed to otherwise undertake if the project does not proceed.

Figure 3.1. Facility Users by Alternative Activity Without Project



Source: AEC.

In the Base Case it is still assumed other elements of the master-planned precinct on the Old Showgrounds site will be developed in time, however, the potential impact of the Aquatic Facility on additional patronage of and expenditure within the precinct as well as enrolment in sports-related vocational education is not assumed to occur.

3.2 COSTS & BENEFITS EXAMINED

3.2.1 Costs

3.2.1.1 Constructions Costs

Section 2.4 provides a detailed overview of the construction costs associated with the Facility, which equates to a total of $71.9 million. Construction activity is assumed to occur over 18 months, from July 2022 to December 2023. For the purposes of this assessment, it has been assumed a large portion of the construction costs would accrue later on during construction, and as such a 50:50 split between 2022 and 2023 has been assumed (i.e., $36.0 in each year).

3.2.1.2 Capital Renewal Costs

Once developed, the Facility will require ongoing capital renewal costs (life-cycle costs) associated with planned replacement of systems or components at the end of their nominal useful life. Section 2.4 provides an overview of the capital renewal schedule over 50 years, which totals approximately $38.5 million. With not all capital replaced over the modelling period through to 2053, the residual value of the assets has been modelled as a benefit (see Section 3.2.2.13).

3.2.1.3 Operating & Maintenace Costs

Section 2.5 provides a detailed overview of the operating and maintenance costs associated with the Facility. Based on this, the Facility is anticipated to incur operational costs of approximately $2.0 million by 2033. For modelling purposes, it has been assumed forward operations estimates will stabilise at the levels outlined in year 10 of operations.

3.2.2 Benefits

3.2.2.1 Facility Revenues

Section 2.5 provides a detailed overview of the revenues associated with the Facility. Based on this, the Facility is anticipated to generate revenues of approximately $1.5 million by 2033. For modelling purposes, it has been assumed forward revenue estimates will stabilise at the levels outlined in year 10 of operations.

3.2.2.2 Additional Incomes for Employees of the Facility

Operations of the Facility will provide employment in the region, which provides a benefit to these employees through the incomes paid. However, not all of the incomes paid to workers represent a net increase in economic welfare – for example, employees may otherwise be gainfully employed elsewhere without the project, and there is an opportunity cost of time for people that are employed (i.e., they could otherwise undertake leisure activity).

As per Section 2.5, employee salaries and wages associated with the Facility have been estimated at approximately $1.2 million per annum. It has been conservatively assumed that only 25% of the net additional wages and salaries paid to Facility staff represents a net economic benefit. This reflects that not all employment supported by the Facility would represent net new incomes for residents, and that people employed due to the Facility that would otherwise be unemployed may still contribute to economic activity without the project and there is an opportunity cost for the time (e.g., leisure time). [1]

3.2.2.3 Leisure/ Amenity Benefit of Users

It is well documented that people participating in sport and physical leisure activities receive an amenity benefit from undertaking such an activity. It is expected the proposed Facility will provide a high-quality FINA approved aquatic centre. Given the high-quality nature, the Facility is expected to result in an improvement in amenity for participants, including both those that would otherwise partake in similar swimming activity elsewhere in Bundaberg (surrounding regions to the site location) and those participants attracted to undertake sporting and physical leisure activity as a result of Facility.

Estimates of Facility demand and alternative activities these users would undertake in the base is outlined in Section 3.1.5.

The leisure/ amenity value of participation for activities undertaken in the facility has been conservatively estimated based on the leisure value of the time. Leisure time has been valued at $26.35 per hour (in 2021 AUD real terms), by a contingent valuation study conducted in the Netherlands (Verbooy *et al*, 2018). The Royal Life Saving Society – Australia (Barnsley and Scarr, 2017) report the estimated leisure value of pool visits is $14.68 per hour (in 2021-dollar terms). However, as this is likely to underestimate the value of participation in sport and physical leisure activity it does not account for any amenity value people place on or experience from participating in sport and physical leisure activity in addition to their time spent participating, therefore $26.35 is the value of leisure time applied in this assessment.

For Facility users that would do another activity or would have done no activity (as part of the Base Case), a smaller leisure/ amenity benefit of 20% of the value of their leisure time reflecting a marginal lift in amenity received for these users due to the enhanced/ improved facilities at the proposed Facility relative to their alternative activity.

In addition to the amenity benefits specific to the users of the Aquatic Facility, it is anticipated the Facility as a key component of a broader sports, education and commercial precinct will encourage higher levels of patronage at other facilities within the precinct than would occur in the base case. In particular, co-location of a high-quality aquatic facility with the gym at the PCYC in the neighbouring Multiplex is expected to support increased membership and usage of the gym through cross-pollination. While it is unclear as to what level of increased

[1] While labour benefits are often excluded from CBA, this is typically done as shadow labour costs (i.e., real resource cost to society) are used as well as a conservative assumption that the labour may otherwise be employed elsewhere. However, a market wage rather than a shadow wage was used in estimating labour costs, and an assumption that labour would otherwise be employed elsewhere with minimal difference in compensation is considered inappropriate given the impacts on the economy from the COVID-19 pandemic. To this end, an assumption that 25% of labour compensation reflects a benefit has been applied.

patronage may result, for the purposes of this analysis it has been assumed the PCYC receives an uplift in patronage equivalent to approximately 5% of the patronage of the Aquatic Facility. These users have been assumed to receive an amenity benefit of approximately $2.40 per hour/ per use (20% of the full benefit).

3.2.2.4 Health Benefit of Users

The health benefits of undertaking physical activity and sports participation are well documented, with participation in sports and physical activity directly linked to increased long term health outcomes.

Analysis for Royal Life Saving Society – Australia (Barnsley and Scarr, 2017)[2] estimates that the average pool visit generated benefits of approximately $28.60 (2021 dollar terms) in improved health outcomes and consequent reductions in health-related expenditure and absenteeism from the work place. It is estimated that the majority of this benefit is due to physically inactive people moving into physical activity.

In understanding the health benefit derived from the Facility it is important to understand that many users of the Facility would likely still undertake some level of physical activity at alternative venues. Only users of the Facility that would otherwise be inactive have been assumed to receive this health benefit (see Section 3.1.5 for a summary of users that would otherwise be physically inactive).

3.2.2.5 Travel Time Savings Benefit

Users of the Facility that would otherwise travel to different locations to undertake swimming or an alternative physical activity elsewhere without the project may also receive a benefit through a reduction in travel times as a result of having access to a Facility located closer to where they live. For the purposes of this assessment, it has been assumed that, on average, patrons that would otherwise use an alternative Facility in the Base Case will save approximately:

- 20 minutes[3] in travel time for users who otherwise would undertake swimming activities at the beach.
- 5 minutes in travel time for users who otherwise would undertake swimming activities at Norville Park Pool.
- 5 minutes in travel time for users who otherwise would undertake an alternative sporting activity.

The travel time saving has been applied to the demand estimates (excluding event demand) presented in Section 2.3, utilising the assumption surrounding alternative activities undertaken as presented in Section 3.1.5, to provide the net time saving the Facility provides.

The value of time per passenger vehicle was estimated at $17 per hour, based on data from ATAP (2016) indexed to 2021 values using CPI (ABS, 2021c). These results were applied to demand estimates and average hours travelled to estimate the benefit of improved transport efficiency.

3.2.2.6 Reduced Vehicle Fuel & Maintenance Costs

In addition to travel time savings due to less distance travelled in the project case compared to the base case, vehicle owners/ operators are expected to receive a benefit in terms of fuel and maintenance cost savings due to the project. As with the travel time savings benefit above, the fuel and maintenance cost valuation only consider visitors, agents, and buyers. An assumed occupancy rate of 1.0 persons per was used for private vehicle (visitors). For the purposes of this assessment, it has been assumed that, on average, patrons that would otherwise use an alternative Facility in the Base Case will save approximately:

- 15 minutes[4] in travel time for users who otherwise would undertake swimming activities at the beach.
- 3 kilometres in travel time for users who otherwise would undertake swimming activities at Norville Park Pool.

[2] This study aims to estimate the economic benefits of an individual aquatic facility visit by measuring the links between an increase in physical activity from an average pool visit and reduced risk of mortality, morbidity and health care expenditure, as well as reduced absenteeism from work.

[3] The time saving estimates have been estimated as the time from the centre of Bundaberg residential area.

[4] The time saving estimates have been estimated as the time from the centre of Bundaberg residential area.

- 3 kilometres in travel time for users who otherwise would undertake an alternative sporting activity.

The travel distance saving has been applied to the demand estimates (excluding event demand) presented in Section 2.3, utilising the assumption surrounding alternative activities undertaken as presented in Section 3.1.5, to provide the net time saving the Facility provides.

The estimated fuel saving was based on prices in Bundaberg for unleaded petrol (used for light vehicles) of approximately 170c/L (Petrol Spy, 2021). GST of 10% and fuel excise rate of 42c/L (ATO, 2021) were subtracted from these prices to provide the resource cost for each type of fuel. Average kilometers travelled per liter of petrol and diesel were estimated at 0.11 for passenger vehicles (ABS, 2017b). Additional maintenance costs were estimated at 7.22 c/km for cars, accounting for inflation between 2013 and 2021 (ATAP, 2016; ABS, 2021c).

3.2.2.7 Crash Reduction Benefit

Increased travel distance increases the potential for vehicle crashes; this represents a reduction in travel safety. Costs avoided due to crashes resulting from the lower travel distances in the project case have been based on ATAP (2016) benchmarks based on their historical severity as per the table below.

Table 3.2. Reduced Travel Distance Safety Benefits

Input	Fatal	Serious Injury	Slight Injury	Property Damage Only
Crash Rate	0.6	19.4	19	32.0
Value Per Crash Avoided ($)	$2,727,103.9	$611,585.2	$21,412.2	$10,608.4

Source: ATAP (2016), AEC.

To identify the annual benefit, projections of distance travelled for vehicles (see Section 3.2.2.6) were applied to the crash rate and value per crash for each category.

3.2.2.8 Economic Benefit from Events & Swimming Carnival-Related Expenditure

Due to the improved/ enhanced nature of the Facility, approximately 11 events throughout the year, including three regional swimming meets, two regional championships, four regional development activities, and two Swimming Queensland activities/ training. These regional-scale events will attract visitors from outside the Bundaberg LGA.

The broader swimming carnivals and events (regional swimming carnivals) will attract swimmers, their families, and tourists to the Facility. Initially, it has been estimated that these will be day events and the average expenditure per person is approximately $25.00 per day. Approximately 80% of this is anticipated to be spent on food and beverages whilst approximately 20% is anticipated to be spent on merchandise. It has been assumed that two thirds of event visitors (inclusive of participants and spectators) come from outside the LGA, whilst one third reside in the LGA. Only the event visitors that come from other regional areas (i.e., outside of the LGA) have been assumed to spend the additional $25 per day in Bundaberg.

The provision of goods and services to visitors is not costless, and only the producer surplus has been included as a net benefit. Input-Output transaction tables were used to estimate the level of gross profit and wages and salaries associated with this level of activity. It has been assumed that 25.0% of the net additional wages and salaries paid to staff represents a net economic benefit.

3.2.2.9 Economic Benefit from Induced Precinct Spend

As noted in Section 2, the Facility will be a key attractor within a master-planned mixed-use precinct and sports hub. Once the Facility is operational, as a result of the proposed Facility being co-located with a broader commercial, sports and education precinct, it is expected that Facility visitors/ users may be induced to have additional food and beverage and retail related expenditure within the confinements of the precinct. For the purposes of this assessment, it has been assumed the commercial areas of the precinct will be operational by January 2026.

The analysis has assumed that, on average, for each person visiting the Facility an additional $2.50 will be spent at commercial premises within the precinct that would not otherwise occur if the Facility was not developed, split evenly between expenditure and food and beverages services and retail trade. This assumption takes into consideration that only a subset of all users of the Facility will visit the precinct as part of their trip.

The provision of goods and services to visitors is not costless, and only the producer surplus has been included as a net benefit. Input-Output transaction tables were used to estimate the level of gross profit and wages and salaries associated with this level of activity. It has been assumed that 25.0% of the net additional wages and salaries paid to staff represents a net economic benefit.

3.2.2.10 Economic Benefit from Induced Sports-Related Education Activity

Section 2 notes that The Facility will be situated within a proposed mixed-use precinct and sports hub, which hosts a TAFE campus. There is considerable potential for the Facility to act as an attractor for increased enrolment in sport related vocational/ technical courses at the local TAFE Campus, which would provide additional activity within the local education sector through an increase in student numbers and student fees for sports-related qualifications (vocational and technical courses) at the Bundaberg TAFE campus located within close proximity to the Facility.

In estimating the increase in enrolments in sports-related vocational courses resulting from the Facility, the following approach was used:

- The average annual enrolments in sports and recreational courses in Bundaberg over the five years to 2020-21 were estimated based on:
    - Vocational education enrolments in sports and recreation courses located within Queensland's Department of Education North Coast Region (DESBT, 2021), which Bundaberg LGA forms part of.
    - The proportion that Bundaberg LGA's population comprises as a share of the overall North Coast Region's population (ABS, 2021b) was applied to enrolments above to estimate Bundaberg's annual enrolments in sports and recreation courses.
- Baseline enrolments in sports and recreation courses in Bundaberg LGA were then projected to increase based on population growth projections for the study area (QGSO, 2018).
- The analysis assumed that the Facility, as a key component of a broader sports and education hub in Bundaberg LGA co-located with a TAFE, will result in an increase in enrolments in sports-related vocational courses of 25%.

Based on the above approach, an additional 18 enrolments in sports-related vocational courses is estimated in 2026. In calculating the level of additional economic activity generated by the induced sports-related vocational course enrolments, the average cost per course in Bundaberg of $7,000 (TAFE Queensland, 2019) was applied to the additional enrolments and this figure was then modelled through the Input-Output industry of technical, vocational, and tertiary education services (including undergraduate and postgraduate).

The provision of goods and services to visitors is not costless, and only the producer surplus has been included as a net benefit. Input-Output transaction tables were used to estimate the level of gross profit and wages and salaries associated with this level of activity. It has been assumed that 25% of the net additional wages and salaries paid to staff represents a net economic benefit.

3.2.2.11 Increased Lifetime Earnings

As a result of the additional induced enrolments in sports-related vocational courses discussed in Section 3.2.2.10, it is anticipated that, once graduated and commenced the chosen sports-related career these individuals will see an increase in their lifetime earnings as a result of furthering their educational qualifications.

For the purposes of this assessment, it has been assumed that:

- The average graduation rate from vocational and technical courses is around 75%.
- Based on the average salary increase from apprenticeship formal qualifications for men and women (17.0% and 27.0% respectively, 22.0% assumed) applied to average weekly personal income in Bundaberg (ABS 2017), it has been estimated that these individuals will see an annual income increase of $9,700. As it is likely not all induced enrolments would not otherwise undertaken formal education, an annual income increase of $7,500 has been assumed.

Each graduate is estimated to receive this increase in lifetime earnings benefit every year (on average) after graduation.

3.2.2.12 Increased Net Profit of PCYC Gym

As aforementioned, the co-location of the Aquatic Facility with the gym at the PCYC is also expected to result in an increase in patronage of the gym (assumed to be equivalent to 5% of users of the Aquatic Facility). This level of increase in patronage is not expected to tangibly impact the PCYC's operational costs, however, where any of this additional patronage represents an increase in membership or entry fees this will result in an increase in the net profit of the PCYC.

PCYC's fee structure ranges between $9.50 per week for gym only membership to $13.99 per week for all-inclusive membership (i.e., gym and classes). For this assessment an average membership fee of $10 has been used, and it has been assumed approximately 10% of Facility users provide an increase in revenue for the PCYC.

3.2.2.13 Residual Value of Assets

Some of the structural components of the Facility (such as exception of filtration and pools' and stands) are assumed to have a life span greater than the 30-year assessment period. As these assets have not reached the end of their useful life, this analysis has estimated the remaining economic value of the asset using the difference between the current asset value and the replacement costs incurred by 2053. The residual value has been estimated to total approximately $22.9 million. The residual value for these assets has been treated as a benefit in the final year of the CBA (at the 30-year mark) and then discounted to its present-day value.

3.2.3 Costs & Benefits Not Included

A number of costs and benefits have not been included in the above quantification and valuation section. These costs and benefits of the project were not included in the cost benefit analysis due to data limitations for quantifying and valuing these results. Instead, these have been discussed qualitatively below:

- **2032 Olympics:** The 2032 Olympics will be hosted in Brisbane and the South East Queensland region, however, there are opportunities for other regions around Queensland to host particular events. Bundaberg, through the development of the Facility, has the potential to host competitions like water polo, artistic swimming, and diving. This will attract a significant level of visitation to the region, from competitors, teams, family, friends, and other spectators.
- **Improved social and community interaction/ reduced social isolation**: While leisure benefits have been included in the CBA, the Facility will also provide an avenue for increased social interaction as well as participation in team sports (swimming related competitions). This will assist in building community cohesiveness and inclusion.

  Social isolation (i.e., loneliness) affects a sizeable portion of the elderly population and can have a negative impact on physical and mental health. These detrimental effects on health have been associated with decreased resistance to infection, cognitive decline on mental health conditions (i.e., dementia) and increased admission into emergency departments at hospitals (Landeiro et al, 2017). The Facility is assumed to offer an increased opportunity for social interaction and support for the population, including the elderly.
- **Reduced crime and anti-social behaviour:** A number of studies have found sport and recreation can assist in diverting youth from crime and anti-social behaviour, in particular in at-risk youth groups. For example:
  - An Australian study by Kempe, Grenside and Lopez in 2003 found a 60% reduction in crime among participants of the Youth in Sport Program (operated by the NSW Department of Sports, Recreation and PCYC) (referenced in WA Government, 2009).
  - A study in Canada found programs involving physical activity and recreation helped reduce anti-social behaviour, including a 17% reduction in crime in communities participating in the program (referenced in Morris *et al*, 2003).

There is potential for the Facility to assist in reducing crime rates and anti-social behaviour through provision of additional opportunities for physical leisure activity and sport participation.

- **Passive use value:** It is expected that passive users (i.e., parents/ guardians) watching their children learning to swim may benefit from quality seating to spectate the activities from. This value may be captured via additional spending on ancillary services (i.e., cafés, vending machines, etc.)
- **Social use value for the Bundaberg community:** Bundaberg community members may be expected to place a value on its members having access to a new high-quality, modern aquatic centre.
- **Environmental Impact:** The preferred site for the aquatic facility is the southern part of Lot 2 of SP270834, on the corner of Walker Street and Pyefinch Boulevard in Bundaberg (Bundaberg Regional Council, unpublished). The site is zoned as open space and consists of 9.2 hectares of mostly open field with minimal vegetation. Bundaberg Creek runs from south to north through the western side of the site. An environmental impact assessment has not been carried out to inform this impact.

3.3 COST BENEFIT ANALYSIS RESULTS

The Facility will be a public good and a catalytic investment which could see further investment, developments, and enhancements across the surrounding region. As per Section 3.1.2, as a project providing a social good to the community, it is considered that commercial discount rates (i.e., rates above 7%) are likely inappropriate for assessing the desirability of the project. A 4% discount rate will likely better reflect the nature of the project due to the large social benefits, long time period over which the benefits are accrued, and current low interest rate environment. The CBA identified that at a 4% discount rate the Facility is deemed to be economically desirable with the benefits outweighing the costs. The CBA results were as follows:

- Net Present Value (NPV) of $23.1 million, with a present value (PV) of benefits of $111.9 million and a PV of costs of $135.0 million.
- Benefit Cost Ratio (BCR) of 1.21.
- Internal Rate of Return (IRR) of 6.0%.

Table 3.3. Summary of the Cost Benefit Analysis

Impact	Total Value ($M)	PV ($M) - 4% Discount Rate	PV ($M) - 7% Discount Rate	PV ($M) - 10% Discount Rate
Costs				
Construction Costs	$71.9	$70.5	$69.6	$68.7
Capital Renewal Costs	$20.0	$8.5	$4.7	$2.7
Operation and Maintenance Costs	$59.3	$32.9	$22.9	$16.9
Total Costs	***$151.3***	***$111.9***	***$97.1***	***$88.2***
Benefits				
Facility Revenues	$45.1	$24.8	$17.2	$12.6
Additional Incomes for Employees of the Facility	$9.3	$5.2	$3.6	$2.7
Leisure/ Amenity Benefit of Users	$35.0	$19.2	$13.3	$9.8
Health Benefit of Users	$88.3	$48.5	$33.6	$24.7
Travel Time Savings Benefit	$1.3	$0.7	$0.5	$0.4
Reduced Vehicle Fuel & Maintenance Costs	$0.8	$0.5	$0.3	$0.2
Crash Reduction Benefit	$0.9	$0.5	$0.3	$0.3
Economic Benefit from Events & Spend	$0.4	$0.2	$0.2	$0.1
Economic Benefit from Inducted Precinct Spend	$2.6	$1.4	$0.9	$0.6
Economic Benefit from Induced Sports-Related Education	$1.1	$0.6	$0.4	$0.3
Increased Lifetime Earnings	$60.9	$26.4	$15.1	$9.2
Increased Net Profit of PCYC Gym	$0.3	$0.2	$0.1	$0.1
Residual Value of Assets	$22.9	$6.8	$2.8	$1.2
Total Benefits	***$269.0***	***$135.0***	***$88.5***	***$62.1***
NPV		**$23.1**	**-$8.7**	**-$26.1**
BCR		**1.21**	**0.91**	**0.70**

Source: AEC.

3.4 SENSITIVITY ANALYSIS

Sensitivity analysis in this section has been undertaken using a Monte Carlo analysis across the key assumptions used in the CBA modelling.

Each of the assumptions has been tested in isolation with all other inputs held constant, with the results reported in the table below in terms of the modelled change in NPV resulting from the variance in the base assumptions at a discount rate of 4%. The 4% discount rate has been utilised due to the justification provided in Section 3.1.2, indicating that a 4% discount rate better reflects the nature of the project due to the large social benefits, long time period the benefits are accrued, and current low interest rate environment. The final row of the table examines each assumption simultaneously to provide a "combined" or overall sensitivity of the model findings to the assumptions used. The table also outlines the distribution used allowing for a 10% confidence interval, with the "5%" and "95%" representing a 90% probability that the distribution and NPV will be within the range outlined in the table.

The table shows, at a discount rate of 4%, there is a 90% probability the project will provide an NPV of between negative $1.4 million and $44.8 million. Sensitivity testing returned a positive NPV across 97.4% of the 5,000 iterations run in Monte Carlo analysis with the results being most sensitive to the estimated health benefit followed by construction costs.

Table 3.4. Sensitivity Analysis Summary, Discount Rate 4%, 2021-dollar terms

Variable	Net Present Value	
	5%	95%
Costs		
Construction Costs	$10.6	$32.3
Capital Renewal Costs	$21.7	$24.5
Operating & Maintenance Costs	$17.7	$28.5
Benefits		
Facility Revenues	$19.0	$27.2
Additional Incomes for Employees of the Facility	$22.3	$24.0
Leisure/ Amenity Benefit of Users	$16.8	$29.4
Health Benefit of Users	$7.2	$39.1
Travel Time Savings Benefit	$22.9	$23.4
Reduced Vehicle Fuel & Maintenance Costs	$23.0	$23.3
Crash Reduction Benefit	$23.0	$23.3
Economic Benefit from Events & Spend	$23.1	$23.2
Economic Benefit from Inducted Precinct Spend	$22.7	$23.6
Economic Benefit from Induced Sports-Related Education	$22.9	$23.3
Increased Lifetime Earnings	$14.4	$31.8
Increased Net Profit of PCYC Gym	$23.1	$23.2
Residual Value of Assets	$22.0	$24.2
Overall Combined	**-$1.4**	**$44.8**

Notes: The percent distributions used for each variable are provided below:
- Construction Costs: maximum 30% higher, minimum 20% lower.
- Capital Renewal Costs: normally distributed with standard deviation of 10% from the mean.
- Operating & Maintenance Costs: normally distributed with standard deviation of 10% from the mean.
- Facility Revenue: normally distributed with standard deviation of 10% from the mean.
- Additional Employment & Incomes: normally distributed with standard deviation of 10% from the mean.
- Amenity/ Leisure Benefit of Users: normally distributed with standard deviation of 20% from the mean.
- Health Benefit of Users: normally distributed with standard deviation of 20% from the mean.
- Travel Time Savings Benefit: normally distributed with standard deviation of 20% from the mean.
- Reduced Vehicle Fuel & Maintenance Costs: normally distributed with standard deviation of 20% from the mean.
- Crash Reduction Benefit: normally distributed with standard deviation of 20% from the mean.
- Economic Benefit from Events & Spend: normally distributed with standard deviation of 20% from the mean.
- Economic Benefit from Induced Precinct Spend: normally distributed with standard deviation of 20% from the mean.
- Economic Benefit from Induced Sports-Related Education: normally distributed with standard deviation of 20% from the mean.
- Increased Lifetime Earnings: normally distributed with standard deviation of 20% from the mean.
- Increased Net Profit of PCYC Gym: normally distributed with standard deviation of 20% from the mean.
- Residual Value of Assets: normally distributed with standard deviation of 10% from the mean.

Source: AEC.

The table below provides the combined sensitivity results across each discount rates, demonstrating the impact of placing higher importance on short term benefits over longer term benefits.

Table 3.5. Combined Sensitivity Summary

Variable	NPV ($M)	
	5%	95%
4%	-$1.4	$44.8
7%	-$27.0	$7.6
10%	-$42.2	-$12.9

Notes: The percent distributions used for each variable are the same as for above.

4. ECONOMIC IMPACT ASSESSMENT

4.1 APPROACH

Economic modelling in this section estimates the economic activity supported by the construction activity of developing the Facility, as well as economic activity supported post construction.

Input-Output modelling is used to examine the direct and flow-on[5] activity expected to be supported within the Bundaberg LGA economy. Modelling drivers used in the assessment are described in section 4.2. A description of the Input-Output modelling framework used is provided in Appendix B.

Input-output modelling describes economic activity by examining four types of impacts:

- **Output**: Refers to the gross value of goods and services transacted, including the costs of goods and services used in the development and provision of the final product. Output typically overstates the economic impacts as it counts all goods and services used in one stage of production as an input to later stages of production, hence counting their contribution more than once.
- **Gross product**: Refers to the value of output after deducting the cost of goods and services inputs in the production process. Gross product (e.g., Gross Regional Product) defines a true net economic contribution and is subsequently the preferred measure for assessing economic impacts.
- **Income**: Measures the level of wages and salaries paid to employees of the industry under consideration and to other industries benefiting from the project.
- **Employment**: Refers to the part-time and full-time employment positions generated by the economic stimulus, both directly and indirectly through flow-on activity, expressed in full time equivalent (FTE) positions[6].

4.2 MODELLING DRIVERS & ASSUMPTIONS

4.2.1 Construction Phase

Construction costs for the Facility are estimated to be $71.9 million in 2021 dollars (Hoverly Pty Ltd, 2021), and is expected to take approximately 18 months to construct, from July 2022 to December 2023. A summary breakdown by component is presented in section 2.4.

For modelling purposes, the capital outlay for the project was disaggregated into relevant industries represented in the Input-Output model (based on the Australian and New Zealand Standard Industrial Classification (ANZSIC) categories). A summary of expenditure for development of the project broken down by relevant industry is outlined in the table below.

Table 4.1. Construction Cost by Industry

Industry	Assumed Share (%)	Cost ($M)
Non-Residential Building Construction	15.0%	$10.8
Construction Services	25.0%	$18.0
Professional, Scientific and Technical Services	15.0%	$10.8
Heavy and Civil Engineering Construction	35.0%	$25.2
Specialised and other Machinery and Equipment Manufacturing	5.0%	$3.6
Waste Collection, Treatment and Disposal Services	5.0%	$3.6
Total	**100.0%**	**$71.9**

Note: Totals may not equal the sum of individual items due to rounding.
Source: Hoverly Pty Ltd (2021), AEC.

[5] Both Type I and Type II flow-on impacts have been presented in this report. Refer to Appendix B for a description of each type of flow-on impact.

[6] Where one FTE is equivalent to one person working full time for a period of one year.

Only the construction activity expected to be undertaken within Bundaberg LGA has been included in the economic impact assessment. For the purposes of this assessment, it was assumed:

- Approximately 80% of the direct expenditure on construction-based activity (i.e., heavy and civil engineering construction, non-residential building construction and construction services) as well as waste collection/ treatment/ disposal services would be sourced from local businesses and labour. Of the non-locally sourced construction activity:
    - Approximately 25% of purchases on goods and services (supply chain related activity) made by construction-related businesses sourced from outside Bundaberg LGA would be spent within the local economy (i.e., 25% of the Type I flow on activity associated with non-local construction companies is assumed to represent additional local activity in Bundaberg LGA).
    - Approximately 5% of wages and salaries paid to construction-related workers sourced from outside the region would be spent on local goods and services, such as food and beverages (i.e., 5% of the Type II flow on activity associated with non-local workers is assumed to represent additional local activity in Bundaberg LGA).
- Approximately 25% of the professional, scientific, and technical services activity (i.e., design, engineering) and 25% of specialised and other machinery and equipment manufacturing activity (i.e., plant and store) would be sourced from local businesses within Bundaberg LGA.

4.2.2 Operations Phase

The key economic benefits of the Facility during the operations phase that have been modelled using Input-Output modelling include:

- **Ongoing Facility Operational Activities:** The Facility will generate economic impacts through the ongoing operations of the aquatic facilities through entry fees, seasonal swimming passes, etc.
- **Induced Visitor Spend from Events & Swimming Carnival Related Expenditure:** The Facility will attract additional regional swimming carnivals and events and thereby inducing increased visitor spend elsewhere in the local economy (in addition to activity of the Facility).
- **Induced Precinct Spend:** The Facility will be a key attractor within a master-planned mixed-use precinct and sports hub. Visitation to the Facility is likely to flow through to increased patronage of and expenditure at other commercial operations within the precinct, resulting in increased economic activity.
- **Induced Sports Related Education Activity:** The Facility will be situated within a proposed mixed-use precinct and sports hub, which hosts a TAFE campus. There is considerable potential for the Facility, as part of a larger sports hub co-located with a TAFE campus that offers sports related qualifications, to act as an attractor for increased enrolment in sport related vocational/ technical courses at the local TAFE Campus. This has the potential to provide additional activity within the local education sector.

The above economic benefits were discussed in more detail in section 3.2. In modelling operational phase impacts, impacts accruing in year ten of operations (i.e., the long run average) have been modelled as a snapshot of future contribution from the Facility. Additional details of the assumptions used in modelling operations phase impacts are presented below.

Ongoing Facility Operational Activities

As noted in section 2.5, operating revenue has been estimated to equate to approximately $1.5 million in year ten of operations (2033). Of this revenue, $0.24 represents revenue through the sales of food, beverages and merchandise, with the remainder representing entry fees and other swimming related revenues. Operating expenditure has been estimated to total approximately $2.0 million, with non-labour operating expenditure totalling approximately $0.7 million, whilst wages and salaries supported by this activity totals approximately $1.2 million. These estimates resulted in a gross operating deficit of approximately $0.5 million in year ten.

As per the detailed breakdown of revenues, operating expenditure estimates for the Facility have been broken down into café and merchandise expenditure and aquatic centre operations expenditure. This split was developed

based on an estimate of operating expenditure for the café and merchandise using IO transaction tables for the food and beverage industry, applied to the estimated food, beverage and merchandise revenue outlined above. The remaining operating expenditure was allocated to pool operation. Estimates of flow-on activity in the Bundaberg LGA economy have been modelled based on the typical level of output associated with non-labour operating expenditure outlined above, allocated to the Sports and Recreation (pool operation) and Food and Beverage Services (café and merchandise) sectors in the Input-Output model. Initial operational activity was based on the revenue, operating costs, and incomes outlined above.

Induced Visitor Spend from Events & Swimming Carnivals

As discussed in section 3.2.2.8, approximately 11 events are anticipated to be held at the Facility throughout the year, generating additional visitation of approximately 5,200 (including participants and spectators) in year ten of operations. Applying an average expenditure per person of $25 per day (with 80% spent on food and beverage services and the remaining 20% spend on merchandise), and assuming two thirds of event visitors come from outside the LGA, generates approximately $0.07 million in expenditure on food and beverage services and approximately $0.02 million in expenditure on retail trade in year ten of operations. This expenditure was then modelled through the food and beverage services and retail trade industries (as outlined above) in the Input-Output model to estimate direct and flow-on activity associated with this expenditure.

Induced Precinct Spend

As discussed in section 3.2.2.9, as a result of the proposed Facility being co-located with a broader commercial, sports and education precinct, it is expected that Facility visitors/ users may be induced to have additional food and beverage and retail related expenditure within the confinements of the precinct.

The analysis has assumed that, on average, for each person visiting the Facility an additional $2.50 will be spent at commercial premises within the precinct that would not otherwise occur if the Facility was not developed. This expenditure has been evenly split between the industries of food and beverage services and retail trade and applied to visitation/ usage projections in year ten of operations (see section 2.3). This expenditure was then modelled through these industries in the Input-Output model to estimate direct and flow-on activity associated with this expenditure.

Induced Education Activity

As discussed in section 3.2.2.10, the Facility is anticipated to act as an attractor for increased enrolment in sport related vocational/ technical courses at the local TAFE Campus. This has the potential to provide additional activity within the local education sector. The induced education related expenditure has been estimated has per the process outlined in section 3.2.2.10. Based on this approach, an additional 27 enrolments are anticipated by year ten of operations, with an anticipated spend of $7,000 per enrolment (TAFE Queensland, 2019) to provide a total induced spend of approximately $0.19 million. This was modelled through the Input-Output industry of technical, vocational, and tertiary education services (including undergraduate and postgraduate).

4.3 MODEL RESULTS

4.3.1 Construction

Modelling drivers outlined in section 4.2. In interpreting the results of the economic modelling, it should be recognised the results refer to the aggregate economic activity supported over the entire construction phase. The construction phase is expected to take approximately 18 months to construct, from July 2022 to December 2023.

Construction of the Facility is estimated to cost $71.9 million (2021 dollars) in total, which will contribute to $49.6 million in industry output (i.e., revenues) to local businesses within the Bundaberg economy through this initial expenditure stimulus. A further $32.4 million to the Bundaberg economy through flow-on activity, including $21.2 million in production induced (i.e., supply chain) activity and $11.2 million through household consumption induced activity (i.e., expenditure of households within the local economy as a result of a lift in household incomes).

This level of industry activity is estimated to support the following within the Bundaberg economy:

- A $32.8 million contribution to Gross Regional Product (GRP) (including $17.6 million through initial stimulus).
- 225 FTE jobs (including 106 FTE jobs through initial stimulus), paying a total of $22.6 in wages and salaries (including $12.4 million through initial stimulus).

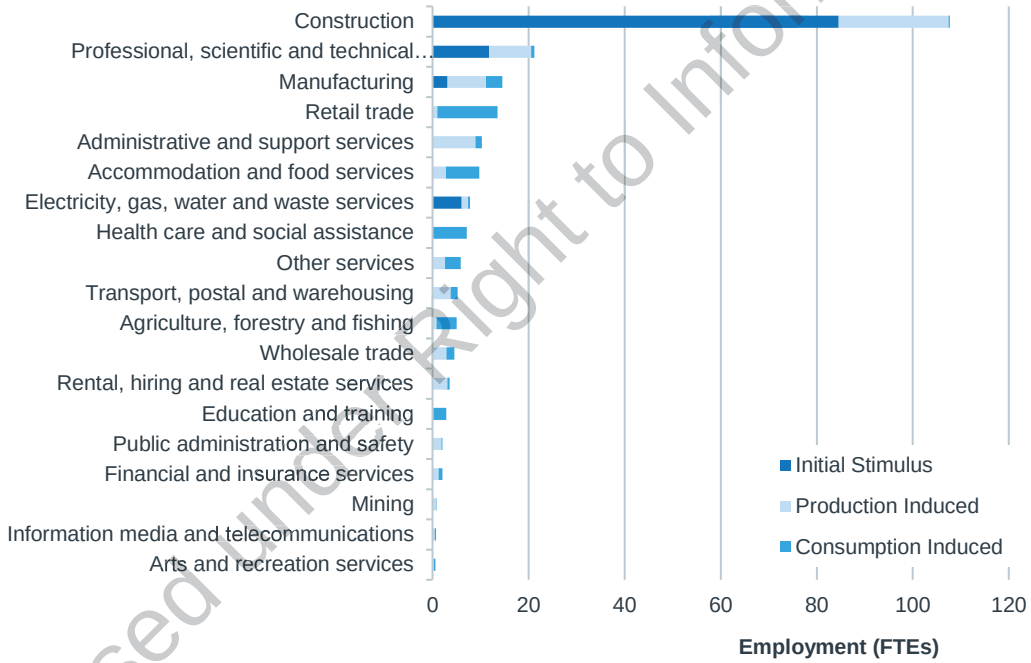
Table 4.2. Economic Activity Supported by Construction ($M), Bundaberg LGA

Impact	Output ($M)	Gross Regional Product ($M)	Incomes ($M)	Employment (FTEs)
Initial Stimulus	$49.6	$17.6	$12.4	106
Production Induced	$21.2	$8.9	$6.6	72
Consumption Induced	$11.2	$6.3	$3.5	48
Total	**$82.0**	**$32.8**	**$22.6**	**225**

Note: Figures may not add due to rounding.
Source: ABS (2012), ABS (2017), ABS (2021d, e, f), DoESE (2021), Hoverly Pty Ltd (2021), AEC.

Figure 4.1 presents a breakdown of the contribution to Bundaberg's employment supported by sector as a result of the construction phase of the Facility. The construction industry is estimated to receive the largest contribution to employment (108 FTEs) with the majority of this delivered directly through construction of the Facility. Other key industries recording a lift in contribution to employment as a result of the Facility include professional, scientific and technical services (21 FTEs), manufacturing (15 FTEs), and retail trade (14 FTEs).

Figure 4.1. Employment Impacts by Industry (FTEs), Construction Phase, Bundaberg LGA



Source: ABS (2012), ABS (2017), ABS (2021d, e, f), DoESE (2021), Hoverly Pty Ltd (2021), AEC.

4.3.1.1 Indigenous Employment Impacts

Census of Population and Housing 2016 data (ABS, 2017) was used to identify the proportion of total employment in the Bundaberg region that is filled by people of indigenous heritage. A summary of these shares for each industry is presented in the table below.

Table 4.3. Share of Indigenous Employment by Industry, Bundaberg Region, 2016

Industry	Indigenous Employment
Agriculture, Forestry and Fishing	2.5%
Mining	0.0%
Manufacturing	1.6%
Electricity, Gas, Water and Waste Services	3.8%
Construction	2.1%
Wholesale Trade	0.1%
Retail Trade	2.8%
Accommodation and Food Services	3.8%
Transport, Postal and Warehousing	2.0%
Information Media and Telecommunications	0.0%
Financial and Insurance Services	0.7%
Rental, Hiring and Real Estate Services	0.9%
Professional, Scientific and Technical Services	1.3%
Administrative and Support Services	4.1%
Public Administration and Safety	2.8%
Education and Training	2.1%
Health Care and Social Assistance	2.8%
Arts and Recreation Services	1.4%
Other Services	1.5%
Total	**36.2%**

Source: ABS (2012), ABS (2017), ABS (2021d, e, f), DoESE (2021), Hoverly Pty Ltd (2021), AEC.

The above shares were applied to total employment impacts by industry to estimate total indigenous employment likely to be supported by the project. Assuming these proportions are maintained, it may be reasonable to expect of the 120 FTE jobs supported during construction, approximately four of these FTE positions may provide a job for a person of indigenous heritage (2 through initial stimulus and 2 through flow-on activity).

Table 4.4. Total Indigenous Employment Impacts from Construction, Bundaberg LGA

Impact	Indigenous	Total
Initial Stimulus	2	106
Flow-On (Type I + Type II)	2	120
Total	**4**	**225**

Source: ABS (2012), ABS (2017), ABS (2021d, e, f), DoESE (2021), Hoverly Pty Ltd (2021), AEC.

4.3.2 Operations

It is anticipated the Facility will commence operations in 2024. Modelling of operational phase impacts has been undertaken using the modelling drivers outlined in section 4.2. The following analysis examines the impacts delivered by the Facility in 2033 (year ten of operations).

In year ten (i.e., 2033), the Facility is estimated to deliver $2.3 million in initial stimulus output for businesses in the Bundaberg economy though operations of the Facility, induced expenditure of visitors for events and swimming carnivals, induced expenditure of Facility patrons within the broader precinct, and induced education activity. This activity is estimated to support a further $1.1 million in industry output for local businesses through flow-on activity.

This level of industry activity is estimated to support the following within the Bundaberg economy:

- A $1.6 million contribution to GRP (including $1.1 million through initial stimulus).
- 17 FTE jobs (including 13 through initial stimulus), supporting $1.7 million in wages and salaries (including $1.3 million through initial stimulus).

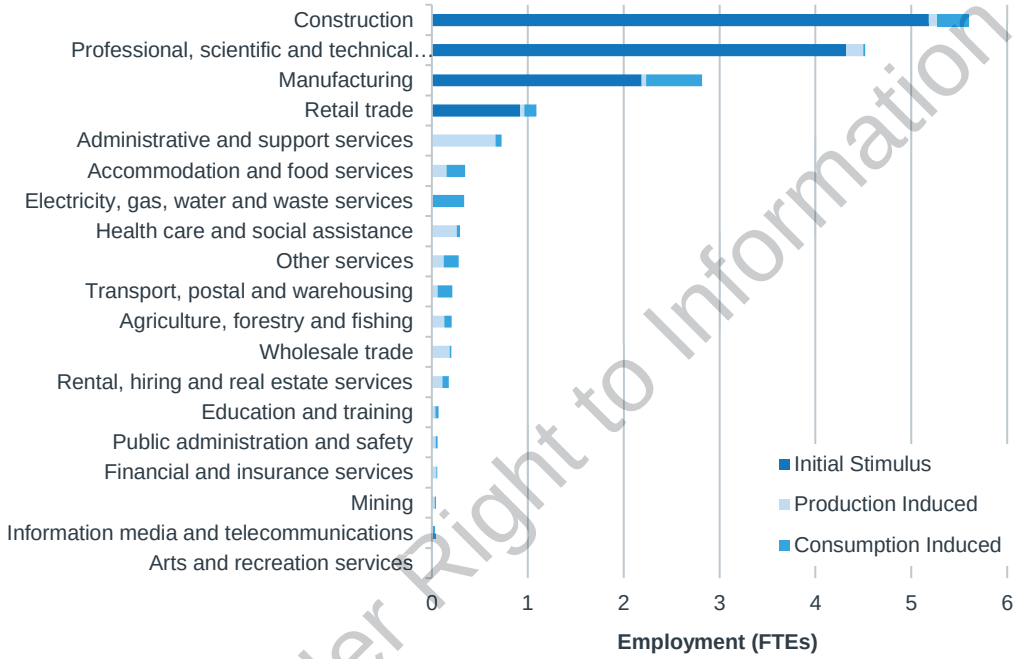
Table 4.5. Economic Activity Supported by Operations ($M), Year Ten, Bundaberg LGA

Impact	Output ($M)	Gross Regional Product ($M)	Incomes ($M)	Employment (FTEs)
Initial Stimulus	$2.3	$1.1	$1.3	13
Production Induced	$0.5	$0.3	$0.2	2
Consumption Induced	$0.5	$0.3	$0.2	2
Total	**$3.4**	**$1.6**	**$1.7**	**17**

Source: ABS (2012), ABS (2017), ABS (2021d, e, f), DoESE (2021), AEC, Xypher Sport + Leisure (2021).

Employment by industry supported through operations phase activity is presented in Figure 4.2. The accommodation and food services industry is estimated to record the largest increase in employment as a result of the Facility (combined direct and flow-on contribution to employment of 6 FTEs). Other key industries experiencing an increase in employment as a result of the Facility include arts and recreation services (5 FTEs) and retail trade (3 FTEs).

Figure 4.2. Employment Impacts by Industry (FTEs), Operations Phase Year Ten, Bundaberg LGA



Source: ABS (2012), ABS (2017), ABS (2021d, e, f), DoESE (2021), AEC, Xypher Sport + Leisure (2021).

4.3.2.1 Indigenous Employment Impacts

Census of Population and Housing 2016 (ABS, 2017a) shares of employment for people of indigenous heritage (outlined in Table 4.3) were applied to total employment supported by the project by industry to identify the number of jobs operational activity and induced spend may support in these cohorts. Assuming 2016 proportions are maintained, it is not anticipated any of the 16 FTE positions will provide a job for a person of indigenous heritage (including initial stimulus or through flow on activity).

Table 4.6. Total Indigenous Employment Impacts in Year Ten Post Construction, Bundaberg LGA

Impact	Indigenous	Total
Initial Stimulus	0	13
Flow-On (Type I + Type II)	0	4
Total	**0**	**17**

Source: ABS (2012), ABS (2017), ABS (2021d, e, f), DoESE (2021), AEC, Xypher Sport + Leisure (2021).

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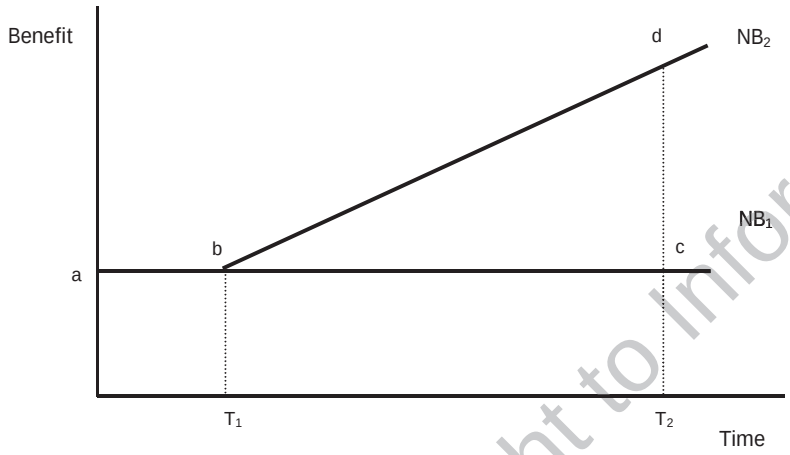
APPENDIX A: COST BENEFIT ANALYSIS METHODOLOGY

STEP 1: DEFINE THE SCOPE AND BOUNDARY

To enable a robust determination of the net benefits of undertaking a given project, it is necessary to specify base case and alternative case scenarios. The base case scenario represents the 'without project' scenario and the alternative or 'with project' scenario examines the impact with the project in place.

The base case (without) scenario is represented by line NB_1 (bc) over time T_1 to T_2 in the figure below. The investment in the project at time T_1 is likely to generate a benefit, which is represented by line NB_2 (bd). Therefore the net benefit flowing from investment in the project is identified by calculating the area (bcd) between NB_1 and NB_2.

Figure A. 1. With and Without Scenarios



Source: AEC

STEP 2: IDENTIFY COSTS AND BENEFITS

A comprehensive quantitative specification of the benefits and costs included in the evaluation and their various timings is required and includes a clear outline of all major underlying assumptions. These impacts, both positive and negative, are then tabulated and where possible valued in dollar terms.

Some impacts may not be quantifiable. Where this occurs the impacts and their respective magnitudes will be examined qualitatively for consideration in the overall analysis.

Financing costs are not included in a CBA. As a method of project appraisal, CBA examines a project's profitability independently of the terms on which debt finance is arranged. This does not mean, however, that the cost of capital is not considered in CBA, as the capital expenses are included in the year in which the transaction occurs, and the discount rate (discussed below in Step 5) should be selected to provide a good indication of the opportunity cost of funds, as determined by the capital market.

STEP 3: QUANTIFY AND VALUE COSTS AND BENEFITS

CBA attempts to measure the value of all costs and benefits that are expected to result from the activity in economic terms. It includes estimating costs and benefits that are 'unpriced' and not the subject of normal market transactions but which nevertheless entail the use of real resources. These attributes are referred to as 'non-market' goods or impacts. In each of these cases, quantification of the effects in money terms is an important part of the evaluation.

However, projects frequently have non-market impacts that are difficult to quantify. Where the impact does not have a readily identifiable dollar value, proxies and other measures should be developed as these issues represent real costs and benefits.

One commonly used method of approximating values for non-market impacts is 'benefit transfer'. Benefit transfer (BT) means taking already calculated values from previously conducted studies and applying them to different study sites and situations. In light of the significant costs and technical skills needed in using the methodologies outlined in the table above, for many policy makers utilising BT techniques can provide an adequate solution.

Context is extremely important when deciding which values to transfer and from where. Factors such as population, number of households, and regional characteristics should be considered when undertaking benefit transfer. For example, as population density increases over time, individual households may value nearby open space and parks more highly. Other factors to be considered include, depending on the location of the original study, utilising foreign exchange rates, demographic data, and respective inflation rates.

Benefit transfer should only be regarded as an approximation. Transferring values from similar regions with similar markets is important, and results can be misleading if values are transferred between countries that have starkly different economies (for example a benefit transfer from the Solomon Islands to Vancouver would likely have only limited applicability). However, sometimes only an indicative value for environmental assets is all that is required.

STEP 4: TABULATE ANNUAL COSTS AND BENEFITS

All identified and quantified benefits and costs are tabulated to identify where and how often they occur. Tabulation provides an easy method for checking that all the issues and outcomes identified have been addressed and provides a picture of the flow of costs, benefits and their sources.

STEP 5: CALCULATE THE NET BENEFIT IN DOLLAR TERMS

As costs and benefits are specified over time it is necessary to reduce the stream of benefits and costs to present values. The present value concept is based on the time value of money – the idea that a dollar received today is worth more than a dollar to be received in the future. The present value of a cash flow is the equivalent value of the future cashflow should the entire cashflow be received today. The time value of money is determined by the given discount rate to enable the comparison of options by a common measure.

The selection of appropriate discount rates is of particular importance because they apply to much of the decision criteria and consequently the interpretation of results. The higher the discount rate, the less weight or importance is placed on future cash flows.

The choice of discount rates should reflect the weighted average cost of capital (WACC). For this analysis, a base discount rate of 6% has been used to represent the minimum rate of return, in line with Australian Government guidelines. As all values used in the CBA are in real terms, the discount rate does not incorporate inflation (i.e., it is a real discount rate, as opposed to a nominal discount rate).

To assess the sensitivity of the project to the discount rate used, discount rates either side of the base discount rate (6%) have also been examined (4% and 8%).

The formula for determining the present value is:

$$PV = \frac{FV_n}{(1+r)^n}$$

Where:

PV = present value today

FV = future value n periods from now

r = discount rate per period

n = number of periods

Extending this to a series of cash flows the present value is calculated as:

$$PV = \frac{FV_1}{(1+r)^1} + \frac{FV_2}{(1+r)^2} + \cdots + \frac{FV_n}{(1+r)^n}$$

Once the stream of costs and benefits have been reduced to their present values the Net Present Value (NPV) can be calculated as the difference between the present value of benefits and present value of costs. If the present value of benefits is greater than the present value of costs then the option or project would have a net economic benefit.

In addition to the NPV, the internal rate of return (IRR) and benefit-cost ratio (BCR) can provide useful information regarding the attractiveness of a project. The IRR provides an estimate of the discount rate at which the NPV of the project equals zero, i.e., it represents the maximum WACC at which the project would be deemed desirable. However, in terms of whether a project is considered desirable or not, the IRR and BCR will always return the same result as the NPV decision criterion.

STEP 6: SENSITIVITY ANALYSIS

Sensitivity analysis allows for the testing of the key assumptions and the identification of the critical variables within the analysis to gain greater insight into the drivers to the case being examined.

A series of Monte Carlo analyses has been conducted in order to test the sensitivity of the model outputs to changes in key variables. Monte Carlo simulation is a computerised technique that provides decision-makers with a range of possible outcomes and the probabilities they will occur for any choice of action. Monte Carlo simulation works by building models of possible results by substituting a range of values – the probability distribution – for any factor that has inherent uncertainty. It then calculates results over and over, each time using a different set of random values from the probability functions. The outputs from Monte Carlo simulation are distributions of possible outcome values.

During a Monte Carlo simulation, values are sampled at random from the input probability distributions. Each set of samples is called an iteration, and the resulting outcome from that sample is recorded. Monte Carlo simulation does this hundreds or thousands of times, and the result is a probability distribution of possible outcomes. In this way, Monte Carlo simulation provides a comprehensive view of what may happen. It describes what could happen and how likely it is to happen.

APPENDIX B: INPUT-OUTPUT METHODOLOGY

INPUT-OUTPUT MODEL OVERVIEW

Input-Output analysis demonstrates inter-industry relationships in an economy, depicting how the output of one industry is purchased by other industries, households, the government, and external parties (i.e., exports), as well as expenditure on other factors of production such as labour, capital, and imports. Input-Output analysis shows the direct and indirect (flow-on) effects of one sector on other sectors and the general economy. As such, Input-Output modelling can be used to demonstrate the economic contribution of a sector on the overall economy and how much the economy relies on this sector or to examine a change in final demand of any one sector and the resultant change in activity of its supporting sectors.

The economic contribution can be traced through the economic system via:

- **Initial stimulus (direct) impacts**, which represent the economic activity of the industry directly experiencing the stimulus.
- **Flow-on impacts**, which are disaggregated to:
    - **Production induced effects (type I flow-on)**, which comprise the effects from:
        - Direct expenditure on goods and services by the industry experiencing the stimulus (direct suppliers to the industry), known as the first round or direct requirements effects.
        - The second and subsequent round effects of increased purchases by suppliers in response to increased sales, known as the industry support effects.
    - **Household consumption effects (type II flow-on)**, which represent the consumption induced activity from additional household expenditure on goods and services resulting from additional wages and salaries being paid within the economic system.

These effects can be identified through the examination of four types of impacts:

- **Output**: Refers to the gross value of goods and services transacted, including the costs of goods and services used in the development and provision of the final product. Output typically overstates the economic impacts as it counts all goods and services used in one stage of production as an input to later stages of production, hence counting their contribution more than once.
- **Gross product**: Refers to the value of output after deducting the cost of goods and services inputs in the production process. Gross product (e.g., Gross Regional Product) defines a true net economic contribution and is subsequently the preferred measure for assessing economic impacts.
- **Income**: Measures the level of wages and salaries paid to employees of the industry under consideration and to other industries benefiting from the project.
- **Employment**: Refers to the part-time and full-time employment positions generated by the economic shock, both directly and indirectly through flow-on activity, and is expressed in terms of full time equivalent (FTE) positions.

Input-Output multipliers can be derived from open (Type I) Input-Output models or closed (Type II) models. Open models show the direct effects of spending in a particular industry as well as the indirect or flow-on (industrial support) effects of additional activities undertaken by industries increasing their activity in response to the direct spending.

Closed models re-circulate the labour income earned as a result of the initial spending through other industry and commodity groups to estimate consumption induced effects (or impacts from increased household consumption).

MODEL DEVELOPMENT

Multipliers used in this assessment are derived from sub-regional transaction tables developed specifically for this project. The process of developing a sub-regional transaction table involves developing regional estimates of gross production and purchasing patterns based on a parent table, in this case, the 2018-19 Australian transaction table (ABS, 2021d).

Estimates of gross production (by industry) in the study areas were developed based on the percent contribution to employment (by place of work) of the study areas to the Australian economy (ABS, 2012; ABS, 2017; ABS, 2021e; DoESE, 2021), and applied to Australian gross output identified in the 2018-19 Australian table.

Industry purchasing patterns within the study area were estimated using a Flegg Location Quotient approach, as described in Flegg *et al*. (2021), with a fixed degree of convexity applied to the regional size scalar. Regional final demand estimates (except exports) developed based on the regional inter-industry sales estimated using the Flegg Location Quotient relative to national inter-industry sales and final demand estimates for each industry (noting regional exports are assumed to reflect the remainder of total uses).

Employment estimates were rebased from 2018-19 (as used in the Australian national Input-Output transaction tables) to current year values using the Wage Price Index (ABS, 2021f).

MODELLING ASSUMPTIONS

The key assumptions and limitations of Input-Output analysis include:

- **Lack of supply-side constraints**: The most significant limitation of economic impact analysis using Input-Output multipliers is the implicit assumption that the economy has no supply-side constraints so the supply of each good is perfectly elastic. That is, it is assumed that extra output can be produced in one area without taking resources away from other activities, thus overstating economic impacts. The actual impact is likely to be dependent on the extent to which the economy is operating at or near capacity.
- **Fixed prices**: Constraints on the availability of inputs, such as skilled labour, require prices to act as a rationing device. In assessments using Input-Output multipliers, where factors of production are assumed to be limitless, this rationing response is assumed not to occur. The system is in equilibrium at given prices, and prices are assumed to be unaffected by policy and any crowding out effects are not captured. This is not the case in an economic system subject to external influences.
- **Fixed ratios for intermediate inputs and production (linear production function)**: Economic impact analysis using Input-Output multipliers implicitly assumes that there is a fixed input structure in each industry and fixed ratios for production. That is, the input function is generally assumed linear and homogenous of degree one (which implies constant returns to scale and no substitution between inputs). As such, impact analysis using Input-Output multipliers can be seen to describe average effects, not marginal effects. For example, increased demand for a product is assumed to imply an equal increase in production for that product. In reality, however, it may be more efficient to increase imports or divert some exports to local consumption rather than increasing local production by the full amount. Further, it is assumed each commodity (or group of commodities) is supplied by a single industry or sector of production. This implies there is only one method used to produce each commodity and that each sector has only one primary output.
- **No allowance for economies of scope**: The total effect of carrying on several types of production is the sum of the separate effects. This rules out external economies and diseconomies and is known simply as the "additivity assumption". This generally does not reflect real world operations.
- **No allowance for purchasers' marginal responses to change**: Economic impact analysis using multipliers assumes that households consume goods and services in exact proportions to their initial budget shares. For example, the household budget share of some goods might increase as household income increases. This equally applies to industrial consumption of intermediate inputs and factors of production.
- **Absence of budget constraints**: Assessments of economic impacts using multipliers that consider consumption induced effects (type two multipliers) implicitly assume that household and government consumption is not subject to budget constraints.

Despite these limitations, Input-Output techniques provide a solid approach for taking account of the inter-relationships between the various sectors of the economy in the short-term and provide useful insight into the quantum of final demand for goods and services, both directly and indirectly, likely to be generated by a project.

In addition to the general limitations of Input-Output analysis, there are two other factors that need to be considered when assessing the outputs of sub-regional transaction table developed using the above approach, namely:

- It is assumed the sub-region has similar technology and demand/ consumption patterns as the parent (Australia) table (e.g., the ratio of employee compensation to employees for each industry is held constant).
- Intra-regional cross-industry purchasing patterns for a given sector vary from the national tables depending on the prominence of the sector in the regional economy compared to its input sectors. Typically, sectors that are more prominent in the region (compared to the national economy) will be assessed as purchasing a higher proportion of imports from input sectors than at the national level, and vice versa.
- The size of the regional economy is assumed to have an inverse relationship with the requirement to import goods/ services to meet its needs (i.e., the smaller the economy, in general the greater the reliance on imports).

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