empower
ECONOMICS

Museum Of Underwater Art
Economic Impact Assessment

Report prepared for:

townsville
enterprise

August 2017

Empower Economics are expert consultants providing select clients with an integrated service across the specialist areas of economics, strategic project evaluation and management and market research. We are a client centred team delivering nuanced services to business, industry and all three tiers of government. We offer seamless cross specialty service delivery to provide clients holistic and fully integrated solutions and outcomes.

Job ID: EMP:0035
Job Name:WCA MOUA EIA
Project Manager: David Lynch
Company: Townsville Enterprise
Job Contact: Patricia O'Callaghan
Document Name: 004_TEL_V1.0

Author

Author	Title	Date
David Lynch	Principal Economist	12/8

Revision History

Date	Revision Description	By
12/8	Version 1	DL
19/9	Version 2	DL

Distribution

Date	Version	Issued to
12/9	1	B Woods & P. Victory
20/9	2	P O'Callaghan, B Woods & P Victory

Disclaimer

Executive Summary

This report presents the findings an Economic Impact Assessment (EIA) of the Museum Of Underwater Art (MOUA) project.

Figure ES1: Strategic Location – Townsville Region

Located within the heart of the Great Barrier Reef, few regions are better placed to take advantage of Australia's resources and geography than Townsville North Queensland.

Directly linked to the Carpentaria Minerals province, the Galilee and Bowen Basins, the dominate force in the Townsville North Queensland economy has been the rise and fall of mining and the uncertainty confronting the industry.

Townsville North Queensland is going through a significant structural transition following a decade of unprecedented mining investment and activity. This transition has caused a prolonged period of slow to no growth, high unemployment and declining relative wealth and prosperity.

This transition has impacted the regions visitor performance, with its high dependence on business, inter and intraregional visitors and visitor friends and relatives.

The Museum of Underwater Art is a proposal based on the works of internationally recognised and acclaimed sculpture and underwater artist - Jason deCaires Taylor. Taylor has gained worldwide recognition for his work in developing underwater sculpture parks and arts museums. These works recognise the fragility of the marine environment and mankind's impact on it. They have the added advantage of creating artificial structures to improve habitat and divert pressure away from natural reef environments. They are also popular visitor attractions, promoting increased economic opportunities for the people of their host regions.

In July 2017, Taylor travelled to Townsville to scope out the potential for a "Museum of Underwater Art" within the Great Barrier Reef. The concept being proposed is for a series of four integrated installations themed around the Great Barrier Reef marine environment.

- ❖ **Reef Symbiosis -** The Strand Townsville – A proposed intertidal piece of significance for all to engage with along Townsville's marine promenade
- ❖ **Reef Science & Stewardship -** Magnetic Island – An inter tidal experience at Geoffrey Bay that identifies with the scientific stewardship of the Reef – that connects with the MI snorkel trail
- ❖ **Reef Corroboree -** Palm Island – An underwater installation that connects with the cultural story of the People, Reef, Stewardship, Corroboree, Land and Sea
- ❖ **Reef Futures -** John Brewer Reef – An underwater Museum of scale that identifies the balance of the reef, climate change and our role in protection

The initial planned Investment requirement is $3,000,000.00 over two years from 2018. A Public Private Partnership investment model is proposed and is currently being sought with initial funding of;

- Corporate and Community: $1,500,000.00
- State Government: $1,500,000.00

The MOUA proponents have estimated that once established, the MOUA will attract an additional 50,000 visitors per annum. This EIA is based on this assumption. It assesses the MOUA's development and on-going (Operational) tourism economic impacts for the Townsville SA4 region.

Based on an investment of $3,000,000.00 it is estimated that the MOUA would during its development:

- Generate $5,965,000.00 in output
- Create employment for 26 people (16 directly), most in the creative arts industry
- Generate $1,317,000.00 in wages and salaries
- Add $2,759,000.00 to gross regional product

But it's the flow on tourism impacts that are most remarkable. Based on the regions current visitor profile, 50,000 additional visitors would result in an additional 25,000 domestic day trippers, 109,080 domestic and international visitor nights and $22,551,440.00 in visitor expenditure. Based on this expenditure, it is estimated that the operation of the MOUA will recurrently:

- Generate $42,119,000.00 in output
- Create employment for 182 (119 directly) people mostly within tourism and conservation
- Generate $10,594,000.00 in wages and salaries annually
- Add $20,073,000.00 to gross regional product

An important component of this proposal is the incorporation of Palm Island into the development. "**Reef Corroboree"** will connect with the cultural story of the Palm Island - The People, Reef, Stewardship, Corroboree, Land and Sea. It will also create employment, training and cultural education opportunities for the people of Palm Island – a community plagued by high unemployment and social disadvantage.

In addition to these economic impacts, the MOUA will draw attention to the plight of the world's oceans and coral reefs and educate visitors and residents on the role of reefs and the threats that confront them. It will also provide the opportunity for Townsville preeminent marine science research and education institutes to study coral foundation and development within the modern marine environment.

Contents

1. Introduction:

This report presents an Economic Impact Assessment (EIA) of the Museum Of Underwater Art (MOUA) project. This EIA provides analysis of the economic importance of the development to the Townsville North Queensland economy in terms of output, value added, incomes and employment.

1.1 Background

Figure 1: Strategic Location – Townsville Region

Located within the heart of the Great Barrier Reef, few regions are better placed to take advantage of Australia's resources and geography than Townsville North Queensland.

Firmly connected to Australia's traditional economic drivers, with specific advantages in public administration (Defence), mining, agriculture, manufacturing and the education sectors, the Townsville North Queensland region is considered Australia's most diverse regional centre, acting as the unofficial capital of the north.

Directly linked to the Carpentaria Minerals province, the Galilee and Bowen Basins, the dominate force in the Townsville North Queensland economy has been the rise and fall of mining and the uncertainty confronting the industry.

Townsville North Queensland is going through a significant structural transition following a decade of unprecedented mining investment and activity.

This transition has caused a prolonged period of slow to no growth, high unemployment and declining relative wealth and prosperity. As the mining boom cooled and the Australian $ settled, the region has looked to transition to advantages within the services (tertiary) sector.

Poor regional economic conditions have impacted visitor performance, with its high dependence on business, inter and intraregional visitors and visitor friends and relatives. To improve tourism product and performance, a consortium of community, environmental and business leaders are scoping the potential of developing a "Museum of Underwater Art" within the Great Barrier Reef.

The MOUA is based on the works of internationally acclaimed sculpture and underwater artist - Jason deCaires Taylor. Taylor has gained worldwide recognition for his work in developing underwater sculpture parks and arts museums. These works recognise the fragility of the marine environment and mankind's impact on it. They have the added advantage of creating artificial structures to improve habitat and divert pressure away from natural reef environments. They are also popular visitor attractions, promoting increased economic opportunities for the people of their host regions.

Townsville Enterprise has commissioned Empower Economics to analyse the economic impact of the MOUA. This report presents the findings of this analysis.

1.2 Sources of Information

Information has been used from the following sources:

- ABS Sample Survey Data
- ABS Census Data
- Australian Government Department of Employment Small Area Labour Market Data
- Queensland Regional Database
- Tourism and Events Queensland
- Tourism Research Australia
- Sealink Queensland

1.3 Form and Methodology

- Section 1: Introduction and Background to the report
- Section 2: Townsville North Queensland – Demographic and Economic Overview
- Section 3: Museum of Underwater Art Overview
- Section 4: Economic Impact Assessment of MOUA
- Section 5 Conclusion

1.4 Input-Output Modelling

Input-Output (IO) modelling is used to estimate the Museum of Underwater Art contribution to the Townsville SA4 economy in terms of output, value added, employment generated and wages and salaries paid. This approach assumes there are no resource constraints. For example, it is assumed that the project will not draw labour from other businesses and there are limitless goods and services to supply the operation. IO modelling is useful to identify the unconstrained potential benefits (demand) of an operation and provides a clear understanding of the direct and indirect impacts associated with its operation.

2 Townsville North Queensland – Demographic and Economic Overview

2.1 Townsville North Queensland – Demographic Overview

Figure 2: Townsville SA4
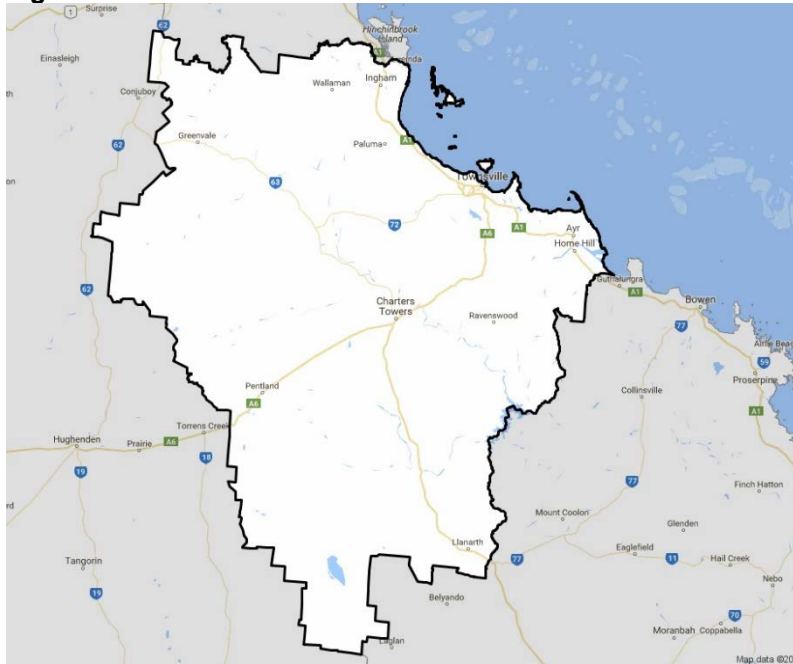
Source: Map Build. Empower Economics

Covering an area of 80,268.9 km², or 4.6 percent of the land area of Queensland, Townsville SA4 incorporates the Local Government Areas (LGA) of Townsville, Burdekin, Charters Towers, Hinchinbrook and Palm Island.

As at 30 June 2016, Townsville SA4 had a population of 235,037 with average annual growth of 1.5 percent over the preceding decade and 0.9 percent over the five years to June 2016. This growth was 0.4 and 0.7 percent less respectively than the average for Queensland over the corresponding period.

During 2015/16 the Townsville SA4 population growth declined to 0.3 percent, ¼ of that experienced by Queensland for the same period. Estimated Resident Population (ERP), for the decade through to June 2016, is outlined within Table 1 below.

**Table 1: Estimated Resident Population – Townsville SA4 by LGA and Queensland**

SA4/LGA/State	As at 30 June				Average annual growth rate		
	2006	2011	2015	2016p	2006–2016p	2011–2016p	2015-20
	— number —				— % —		
Townsville SA4	202,542	224,678	234,303	235,037	1.5	0.9	0.3
Townsville LGA	159,519	180,186	190,726	192,113	1.9	1.3	0.7
Burdekin LGA	17,451	17,775	17,568	17,313	-0.1	-0.5	-1.5
Charters Towers LGA	11,729	12,434	12,237	12,074	0.3	-0.6	-1.3
Hinchinbrook LGA	11,810	11,817	11,207	10,990	-0.7	-1.4	-1.9
Palm Island LGA	2,070	2,538	2,569	2,602	2.3	0.5	1.3
Queensland	4,007,992	4,476,778	4,784,367	4,848,877	1.9	1.6	1.3

Source: ABS 3218.0, *Regional Population Growth, Australia, various editions*

Of note is the relative impact and importance of the Townsville LGA to population and population growth within the Townsville SA4 region. The Townsville LGA accounts for 81.7 percent of the resident population of the region and 100.3 percent of the Townsville SA4 population growth for the decade through to 2016. Palm Island, at an average of 2.3 percent per annum, experienced strong population growth for the decade through to 2016, while the remaining LGA's collectively experienced average annual population decline of 0.15 percent.

The ERP growth for Townsville SA4 and Queensland is illustrated in Figure 3 below. After 5 years of above Queensland average growth, Townsville SA4 has experienced relatively low and declining average annual grow for the five years to June 2016.

Figure 3: Estimated Resident Population Growth - Townsville SA4 and Queensland
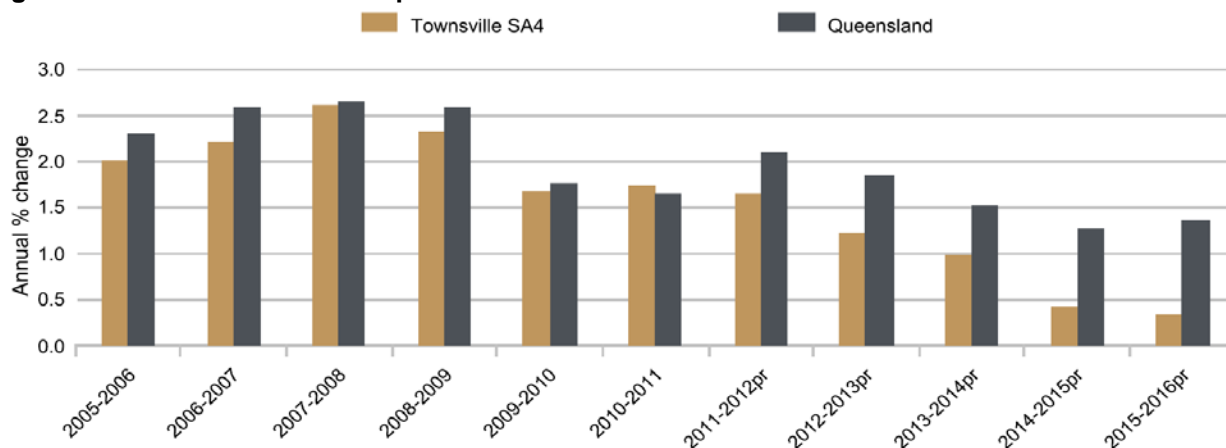
Source: ABS 3218.0, *Regional Population Growth, Australia, Various Editions*

Table 2 outlines the median age for Townsville SA4 by LGA and Queensland as at 30 June 2016. Townsville SA4 had a median age of 35.1 years. This is 1.9 years younger than Queensland's average age and represents an increase of 1.2 years from median age of 33.9 years as at 30 June 2006. Of note is the relatively younger age of Palm Island (24.6) and older age of Ayr, Charters Towers and Ingham (44.2).

Table 2: Median Age, Townsville SA4 by LGA and Queensland

SA4 / LGA / State	As at 30 June			Change
	2006	2011	2016p	2006–2016p
	— years —			Years
Townsville SA4	33.9	34.4	35.1	1.2
Palm Island LGA	22.5	24.3	24.6	2.1
Ayr-Charters Towers-Ingham[1]	39.9	41.4	44.2	4.3
Townsville LGA	32.8	33.2	33.8	1.0
Queensland	36.1	36.6	37.0	1.0

Source: ABS 3235.0, *Population by Age and Sex, Regions of Australia* data and Queensland Treasury estimates unpublished

Table 3 outlines births and deaths for Townsville SA4 by LGA and Queensland for calendar year 2015.

Table 3: Registered Births and Deaths, Townsville SA4 by LGA and Queensland 2015

SA4 / LGA / State	Births		Deaths		Natural Increase
	Number	Rate[a]	Number	Rate[a]	Number
Townsville SA4	3,349	14.1	1,439	6.0	1910
Palm Island (S)	72	27.0	14	5.2	58
Ayr-Charters Towers-Ingham	469	11.3	390	9.4	79
Townsville (C)	2,808	14.5	1,035	5.3	1,773
Queensland	61,745	12.9	29,782	6.2	31,963

Source: ABS 3301.0 Births Australia 2015; ABS 3302.0 Deaths Australia 2015. QRSIS. (a) Crude rate per 1,000 persons.

With a birth rate of 14.1 people per 1,000 persons and a death rate of 6.0 people per 1,000 persons, Townsville SA4's natural rate of population growth, at 8.1 persons per 1,000 persons, is 1.4 people per 1,000

---

[1] **Ayr – Charters Towers - Ingham comprises the three Local Government Areas (LGA) of Burdekin, Charters Towers and Hinchinbrook.**

persons higher than that recorded for Queensland (6.7 persons per 1,000). With a birth rate of 27.0 and death rate of 5.2 people per 1,000 persons, Palm Island has the highest natural rate of population growth of 21.8 people per 1,000 persons per annum.

Table 4 presents population projections for Townsville SA4 by LGA and Queensland through to 2036.

Table 4: Projected Population, Townsville SA4 by LGA and Queensland

SA4 / LGA / State	As at 30 June						Average annual growth
	2011	2016	2021	2026	2031	2036	2011–2036
	— number —						%
Townsville SA4	224,678	244,003	264,438	286,875	310,179	333,833	1.6
Palm Island (S)	2,538	2,668	2,794	2,927	3,057	3,184	0.9
Ayr-Charters Towers-Ingham	42,026	41,977	42,000	42,076	42,107	42,057	0.0
Townsville (C)	180,186	199,428	219,713	241,942	265,085	288,663	1.9
Queensland	4,476,778	4,853,048	5,250,292	5,730,062	6,240,546	6,763,153	1.7

Source: *Queensland Government Population Projections*, 2015 edition (medium series)

The resident population of the Townsville SA4 region is projected to be 333,833 persons as at 30 June 2036. This represents an average increase of 1.6 percent per annum over 25 years, with most growth forecast for Townsville LGA.

Table 5 outlines Indigenous Status for Townsville SA4 by LGA and Queensland as at Census 2016.

Table 5: Indigenous Status, Townsville SA4 by LGA and Queensland

LGA / State	As at 30 June					Non-indigenous	
	Aboriginal	Torres Strait Islander	Both	Total	%	- Number -	%
	- Number -			Number			
Townsville SA4	13,665	2,134	2,209	18,008	7.9	194,657	85.0
Palm Island (S)	1,892	27	380	2,298	93.9	115	4.9
Ayr-Charters Towers-Ingham	2,181	206	275	2,667	6.7	34,000	85.4
Townsville (C)	9,591	1,894	1,549	13,040	7.0	165,539	86.0
Queensland	122,896	20,094	12,834	155,824	3.6	3,955,707	91.2

Source: ABS. Census of Population 2016. Indigenous Profile. Usual Residence. GSO

At 7.9 percent of the population, Townsville SA4 has more than twice the ratio of Queensland residents identifying as being indigenous (Aboriginal and/or Torres Strait Islander). Administered as an Aboriginal Shire Council, Palm Island has the highest proportion of residents identifying as Indigenous at 93.9 percent.

Table 6 presents unemployment and labour force for Townsville SA4 by LGA and Queensland as at the March Quarter 2017.

Table 6: Unemployment and labour force, Townsville SA4 by LGA and Queensland, March 2017

LGA / Queensland	Unemployed	Labour force	Unemployment rate
	— number —		%
Townsville SA4	12,572	111,262	11.3
Palm Island (S)	473	857	55.2
Ayr-Charters Towers-Ingham	2,042	17,661	11.6
Townsville (C)	10,060	92,780	10.8
Queensland	156,627	2,506,666	6.2

Source: Australian Government Department of Employment, *Small Area Labour Markets Australia*, various editions

At 11.3 percent, Townsville SA4's unemployment rate was 5.1 percent higher than that recorded for Queensland (6.2%) for the March quarter. Save and accept for Palm Island, with an unemployment rate of 55.2 percent, the unemployment rate across the Townsville SA4 region was reasonably consistent.

Table 7 below provides selected median and average measures from the 2016 Census for Townsville SA4 by LGA and Queensland.

Table 7: Select medians/averages, Townsville SA4 by LGA and Queensland, 2016

	Median / Average					
	Median mortgage repayment	Median total family income	Median total household income	Median total personal income	Average household size	Average number of persons per bedroom
	$/month	$/week	$/week	$/week	persons	number
Townsville SA4	1,668	1,640	1,362	672	2.5	0.8
Palm Island (S)	0	927	1,119	303	4.3	1.5
Ayr-Charters Towers-Ingham	1,300	1,387	1,088	559	2.4	0.8
Townsville (C)	1,733	1,705	1,424	703	2.6	0.8
Queensland	1,733	1,453	1,235	587	2.6	1.1

Source: ABS, Census of Population and Housing, 2016, General Community Profile - B02

On average, Townsville SA4 residents/households receive more income and have lower median monthly mortgage repayments than Queensland residents/households. This result is significantly influenced by Townsville (C) income levels. Palm Island recorded significantly lower levels of income and higher average household sizes.

Table 8 presents the index of relative socio-economic disadvantage for Townsville SA4 by LGA and Queensland.

Table 8: Population by Index of Relative Socio-Economic Disadvantage, 2011

LGA/State	Quintile 1 (most disadvantaged)	Quintile 2	Quintile 3	Quintile 4	Quintile 5 (least disadvantaged)
	— % —				
Townsville SA4	18.6	29.6	19.3	13.8	18.7
Palm Island (S)	100.00	0.0	0.0	0.0	0.0
Ayr-Charters Towers-Ingham	35.8	37.0	18.7	6.5	1.9
Townsville (C)	13.3	28.2	19.7	15.8	23.0
Queensland	20.0	20.0	20.0	20.0	20.0

Source: ABS 2033.0.55.001, *Census of Population and Housing: Socio-Economic Indexes for Areas (SEIFA), Australia - Data only, 2011*, (Queensland Treasury derived)

Socio-Economic Indexes for Areas (SEIFA) is a measure of the social and economic conditions of geographic areas across Australia. The index focuses on low-income earners, relatively lower education attainment, high unemployment and dwellings without motor vehicles. Low index values represent areas of most disadvantage and high values represent areas of least disadvantage.

With 100 percent of Palm Island residents falling within the most disadvantaged quintile, Palm Island is considered highly disadvantaged in socio-economic terms. With 72.8 percent of its residents falling within the disadvantaged quintiles (1 & 2), Ayr – Charters Towers – Ingham is considered disadvantaged in socio-economic terms.

2.2 Townsville North Queensland – Economic Overview

As at December 2016, the Gross Regional Product for Townsville SA4 is calculated at $14,169.614 million as outlined in Table 9.

Table 9: Gross Regional Product – Townsville SA4, December 2016

GRP Expenditure Method	$M
Household Consumption	$10,576.514
Government Consumption	$3,202.032
Private Gross Fixed Capital Expenditure	$3,980.665
Public Gross Fixed Capital Expenditure	$847.920
Gross Regional Expenses	**$18,607.130**
plus Regional Exports	$7,351.329
minus Domestic Imports	-$9,487.243
minus Overseas Imports	-$2,301.601
Gross Regional Product	**$14,169.614**

Source: Empower Economics

Figure 4 illustrates gross revenue (Output) by industry sector for Townsville SA4. Total output for Townsville SA4, as at December 2016, is estimated at $28,856.63 million.

Figure 4: Industry Output ($m) – Townsville SA4, December 2016
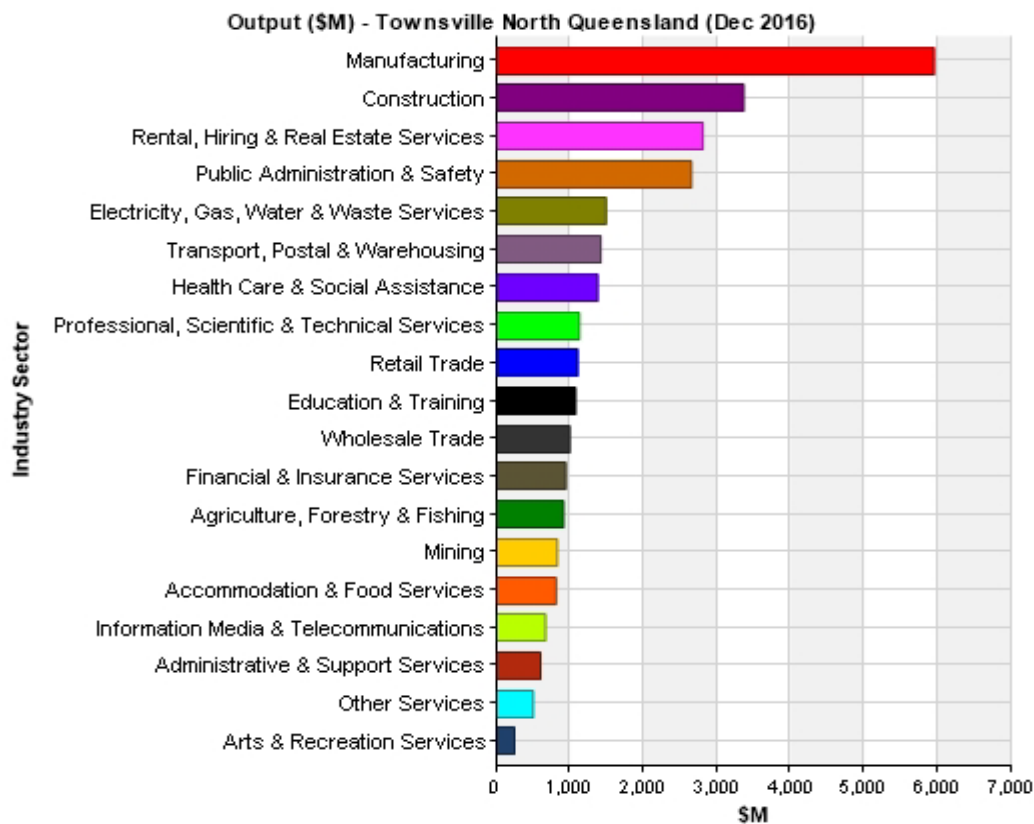
Source: Empower Economics

Table 10 provides a breakdown of the distribution of Output by LGA for Townsville SA4.
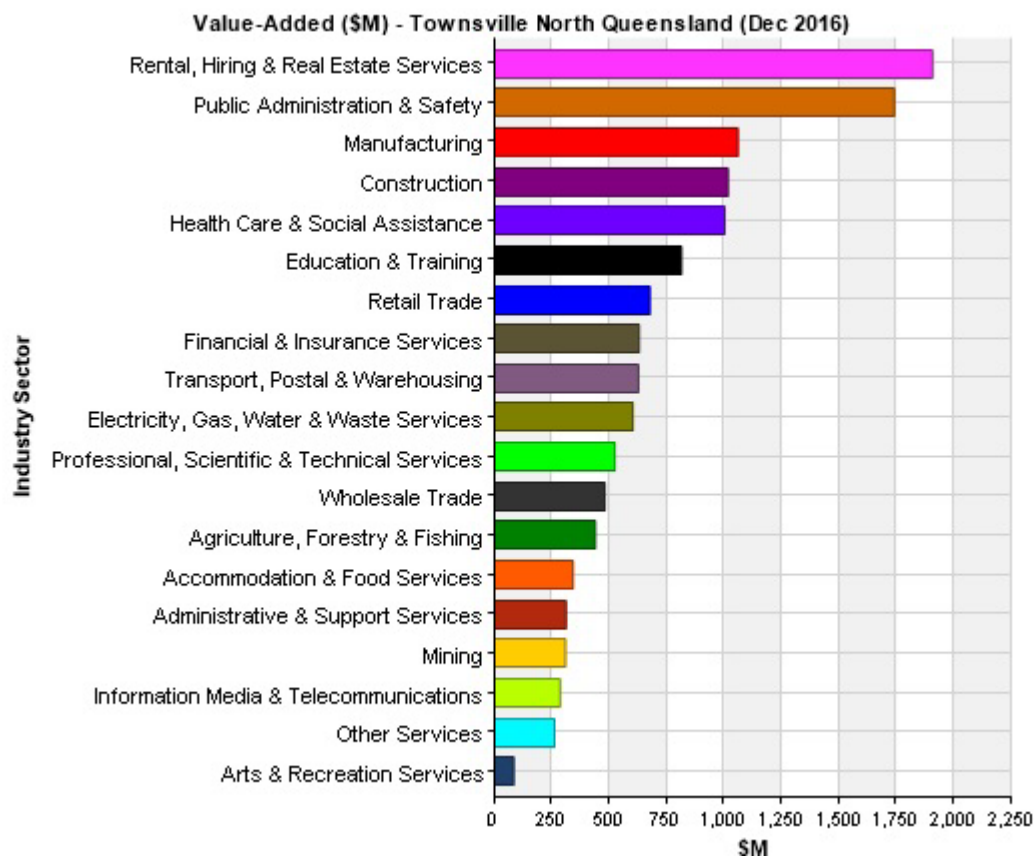
Table 10: Distribution of Output – Townsville SA4

LGA	$M	%
Townsville	$23,721.41	82.2 %
Burdekin	$2,349.93	8.1 %
Charters Towers	$1,392.01	4.8 %
Hinchinbrook	$1,270.19	4.4 %
Palm Island	$123.09	0.4 %
Total	$28,856.63	100 %

Source: Empower Economics

Figure 5 illustrates value-added to intermediate inputs by industry sector for Townsville SA4. Total value-added for Townsville SA4 is estimated $13,110.724 million.

Figure 5: Industry Value-Added ($m) – Townsville SA4, December 2016

Source: Empower Economics

Table 11 provides a breakdown of the distribution of value-added by LGA for Townsville SA4.

Table 11: Distribution of Value-Added – Townsville SA4

LGA	$M	%
Townsville	$10,991.917	83.8 %
Burdekin	$941.81	7.2 %
Charters Towers	$572.99	4.4 %
Hinchinbrook	$531.599	4.1 %
Palm Island	$72.408	0.6 %
Total	$13,110.724	100 %

Source: Empower Economics

Figure 6 shows the number of employees by industry sector, whose place of work is located within Townsville SA4. The total employment estimate for Townsville SA4 is 87,537 jobs.

Figure 6: Employment by Industry Sector - Townsville SA4 December 2016
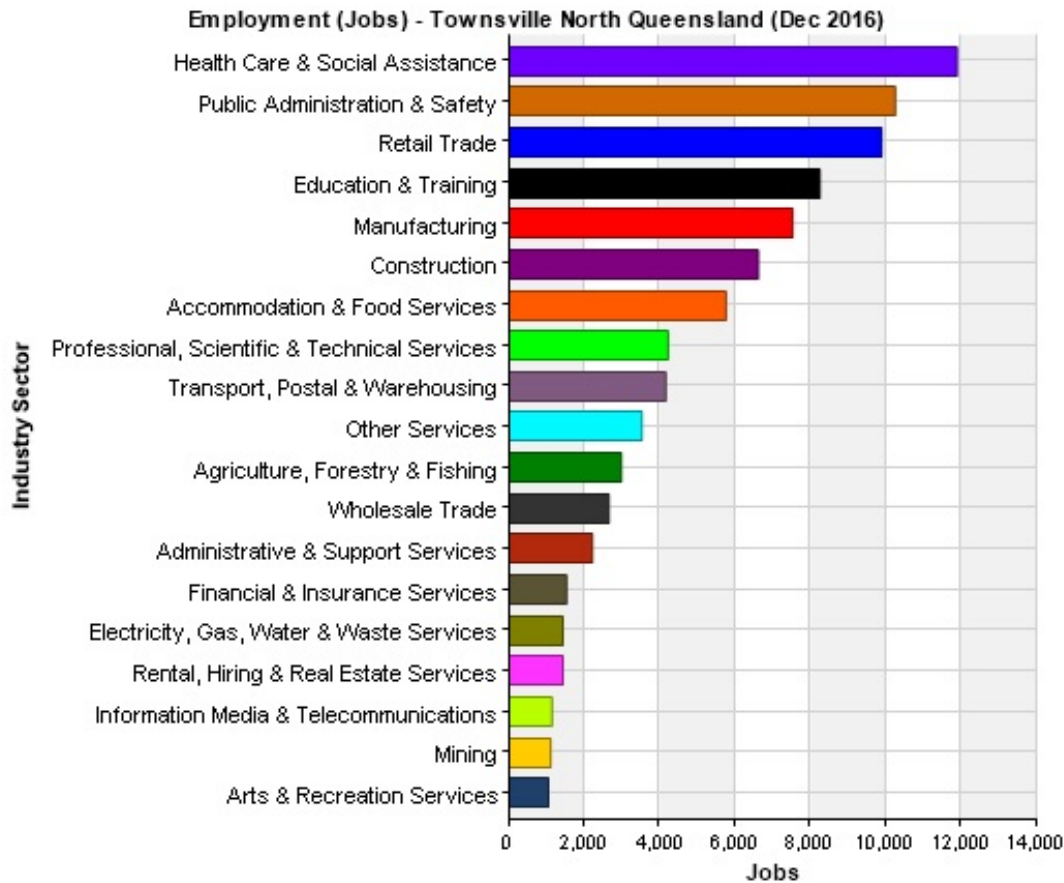
Source: Empower Economics

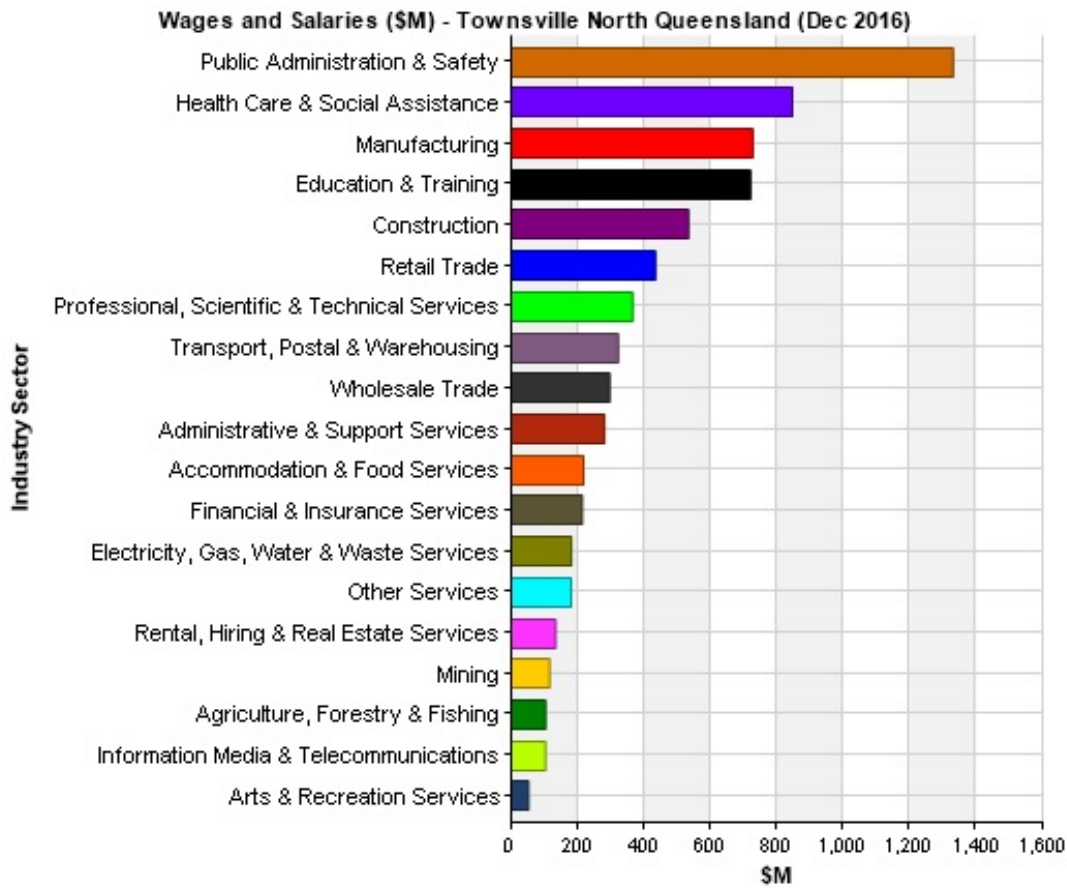Table 12 provides a breakdown of the distribution of Employment by LGA for the Townsville SA4.

Table 12: Distribution of Employment – Townsville SA4

LGA	Jobs	%
Townsville	71,034	81.1 %
Burdekin	7,186	8.2 %
Charters Towers	4,338	5.0 %
Hinchinbrook	4,366	5.0 %
Palm Island	613	0.7 %
Total	87,537	100 %

Source: Empower Economics

Figure 7 outlines wages and salaries paid for people employed within the Townsville SA4 area. Total wages and salaries paid for the year ending December 2016 is estimated at $7,153.56 million.

Figure 7: Wages and Salaries Paid by Industry Sector - Townsville SA4 Year Ending December 2016

Source: Empower Economics

Table 13 provides a breakdown of the distribution of wages and salaries paid by LGA for the Townsville SA4.

Table 13: Distribution of Wages and Salaries by LGA – Townsville SA4

LGA	$M	%
Townsville	$5,976.08	83.5 %
Burdekin	$500.35	7.0 %
Charters Towers	$313.28	4.4 %
Hinchinbrook	$306.49	4.3 %
Palm Island	$57.36	0.8 %
Total	$7,153.56	100 %

Source: Empower Economics

2.2.1 Tourism Sector:

Tourism is an amalgam of activities across various industry sectors such as Accommodation and Food Services, Retail and Transport Services. By using Tourism Expenditure Survey data, we can model the impacts of the sector on the Townsville SA4 economy in terms of output, employment, wages and salaries and value-add. Table 14 presents these impacts for the Townsville SA4 region for the year to December 2016.

Table 14: Economic Impacts – Townsville SA4 Tourism Sector December 2016.

Economic Impact	Contribution	% of Total Contribution	Sector Ranking of 19
Output	$1,240,835,000	4.3%	8th
Employment	6,478 Jobs	7.5%	7th
Wages and Salaries Paid	$343,370,000	4.8%	9th
Value-added	$589,983,000	4.5%	11th

Source: Empower Economics

In the year ending December 2016, the tourism sector generated $1,241 million in output (Gross Revenue), directly and indirectly employed 6,478 people, earnt $343.4 million in wages and salaries and contributed $576.9 million in value-added to the Townsville SA4 economy.

Table 15 below presents Townsville SA4's visitor profile for the year ended March 2017.

Table 15: Visitor Profile Townsville SA4 Year Ended March 2017

Visitor Type	Visitors (#)	Visitor Days	Average Length of Stay (Days)	Expenditure ($M)
Domestic Overnight	1,115,000	3,846,000	3.5	$757.7
Annual %	-8.9%	-9.0%	0.0%	-11.8%
Domestic Day	1,244,000	1,244,000	1	$215.3
Annual %	6.6%	6.6%	0%	0.2%
International	130,000	1,532,000	11.8	$88.4
Annual %	6.1%	-7.8%	-1.8%	-16.9%
Total	2,489,000	6,622,000	2.7	$1,061.4

Source: Townsville Regional Snapshot, Year Ending March 2017, Tourism and Events Queensland. Empower Economics

In the year to March 2017, Townsville SA4 had 2,489,000 visitors, staying a combined 6,622,000 days and expending a total of $1,061,400,000. This represents a year-on-year decline of 0.4 percent in visitors, 5.5 percent decline in visitor days and 8.9 percent decline in expenditure (-$96.46 million).

In August 2015, Tourism Research Australia published the Tourism Satellite Account (TSA) for Queensland by tourism region. Key aggregates for the Northern (Townsville) Region from the TSA included:

- **Tourism Output:** $1,700 million
- **Gross Value-Added:** $700 million
- **Tourism Employment:** 9000

While caution must be exercised in comparing results across studies, models and time, it is evident from historical impact modeling and tourism visitor statistics that the contribution of Tourism to the Townsville North Queensland economy has declined.

3 Museum of Underwater Art Overview:

The Museum of Underwater Art is a proposal based on the works of internationally recognised and acclaimed sculpture and underwater artist - Jason deCaires Taylor.

A graduate of the London Institute of Arts, with a BA Honours in Sculpture, Jason deCaires Taylor is a sculptor, environmentalist and professional underwater photographer. His permanent site-specific works span several continents and predominately explore submerged and tidal marine environments. His multi-disciplinarily sculptural works explore modern themes of conservation and environmental activism; Over the past 10 years Taylor he has created several large-scale underwater "Museums" and "Sculpture Parks", with collections of over 850 life-size public works.

He gained international notoriety in 2006 with the creation of the world's first underwater sculpture park, situated off the west coast of Grenada in the West Indies. Now listed as one of the Top 25 Wonders of the World by National Geographic the park was instrumental in the government declaring the site a National Marine Protected Area. This was followed in 2009 when he co-founded MUSA (Museo Subacuático de Arte), a vast collection of over 500 of his sculptural works, installed between Cancun and Isla Mujeres in Mexico.
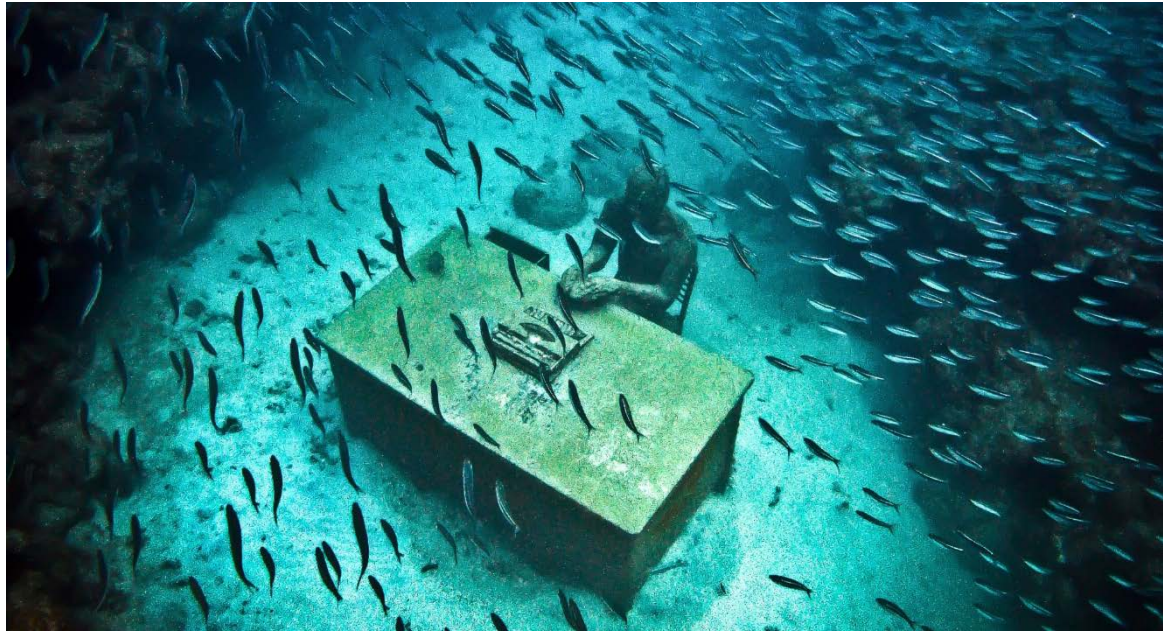
Other major projects include Museo Atlantico (2016), a collection of over 300 submerged sculptures and architectural forms in Lanzarote, Spain, the first of its kind in European waters. The Rising Tide (2016 Thames London) and Ocean Atlas a monumental 60-ton single sculpture located in the Bahamas.

In July 2017, Jason travelled to Townsville at the invitation of a group of community, environmental and business leaders, to scope out the potential for a "Museum of Underwater Art" within the Great Barrier Reef. The Concept being scoped is for a series of four integrated installations themed around the Great Barrier Reef marine environment;

❖ **Reef Symbiosis -** The Strand Townsville – A proposed intertidal piece of significance for all to engage with along Townsville's marine promenade
❖ **Reef Science & Stewardship -** Magnetic Island – An inter tidal experience at Geoffrey Bay that identifies with the scientific stewardship of the Reef – that connects with the MI snorkel trail
❖ **Reef Corroboree -** Palm Island – An underwater installation that connects with the cultural story of the People, Reef, Stewardship, Corroboree, Land and Sea
❖ **Reef Futures -** John Brewer Reef – An underwater Museum of scale that identifies the balance of the reef, climate change and our role in protection

It is proposed to establish and develop the MOUA as a Not-For-Profit Deductible Gift Recipient Organisation governed by a Board of Management.

The initial planned Investment requirement is $3,000,000.00 over two years from 2018. A Public Private Partnership investment model is proposed and is currently being sought with initial funding of:

- Corporate and Community: $1,500,000.00
- State Government: $1,500,000.00

The MOUA proponents have estimated that once fully established, the MOUA will attract an additional 50,000 visitors per annum. This Economic Impact Assessment is based on these assumptions.

4. Impact Assessment MOUA

This impact assessment is based on the MOUA's development and on-going (Operational) tourism economic impacts for the Townsville SA4 region. The MOUA potential social impacts are also considered.

4.1   MOUA Development Economic Impacts

As outlined in Section 3, an initial budget of $3,000,000.00 is proposed to develop the MOUA.

It is proposed that the MOUA be established and developed over a period of up to three years from 2018. During this period, Jason deCaires Taylor will reside and base his operations in Townsville North Queensland.

Sculpture design will be a collaborative process that will use and develop local artists and cultural advisors to ensure authenticity and ownership. Collaboration with Indigenous Traditional Owners and Palm Island Residents will be a feature of the development of the MOUA.

Sculptures are manufactured out of pH neutral concrete materials, which will be sourced locally.

Based on the process as outlined above, Table 16 reports the activity breakdown of capital expenditure used as input to the IO model. Activity is spread across: Heritage, Creative and Performing Arts; Heavy and Civil Engineering Construction; and Cement Manufacturing ANZSIC Codes.

Table 16: Expenditure Allocation by Input – MOUA Development

Input	Expenditure $
Public Administration and Regulatory Services	$50,000.00
Non-residential Property Operators	$75,000.00
Cement Manufacturing	$75,000.00
Heritage, Creative and Performing Arts	$1,800,000.00
Heavy and Civil Engineering Construction	$1,000,000.00
Total	*$3,000,000.00*

Table 17 outlines the impact on Gross Regional Product resulting from input expenditure of $3,000,000.00 as outlined in Table 16.

Table 17: Gross Regional Product Impact – MOUA Development.

GRP Expenditure Method	Before $M	Impact $M	Change %
Household Consumption	$10,576.514	$10,577.703	0.01 %
Government Consumption	$3,202.032	$3,202.840	0.03 %
Private Gross Fixed Capital Expenditure	$3,980.665	$3,981.487	0.02 %
Public Gross Fixed Capital Expenditure	$847.920	$848.201	0.03 %
Gross Regional Expenses	**$18,607.130**	**$18,610.232**	**0.02 %**
plus Regional Exports	$7,351.329	$7,351.789	0.01 %
minus Domestic Imports	-$9,487.243	-$9,487.016	0.01 %
minus Overseas Imports	-$2,301.601	-$2,301.885	0.01 %
balancing item	$0.000	-$0.253	
GRP	**$14,169.614**	**$14,172.373**	**0.02%**

Source: Empower Economics

Using this impact scenario, Gross Regional Product is estimated to increase by $2.759 million (0.01 %) to $14,172.373 million.

Contributing to this is a direct increase in output of $3.0 million, 16 additional jobs, $0.595 million in wages and salaries and a boost in value-added of $1.366 million.

From this direct expansion in the economy, flow-on industrial effects in terms of local purchases of goods and services are anticipated, and it is estimated that these indirect impacts would result in a further increase to output valued at $1.851 million, 6 more jobs, $0.463 million more paid in wages and salaries, and a gain of $0.768 million in terms of value-added.

The increase in direct and indirect output and the corresponding creation of jobs in the economy are expected to result in an increase in the wages and salaries paid to employees. A proportion of these wages and salaries are typically spent on consumption and a proportion of this expenditure will be captured in the local economy. The consumption effects under the scenario are expected to further boost output by $1.113 million, employment by 4 jobs, wages and salaries by $0.259 million, and value-added by $0.624 million.

In total, output is expected to rise by $5.965 million. Corresponding to this are anticipated increases in employment of 26 jobs, $1.317 million in wages and salaries, and $2.759 million in terms of value-added. These impacts are summarised in Table 18 below.

Table 18: Economic Impact Summary – MOUA Development

Economic Impact Summary Report				
Impact Summary	Direct Effect	Industrial Flow-on Effect	Consumption Flow-on Effect	Total
Output $m	3.0	1.851	1.113	5.965
Employment Jobs	16	6	4	26
Wages & Salaries $m	0.595	0.463	0.259	1.317
Value Added $m	1.366	0.768	0.624	2.759

Source: Empower Economics

4.2 MOUA - Operational Economic Impacts

This section outlines the economic impact of the operation of the MOUA resulting from the increased tourism visitation and expenditure within the Townsville SA4 region.

4.2.1 Modeling Assumptions

The following assumptions have been made in assessing the MOUA operational impacting on Townsville SA4 region:

A. Additional Visitors – Townsville North Queensland

The MOUA proponents have estimated that when fully operational, the MOUA will attract an additional 50,000 visitors per annum to the Townsville North Queensland Region.

B. Visitor Type Ratio

Based on Tourism and Events visitation data, the ratio of visitor types is as outlined in Table 19.

Table 19: Visitor Type Ratio - MOUA

Visitor Type	Visitors (#)	% of Total Visitors	# of MOUA Visitors
Domestic Day	1,244,000	50%	25,000
Domestic Overnight	1,115,000	44.8%	22,400
International	130,000	5.2%	2,600
Total	2,489,000	100%	50,000

C. Visitor Length of Stay and Trip Expenditure

Visitor Expenditure and Length of Stay are as outlined in Table 20.

Table 20: Visitor Profile Townsville Region

Visitor Profile	Domestic Day	Domestic Overnight	International
Average stay (nights)	-	3.5	11.8
Average spend per trip ($)	$164.00	$689.50	$1,156.40
Average spend per night ($)	-	$197	$98

Source: Tourism Research Australia (TRA) Visitor Surveys and Deloitte Access Economics' Regional TSA model.

D. Additional Annual Tourism Expenditure – Townsville North Queensland Region

Tables 19 and 20 have been used to estimate additional annual expenditure as outlined within Table 21.

Table 21: Annual Expenditure by Visitor Type – Townsville North Queensland Region

Visitor Type	Additional Annual Expenditure
Domestic Day	$4,100,000.00
Domestic Overnight	$15,444,800.00
International	$3,006,640.00
Total	$22,551,440.00

E. Distribution of Tourism Expenditure

Using ABS Tourism Satellite Account data, it is estimated that the distribution of Tourism expenditure is as outlined in Figure 8.

Figure 8: Distribution of each $1 spent by a tourist $ – Townsville North Queensland Region
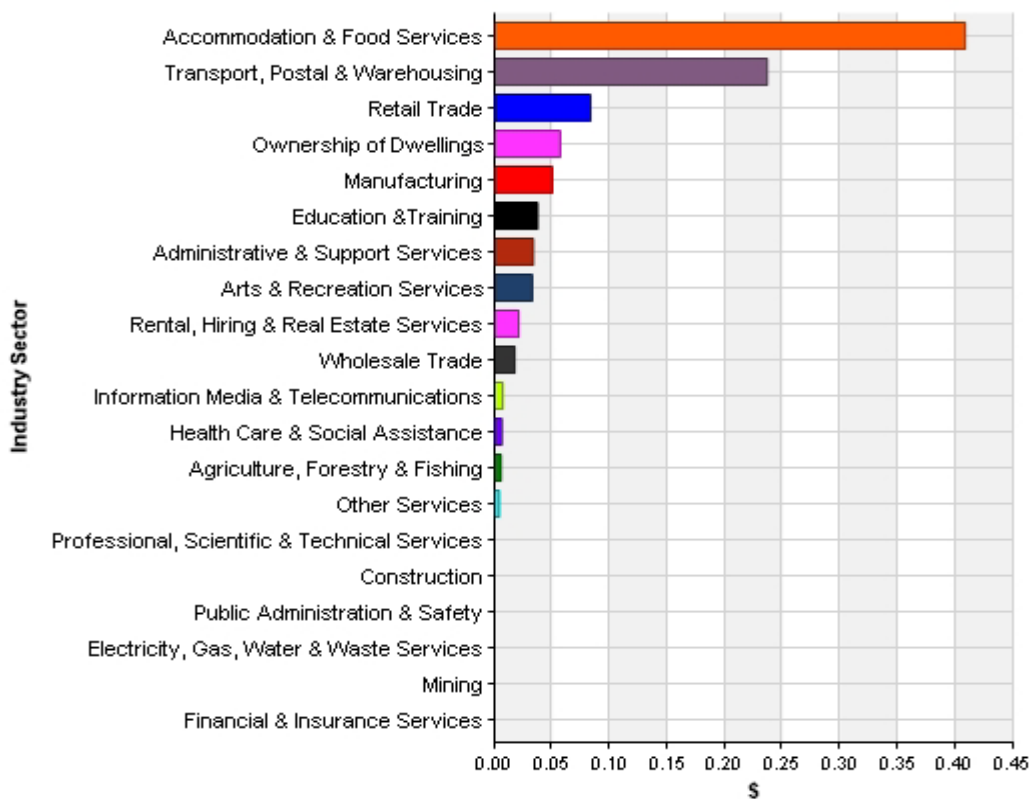
Based on the expenditure of $22.551 million, distributed as illustrated in Figure 8 above, Table 22 reports the breakdown of expenditure used as input to the IO model.

Table 22: Expenditure Allocation by Input – Tourism Expenditure - MOUA Operations

Input	Expenditure $M
Accommodation and Food Services	$9.201
Transport Services	$5.345
Retail Trade	$1.873
Ownership of Dwellings	$1.285
Manufacturing	$1.128
Education and Training	$0.856
Administrative & Support Services	$0.744
Arts and Recreational Services	$0.744
Rental & Hiring Services	$0.474
Wholesale Trade	$0.383
Information, Media and Telecommunications	$0.158
Health Care and Social Assistance	$0.135
Agriculture, Forestry and Fishing	$0.135
Other Services	$0.090
Total	*$22.551*

Based on annual tourism expenditure of $22.551 million as outlined in Table 22, Townsville SA4 Gross Regional Product is estimated to increase by $19.516 million (0.14 %) to $14,189.130 million as outlined in Table 23.

Table 23: Gross Regional Product Impact – MOUA Operations

GRP Expenditure Method	Before $M	Impact $M	Change %
Household Consumption	$10,576.514	$10,593.066	0.16 %
Government Consumption	$3,202.032	$3,203.843	0.06 %
Private Gross Fixed Capital Expenditure	$3,980.665	$3,981.880	0.03 %
Public Gross Fixed Capital Expenditure	$847.920	$848.170	0.02 %
Gross Regional Expenses	**$18,607.130**	**$18,626.958**	**0.11 %**
plus Regional Exports	$7,351.329	$7,358.787	0.10 %
minus Domestic Imports	-$9,487.243	-$9,492.956	0.06 %
minus Overseas Imports	-$2,301.601	-$2,304.921	0.14 %
balancing item	$0.000	$1.819	
GRP	**$14,169.614**	**$14,189.687**	**0.14%**

Source: Empower Economics

Contributing to this is a direct increase in output of $22.551 million, 119 additional jobs, $5.999 million more in wages and salaries and a boost in value-added of $10.473 million.

From this direct expansion in the economy, flow-on industrial effects in terms of local purchases of goods and services are anticipated, and it is estimated that these indirect impacts would result in a further increase to output valued at $10.615 million, 31 more jobs, $2.513 million more paid in wages and salaries, and a further gain of $4.581 million in terms of value-added.

The increase in direct and indirect output and the corresponding creation of jobs in the economy are expected to result in an increase in the wages and salaries paid to employees. A proportion of these wages and salaries are typically spent on consumption and a proportion of this expenditure will be captured in the local

economy. The consumption effects under the scenario are expected to further boost output by $8.953 million, employment 32 jobs, wages and salaries by $2.081 million, and value-added by $5.020 million.

In total, output (Gross Revenue) is expected to rise by $42.119 million. Corresponding to this are anticipated increases in employment of 182 jobs, $10.594 million in wages and salaries, and $20.073 million in terms of value-added. These impacts are summarised in Table 24 below.

Table 24: Economic Impact Summary – MOUA Operations

| Economic Impact Summary Report				
Impact Summary	Direct Effect	Industrial Flow-on Effect	Consumption Flow-on Effect	Total
Output $m	22.551	10.615	8.953	42.119
Employment Jobs	119	31	32	182
Wages & Salaries $m	5.999	2.513	2.081	10.594
Value Added $m	10.473	4.581	5.020	20.073

Source: Empower Economics

4.3   MOUA Social Impacts

This section considers the potential social impacts of the MOUA. These are considered under the broad headings of Reef Ecology, Indigenous Development and Research and Education.

4.3.1   Reef Ecology

Comprised of over 3000 individual reef systems and coral cays and literally hundreds of tropical islands, the Great Barrier Reef is recognised for its world heritage values as the largest living structure on the planet.
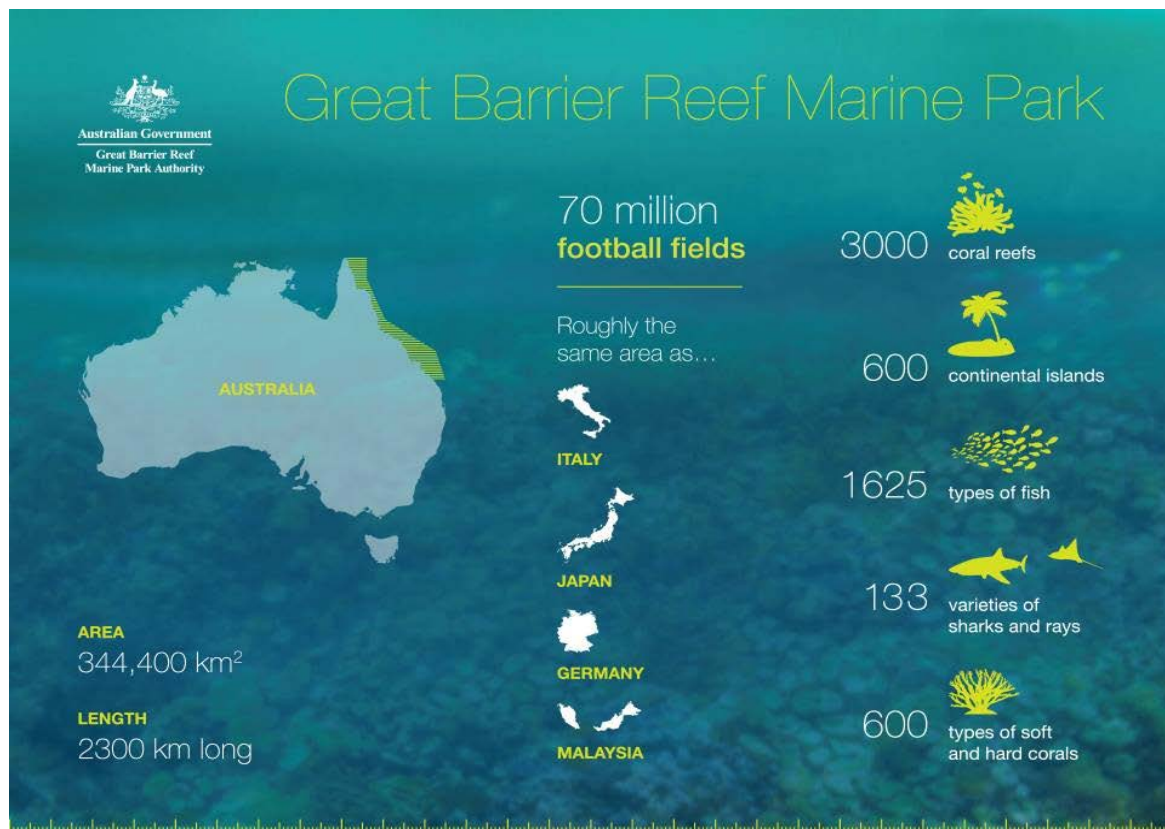
Source: Great Barrier Reef Marine Park Authority

From coastal development to climate change, the Reef is facing a range of human induced and natural threats. The actions to mitigate these are needed both locally and globally.

Jason deCaires Taylor's works span several continents and predominately explore submerged and tidal marine environments. His sculptures explore themes of conservation and environmental activism. A specific objective of the MOUA is to draw attention to the plight of the world's oceans and coral reefs and educate visitors and residents on the role of reefs and the threats that confront them.

4.3.2 Indigenous Culture and Development

At 7.9 percent, Townsville SA4 has more than twice Queensland's ratio of people identifying as Indigenous (Aboriginal and/or Torres Strait Islander). Palm Island is Australia's only indigenous island community living within the Great Barrier Reef Marine Park. With unemployment running at 55.2 percent; personal income less than half the regional weekly average and 100 percent of residents in the most disadvantaged quintile of the Australian Socio-Economic Indexes for Areas (SEIFA), the Palm Island Community is severely disadvantaged, in both social and economic terms.

While each site is proposed to connect with the local culture with an emphasis on environmental stewardship, the Palm Island site, "Reef Corroboree" will connect with the cultural story of the Traditional People, Reef, Stewardship, Corroboree, Land and Sea.

Together the sites will inform and educate thousands of residents and visitors and will provide economic and cultural development opportunities, and improve living standards, particularly for the community of Palm Island.

4.3.3 Research and Education

Townsville is home to Australia's preeminent marine science institutes including - the Great Barrier Reef Marine Park Authority (GBRMPA), Australian Institute of Marine Science (AIMS), James Cook University School of Marine Biology and the CRC for Coral Reef Studies.

Submerged sites (Palm Island and John Brewer Reef) will be selected downstream from existing reefs to capture coral spawning and nurture the growth of coral polyps.

Easily accessible to researchers and students, these sites will provide the ideal opportunity to study coral foundation and development within the modern marine environment.

5. Conclusion

Townsville North Queensland is going through a significant structural transition following a decade of unprecedented mining investment and activity. This transition has caused a prolonged period of slow to no growth, high unemployment and declining relative wealth and prosperity.

This transition has impacted the regions visitor performance, with its high dependence on business, inter and intraregional visitors and visitor friends and relatives.

The Museum of Underwater Art is a proposal based on the works of internationally recognised and acclaimed sculpture and underwater artist - Jason deCaires Taylor. Taylor has gained worldwide recognition for his work in developing underwater sculpture parks and arts museums. These works recognise the fragility of the marine environment and mankind's impact on it. They have the added advantage of creating artificial structures to improve habitat and divert pressure away from natural reef environments. They are also popular visitor attractions, promoting increased economic opportunities for the people of their host regions.

The MOUA is a $3 million proposal to be developed over 4 locations within the Great Barrier Reef. The MOUA would during its development:

- Generate $5,965,000.00 in output
- Create employment for 26 people (16 Directly), most in the creative arts industry
- Generate $1,317,000.00 in wages and salaries
- Add $2,759,000.00 to gross regional product

But it's the flow on tourism impacts that are most remarkable. The MOUA proponents have estimated that the development would increase tourism to the region by 50,000 visitors per annum. Given that this represent less than 1 percent of current annual visitors to the region, this appears conservative. Based on current visitor profiles, this increase would result in an additional 25,000 domestic day trippers, 109,080 domestic and international visitor nights and $22,551,440.00 in visitor expenditure. Based on this, it is estimated that the operation of the MOUA will recurrently:

- Generate $42,119,000.00 in output
- Create employment for 182 (119 Directly) people mostly within tourism and conservation
- Generate $10,594,000.00 in wages and salaries annually
- Add $20,073,000.00 to gross regional product

An important component of this proposal is the incorporation of Palm Island into the development. "**Reef Corroboree"** will connect with the cultural story of the Palm Island and Traditional Owner People, Reef, Stewardship, Corroboree, Land and Sea. It will also create employment, training and cultural education opportunities for the people of Palm Island – a community plagued by high unemployment and social disadvantage.

In addition to these economic impacts, the MOUA will draw attention to the plight of the world's oceans and coral reefs and educate visitors and residents on the role of reefs and the threats that confront them. It will also provide the opportunity for Townsville preeminent marine science research and education institutes to study coral foundation and development within the modern marine environment.

Appendix A: Input Output Model Assumptions

Empower Economics use Input Output (IO) modelling to measure changes resulting from economic impacts. The IO model used by Empower Economics is the REMPLAN Economic model.

Important assumptions in the practical application of input-output modelling include:

- Fixed production coefficients, which imply constant returns to scale; that is to say that if we wanted to double output of sector j, we would have to double all of its inputs with no evidence of scale economies;

- Regional performance matches State average performance;

- Model makes no consideration for change in technology over time. This needs to be considered in long-term forecasting;

- Homogeneity - where it is assumed that each industry sector produces a fixed set of products that are not produced by any other sector …while it is possible to have some overlap e.g. liquor sold in hotels (the Retail sector) and in cafes (the Accommodation and Food services sector) …such an assumption does not appear to be too far away from reality and should not inhibit the validity of the model to any great extent;

- No supply constraints and that the intermediate and household sectors will be able to service any increases in final demand. This assumption could weaken the predictive capacity of the model in those cases where increases in overall demand could bring about factor shortages and raise their prices in the short term.