

Draft : Environmental Impact Statement

Appendix D.9

Economic Analysis Feasibility Report

9
D
APPENDIX
APPENDIX
A



CAIRNS SHIPPING DEVELOPMENT EIS

Economic Analysis

W S Cummings
B Econ

38 Grafton St
(PO Box 2148)
Cairns Q 4870

phones
07 4031 2888
0418 871 011

fax
07 40311108

email
cummings@cummings.net.au
website

www.cummings.net.au

CUMMINGS ECONOMICS
ABN: 99 734 489 175

Ref: J2750

August 2014

Contents

	Pg
1.0 GENERAL	5
2.0 ECONOMIC IMPACT – CRUISE SHIPS	6
2.1 BACKGROUND.....	6
2.2 MEASURING ECONOMIC IMPACT	7
2.3 CRUISE SHIP VISITS	8
2.3.1 Projected increases in ship movements and ship days.....	8
2.3.2 Projected increases in passenger days	8
2.3.3 Projected crew days.....	9
2.4 PROJECTED ECONOMIC IMPACTS – CRUISE SHIP VISITS	12
2.4.1 Expenditure levels.....	12
2.4.2 Expenditure estimates	12
2.5 ANALYSIS	17
3.0 ECONOMIC EFFICIENCY/BENEFIT COST ANALYSIS,	18
CRUISE SHIP VISITS	18
3.1 GENERAL	18
3.2 CAPITAL COSTS	19
3.3 MAINTENANCE COSTS	19
3.4 DIRECT BENEFITS – MOVING FROM YORKEYS KNOB TO CAIRNS SEAPORT	20
3.4.1 General	20
3.4.2 Number of passengers getting off / not getting off / visiting city	20
3.4.3 Cost to passengers not leaving ship	21
3.4.4 Effects of weather.....	21
3.4.5 Shore transfer costs.....	21
3.4.6 Transfers to the city.....	22
3.4.7 Passengers on tours	22
3.4.8 Time costs	22
3.4.9 Crew impacts	23
3.4.10 Ship operating expenses	24
3.4.11 Benefits of improved fuel availability	24
3.5 ANALYSIS	25
4.0 POTENTIAL BENEFITS – HOME-PORTING CRUISE SHIPS	27
4.1 GENERAL	27
4.2 ADDITIONAL ECONOMIC IMPACT	28
4.3 ECONOMIC EFFICIENCY BENEFITS	30



5.0	WIDER BENEFITS TO QUEENSLAND & AUSTRALIA AS A CRUISE SHIP DESTINATION	31
5.1	GENERAL	31
5.2	TRANSIT PORT BENEFITS – QUEENSLAND & AUSTRALIA.....	31
5.3	TRANSIT PORT BENEFITS – PAPUA NEW GUINEA / PACIFIC COUNTRIES.....	32
6.0	BENEFIT COST ANALYSIS – NON-CRUISE SHIPPING.....	33
6.1	GENERAL	33
6.2	CARGO SHIPPING.....	33
6.3	NAVY	36
7.0	ECONOMIC IMPACT – CONSTRUCTION ACTIVITY.....	37
7.1	GENERAL	37
8.0	OVERALL ANALYSIS	39
8.1	GENERAL	39
8.2	ECONOMIC IMPACT – CRUISE SHIP VISITS.....	39
8.3	ECONOMIC EFFICIENCY (BENEFIT COST ANALYSIS) – CRUISE SHIP VISITS	39
8.4	HOME-PORTING	40
8.5	WIDER BENEFITS TO OTHER QUEENSLAND & AUSTRALIAN PORTS	40
8.6	NON CRUISE SHIPS.....	41
8.7	ECONOMIC IMPACT - CONSTRUCTION ACTIVITY.....	41
8.8	CAPITAL AND MAINTENANCE COSTS	41
8.9	CONCLUSIONS	42

Appendices

1: Technical Notes and Terms	45
2: List of References.....	46

Foreword

Cummings Economics was asked by Ports North through Arup and Kleinhardt Pty Ltd to provide economic analysis input into the development of an Environmental Impact Statement in relation to the proposed widening of the Cairns seaport channel and development of fuel facilities, especially to enable larger cruise ships to use the port.

The analysis is based mainly on likely demand identified in the “*Cairns Cruise Shipping Development Demand Study Update 2014 – Final*” report provided to Ports North by BMTWBM, and information gathering from relevant industry sources and other relevant reports.

List of references is given in [Appendix 2](#).

1.0 GENERAL

Assessment of public projects normally take place at two levels:

- a) Economic impact that involves analysis of the impact on the economy of a project including direct and 'flow-on' effects.
- b) For public projects where the operation under examination cannot recover the benefits produced, an economic efficiency / benefit cost analysis of direct and wider impacts.

Analysis only in terms of (a) is not accepted by Infrastructure Australia. It can lead to a higher priority being given to the least economically efficient projects. Infrastructure Australia requires benefit cost analysis that measures economic efficiency.

This report seeks to identify and quantify both types of approaches.

Section 2 looks at economic impacts of increased cruise ship activity.

Section 3 of the report sets out economic efficiency 'benefit cost' analysis of the project for cruise ships comparing the costs to passengers, ships and crew, of shore transfers at Yorkey's Knob compared with berthing at Trinity Wharf.

Home-porting of smaller cruise vessels is already taking place in Cairns. It is likely that over the project period, mega ships will be home-ported at Cairns. Section 4 looks at potential benefits in terms of economic impact and economic efficiency.

However Cairns seaport plays a very important role in Queensland's attractiveness as a cruise shipping destination and Section 5 examines likely wider benefits to other Queensland ports.

While the main impacts of the project will be on cruise shipping, there will be implications for other shipping using the port and this is assessed in Section 6.

Section 7 estimates economic impacts of construction expenditure.

Final Section 8 sets out an overall analysis.

It should be noted that this study relies especially on the Cairns Cruise Shipping Development – Demand Study 2012 and Update Report 2014, prepared by BMT WBM for projections of likely cruise shipping demand for the port of Cairns. Separate studies are being carried out in relation to environmental aspects and this analysis does not extend to consideration of any consequent economic implications should they exist.

2.0 ECONOMIC IMPACT – CRUISE SHIPS

2.1 BACKGROUND

Cairns has long been one of Australia’s leading ports for cruise ship activity. Apart from larger visiting cruise ships, smaller cruise vessels have operated from Cairns. This has meant that in total cruise ship movements including smaller cruise vessels, Cairns has, at times, been second in Australia only to Sydney in total cruise ship movements.

At present, there is one company home-ported in Cairns; the small adventure class Coral Princess Cruises that not only operate cruises out of Cairns but use Cairns as its corporate and maintenance base for cruises it also conducts in the Kimberley region and the Pacific Island areas.

Cruise ship classification used is as per the 2014 Demand Study Update, as follows:

Adventure class vessels.....	up to 100 pax
Boutique class vessels	200 - 500 pax
Mid-sized vessels	500 - 1,500 pax
Mega class vessels	2,000+ pax

Note: The small ‘Adventure class’ vessels will not be affected by the project and are not considered further in this analysis.

The most important developments in recent times have been in two directions:

- The growth of cruising in general in the Australian/Asia Pacific area, and
- The growth in the size of ships commonly used.

The 2014 Demand Study Update indicates recent growth in the Australasia area as high as 34% in one year and expects strong industry growth into the future.

However, more importantly for Cairns, of the 72 new cruise ships identified as being built during 2009–2018, 58 (81%) are of a size that would be unable to enter Cairns seaport at present and only 14 of a size that could enter Cairns seaport.

The 2014 Demand Study Update forecasts that, even without the project upgrading of the channel and provision of suitable fuel facilities, the proportion of cruise ship passengers visiting the area in ‘mega’ class ships will have risen from none in 2004 to an expected 50% in 2016.

At present, the only way that Cairns can service the larger ‘mega’ class ships of about 2,000 passengers or more is via transfer of passengers by tender to Yorkeys Knob and then coach transfer to Cairns city or on tour. The Yorkeys Knob transfer solution involves substantial costs and discomfort to passengers. Further details are given in Section 3.3.

Cairns is regarded by the cruise industry as having one of the best product offers in Australia including day tour availability and access to the CBD right next to the wharves.

However, the lack of access into the seaport by 'mega' sized cruise ships means that it will fail to capitalise on the benefits the expanding cruise industry offers unless the projected improvements take place.

2.2 MEASURING ECONOMIC IMPACT

Measuring economic impact of a project normally involves comparing the 'Project Case' (ie. assuming the project is undertaken) against a 'Base Case' (assuming that no action is taken and the current situation remains).

In this case the 'Project Case' involves widening and deepening the channel and swing basins as described in detail in other parts of the Environmental Impact Statement, provision of fuel facilities in the port suitable for cruise ships and some wharf improvements.

Economic benefits are measured in terms of the 'direct' expenditure generated in the economy (technically referred to as 'output') as a result of the project (the 'Project Case') compared with the 'Base Case'. Standard 'input/output' methodology is then used to identify estimated 'flow-on' effects through the economy including on final 'total value added' and employment.

'Total value added' impacts can in turn be related to 'Gross Regional Product' (GRP), which is a summation of 'value-added' by all economic entities in that region and net indirect taxation.

In some assessments of economic impact, further sophisticated modelling is undertaken to produce Computer Generated Equilibrium model (CGE) to take account of the ability of the economy to respond to the extra demand for factors of production (inputs), especially when large short term projects (eg. construction) are involved. The benefits from this project however are not large in relation to the economy involved and will take place over a period of time. This would enable expansion of production of inputs currently being supplied locally to take place avoiding a need for increased imports.

It is normal in measuring project impacts to establish a 'project period' for assessment of impacts. A 'project period' of base year plus 25 years has been selected for this project based on commencement of benefits in 2016 and extending through to 2041.

It is also standard methodology to assume that benefits into the future are not as valuable as benefits in the present and to 'discount' future impacts at a 'discount rate' to establish a 'Net Present Value' of impacts. A 'discount rate' can be likened to an interest rate. For this project, a discount rate of 4% 'real' is used, ie. the equivalent of 7% 'nominal' assuming an inflation rate of 3% per annum. In the final analysis, results are tested at 7% 'real' (10% 'nominal') and 10% 'real' (13% 'nominal'). (See Technical Note [Appendix 1](#) re treatment of inflation.)

2.3 CRUISE SHIP VISITS

2.3.1 Projected increases in ship movements and ship days

The 2014 Demand Study Update provides projected ship movements in three classes of Mega, Mid-sized and Boutique for 2016, 2021 and 2026. There is a need to project these forward to 2041. Following discussion with Ports North, they are conservatively projected forward at half the growth rate shown in the 2014 Demand Study Update between 2021-2026 except for those off Yorkeys Knob that showed a decline 2021-2026. It is conservatively assumed in this case, that the number would remain static 2026-2041.

Some of the ships will stay for more than one day. Analysis of information available to Ports North indicates the following pattern of average days in port for ships coming into Trinity Wharf.

	<u>Av days per visit</u>
Boutique class vessels	1.70
Mid-sized vessels	1.35
Mega class vessels	1.50

The Mega class ships anchoring off Yorkeys Knob will only stay one day.

Tables #1 and #2 record projected ship visits and ship port days for Base and Project Cases.

2.3.2 Projected increases in passenger days

Information available to Ports North indicates the following average number of passengers for the different classes of ships.

	<u>Av no. passengers</u>
Boutique class vessels	360
Mid-sized vessels	811
Mega class vessels	2,260

It is assumed that the average passenger numbers on Mega class ships will increase and based on the 2012 Demand Study, it is estimated that by 2041, the average number on mega ships will be 15% higher than in 2016, ie. the average will be 2,600 by 2041.

It is estimated from industry information, that for ships berthing at Trinity Wharf, 95% of passengers will disembark, but that at Yorkeys Knob, an average of only 75% will disembark.

Tables #1 and #2 give estimates of passenger days generated for the 'Base Case' and 'Project Case' and passenger days ashore.

2.3.3 Projected crew days

Number of crew on ships varies with size and class. Larger ships will tend to have a lower ship's operations (deck) crew requirement per passenger and higher class vessels will tend to have a higher ratio of service (hotel) crew per passenger.

Industry information indicates that ratios of crew to passengers appropriate to Cairns is on average as follows.

	<u>Crew / passengers ratio</u>
Boutique class vessels	0.67
Mid-sized vessels	0.50
Mega class vessels	0.38

For ships berthing at Trinity Wharf, it is estimated that 60% of crew will go ashore.

For ships anchoring off Yorkeys Knob, it is assumed that virtually no crew go ashore on leave.

Tables #1 and #2 give estimated crew shore days.

Table #1: 'Base Case' – Projections : Medium Projection : No change

FY	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	
Ship Visits (No.)																											
Boutique	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Mid	27	28	29	31	32	34	35	36	37	38	39	40	40	41	41	42	42	43	43	44	44	44	45	46	46	47	47
Mega	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	35	36	37	39	40	42	43	44	45	46	47	48	48	49	49	50	50	51	51	52	52	53	54	54	55	55	
Mega (Yorkeys Knob)	32	32	33	33	34	34	34	33	33	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	
Ship Visits Days (No.)																											
Boutique	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14
Mid	36	38	39	42	43	46	47	49	50	51	53	54	54	55	55	57	57	58	58	59	59	59	61	63	62	64	63
Mega	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	50	51	53	55	57	60	61	62	64	65	66	68	68	69	69	70	70	72	72	73	73	74	76	76	78	77	
Mega (Yorkeys Knob)	32	32	33	33	34	34	34	33	33	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	
Pax Port Days ('000)																											
Boutique	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Mid	30	31	32	34	35	37	38	39	41	42	43	44	44	45	45	46	46	47	47	48	48	49	49	51	50	52	51
Mega	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	34	36	37	39	40	42	43	44	45	47	48	49	49	50	50	51	51	52	52	53	53	54	56	55	57	56	
Mega (Yorkeys Knob)	72	73	76	76	79	79	80	78	78	76	76	77	77	78	78	79	79	80	80	80	81	81	82	82	83	83	
Pax Port Days ('000) Ashore																											
Boutique (x.95)	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Mid (x.95)	28	29	30	32	33	35	36	37	38	40	41	42	42	43	43	44	44	45	45	46	46	47	48	48	49	49	
Mega (x.95)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total	33	34	35	37	38	40	41	42	43	44	45	46	46	47	47	48	48	49	49	50	50	51	53	52	54	54	
Mega (Yorkeys Knob) (x.75)	54	54	57	57	59	59	60	58	58	57	57	58	58	58	59	59	60	60	60	61	61	61	62	62	62	62	
Crew Port Days ('000)																											
Boutique	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Mid	9	9	10	10	11	11	11	12	12	12	13	13	13	13	13	14	14	14	14	14	14	15	15	15	16	15	
Mega	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total	11	11	11	12	12	13	13	14	14	14	15	15	15	15	15	16	16	16	16	16	16	17	17	17	18	17	
Mega (Yorkeys Knob)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	



Table #2: 'Project Case' – Projections (Channel, Wharf & HFO) : Medium Projection

FY	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	
Ship Visits (No.)																											
Boutique	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Mid	27	28	30	31	33	34	35	36	37	38	39	40	40	41	41	42	42	43	43	44	44	45	46	46	47	47	47
Mega	34	37	40	44	48	52	54	56	58	60	63	64	66	67	68	70	71	72	74	75	77	78	80	81	83	85	85
	69	73	78	83	89	94	97	100	103	106	110	112	114	116	117	120	121	123	125	127	129	131	134	135	138	140	
Ship Visits Days (No.)																											
Boutique	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14
Mid	36	38	41	42	45	46	47	49	50	51	53	54	54	55	55	57	57	58	58	59	59	61	62	62	63	63	63
Mega	51	56	60	66	72	78	81	84	87	90	95	96	99	101	102	105	107	108	111	113	116	117	120	122	125	128	128
	101	107	114	121	130	138	142	146	151	155	161	164	167	169	171	175	177	180	183	186	189	191	196	197	202	205	
Pax Port Days ('000)																											
Boutique	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Mid	30	31	33	34	36	37	38	39	41	42	43	44	44	45	45	46	46	47	47	48	48	49	50	50	51	51	51
Mega	115	126	137	152	166	181	190	197	205	214	226	230	240	244	249	258	263	269	278	282	292	297	307	312	321	332	332
	150	162	175	191	207	223	233	242	251	261	273	279	288	294	299	309	314	321	329	335	345	351	362	368	378	388	
Pax Port Days ('000) Ashore																											
Boutique (x.95)	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Mid (x.95)	28	29	31	32	34	35	36	37	38	40	41	42	42	43	43	44	44	45	45	46	46	47	48	48	49	49	49
Mega (x.95)	109	120	131	144	158	172	180	188	195	203	215	219	228	232	236	245	250	255	264	268	278	282	292	297	305	315	315
	142	153	166	181	197	212	221	230	238	248	260	265	274	279	284	294	298	305	313	319	328	334	344	349	359	368	
Crew Port Days ('000)																											
Boutique	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Mid	9	9	10	10	11	11	11	12	12	12	13	13	13	13	13	14	14	14	14	14	14	15	15	15	15	15	15
Mega	26	29	31	35	38	41	43	45	47	49	51	53	55	56	57	59	60	61	63	64	67	68	70	71	73	76	76
	37	40	43	47	51	54	57	59	61	63	66	68	70	71	72	75	76	77	79	81	83	85	87	88	91	93	



2.4 PROJECTED ECONOMIC IMPACTS – CRUISE SHIP VISITS

2.4.1 Expenditure levels

There are three types of expenditure generated.

- 1) By the cruise vessels themselves;
- 2) By passengers;
- 3) By crew.

Industry information available from the previous 2012 Demand Study, when adjusted for inflation, gives estimated average expenditure rate by cruise vessels themselves as follows.

	<u>Est 2016</u>
Boutique class vessels	\$35,000
Mid-sized vessels	\$63,000
Mega class vessels	\$180,000
(Yorkeys Knob).....	(\$87,000)

Note: These rates have been checked against average port day expenditure for cruise ships given as \$41,600 in the AEC report, "Economic Impact Assessment of the Cruise Shipping Industry in Australia 2012-13" for Cruise Down Under, August 2013. This figure reconciles with use of the above estimates for actual cruise ship visits in 2013 and at 2013 values.

Latest information about passenger expenditure comes from the AEC report as follows for Cairns and Yorkeys Knob in 2012/13.

Because of shorter time ashore, it is estimated that expenditure per passenger day is lower at 78% for those coming ashore at Trinity Wharf.

	<u>2013</u>	<u>Est 2016</u>
Per passenger day	\$202	\$220
(Yorkeys Knob).....	(\$158)	(\$172)
Per crew port day	\$71	\$78

2.4.2 Expenditure estimates

The above figures are applied to Tables #1 and #2 to provide in **Table #3** and **Table #4** estimates of expenditure generated and in **Table #5** the increase in expenditure generated of the 'Project Case' over the 'Base Case'.

The following tables calculate expenditure generated (output) at 2016 prices and calculates increases for the 'Project Case' over 'Base Case'.

Table #5 also renders the increase in expenditure generated (output) into current year values at an inflation rate of 3% per annum. The table then renders the current year values into Net Present Values 2016 at a 7% (nominal) discount rate.

Table #3: 'Base Case' – Projections : Medium Projection : No change : Expenditure Generated / Output Values

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	
Ship Visits (No.)																											
Boutique	\$0.28	\$0.28	\$0.28	\$0.28	\$0.28	\$0.28	\$0.28	\$0.28	\$0.28	\$0.28	\$0.28	\$0.28	\$0.28	\$0.28	\$0.28	\$0.28	\$0.28	\$0.28	\$0.28	\$0.28	\$0.28	\$0.28	\$0.28	\$0.28	\$0.28	\$0.28	\$0.28
Mid	\$1.70	\$1.76	\$1.83	\$1.95	\$2.02	\$2.14	\$2.21	\$2.27	\$2.33	\$2.39	\$2.46	\$2.52	\$2.52	\$2.58	\$2.58	\$2.65	\$2.65	\$2.71	\$2.71	\$2.77	\$2.77	\$2.84	\$2.84	\$2.90	\$2.90	\$2.99	\$2.96
Mega (Yorkeys Knob)	\$2.78	\$2.78	\$2.87	\$2.87	\$2.96	\$2.96	\$2.96	\$2.87	\$2.87	\$2.78	\$2.78	\$2.78	\$2.78	\$2.78	\$2.78	\$2.78	\$2.78	\$2.78	\$2.78	\$2.78	\$2.78	\$2.78	\$2.78	\$2.78	\$2.78	\$2.78	\$2.78
Total	\$4.77	\$4.83	\$4.98	\$5.10	\$5.25	\$5.38	\$5.44	\$5.42	\$5.48	\$5.46	\$5.52	\$5.58	\$5.58	\$5.65	\$5.65	\$5.71	\$5.71	\$5.77	\$5.77	\$5.84	\$5.84	\$5.90	\$5.99	\$5.96	\$5.96	\$6.05	\$6.03
Pax Port Days ('000)																											
Boutique	\$1.02	\$1.02	\$1.02	\$1.02	\$1.02	\$1.02	\$1.02	\$1.02	\$1.02	\$1.02	\$1.02	\$1.02	\$1.02	\$1.02	\$1.02	\$1.02	\$1.02	\$1.02	\$1.02	\$1.02	\$1.02	\$1.02	\$1.02	\$1.02	\$1.02	\$1.02	\$1.02
Mid	\$6.18	\$6.41	\$6.64	\$7.09	\$7.32	\$7.78	\$8.01	\$8.24	\$8.47	\$8.70	\$8.92	\$9.15	\$9.15	\$9.38	\$9.38	\$9.61	\$9.61	\$9.84	\$9.84	\$10.07	\$10.07	\$10.30	\$10.62	\$10.53	\$10.86	\$10.75	
Mega (Yorkeys Knob)	\$9.33	\$9.37	\$9.75	\$9.79	\$10.13	\$10.18	\$10.26	\$10.00	\$10.05	\$9.82	\$9.87	\$9.91	\$9.99	\$10.03	\$10.07	\$10.15	\$10.20	\$10.28	\$10.32	\$10.36	\$10.44	\$10.49	\$10.57	\$10.61	\$10.65	\$10.73	
Total	\$16.53	\$16.80	\$17.41	\$17.91	\$18.48	\$18.98	\$19.30	\$19.26	\$19.54	\$19.54	\$19.81	\$20.08	\$20.17	\$20.44	\$20.48	\$20.79	\$20.83	\$21.14	\$21.18	\$21.45	\$21.54	\$21.81	\$22.21	\$22.16	\$22.53	\$22.51	
Crew Port Days ('000)																											
Boutique	\$0.15	\$0.15	\$0.15	\$0.15	\$0.15	\$0.15	\$0.15	\$0.15	\$0.15	\$0.15	\$0.15	\$0.15	\$0.15	\$0.15	\$0.15	\$0.15	\$0.15	\$0.15	\$0.15	\$0.15	\$0.15	\$0.15	\$0.15	\$0.15	\$0.15	\$0.15	\$0.15
Mid	\$0.67	\$0.70	\$0.72	\$0.77	\$0.80	\$0.85	\$0.87	\$0.90	\$0.92	\$0.95	\$0.97	\$1.00	\$1.00	\$1.02	\$1.02	\$1.05	\$1.05	\$1.07	\$1.07	\$1.10	\$1.10	\$1.12	\$1.16	\$1.15	\$1.18	\$1.17	
Mega (Yorkeys Knob)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	\$0.82	\$0.85	\$0.87	\$0.92	\$0.95	\$1.00	\$1.02	\$1.05	\$1.07	\$1.10	\$1.12	\$1.15	\$1.15	\$1.17	\$1.17	\$1.20	\$1.20	\$1.22	\$1.22	\$1.25	\$1.25	\$1.27	\$1.31	\$1.30	\$1.33	\$1.32	
Overall Total	\$22.12	\$22.48	\$23.26	\$23.94	\$24.68	\$25.36	\$25.76	\$25.73	\$26.09	\$26.10	\$26.46	\$26.82	\$26.90	\$27.26	\$27.30	\$27.70	\$27.74	\$28.14	\$28.18	\$28.54	\$28.62	\$28.98	\$29.51	\$29.42	\$29.92	\$29.86	



Table #4: 'Project Case' – Projections (Channel, Wharf & HFO) : Medium Projection – Expenditure Generated / Output Values

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	
Ship Visits (No.)																											
Boutique \$35,000	\$0.28	\$0.28	\$0.28	\$0.28	\$0.28	\$0.28	\$0.28	\$0.28	\$0.28	\$0.28	\$0.28	\$0.28	\$0.28	\$0.28	\$0.28	\$0.28	\$0.28	\$0.28	\$0.28	\$0.28	\$0.28	\$0.28	\$0.28	\$0.28	\$0.28	\$0.28	\$0.28
Mid \$63,000	\$1.70	\$1.76	\$1.89	\$1.95	\$2.08	\$2.14	\$2.21	\$2.27	\$2.33	\$2.39	\$2.46	\$2.52	\$2.52	\$2.58	\$2.58	\$2.65	\$2.65	\$2.71	\$2.71	\$2.77	\$2.77	\$2.84	\$2.90	\$2.90	\$2.96	\$2.96	\$2.96
Mega \$180,000	\$6.12	\$6.66	\$7.20	\$7.92	\$8.64	\$9.36	\$9.72	\$10.08	\$10.44	\$10.80	\$11.34	\$11.52	\$11.88	\$12.06	\$12.24	\$12.60	\$12.78	\$12.96	\$13.32	\$13.50	\$13.86	\$14.04	\$14.40	\$14.58	\$14.94	\$15.30	\$15.30
Total	\$08.10	\$08.70	\$09.37	\$10.15	\$11.00	\$11.78	\$12.21	\$12.63	\$13.05	\$13.47	\$14.08	\$14.32	\$14.68	\$14.92	\$15.10	\$15.53	\$15.71	\$15.95	\$16.31	\$16.55	\$16.91	\$17.16	\$17.58	\$17.76	\$18.18	\$18.54	\$18.54
Pax Port Days ('000)																											
Boutique \$220,000	\$1.02	\$1.02	\$1.02	\$1.02	\$1.02	\$1.02	\$1.02	\$1.02	\$1.02	\$1.02	\$1.02	\$1.02	\$1.02	\$1.02	\$1.02	\$1.02	\$1.02	\$1.02	\$1.02	\$1.02	\$1.02	\$1.02	\$1.02	\$1.02	\$1.02	\$1.02	\$1.02
Mid \$220,000	\$6.18	\$6.41	\$6.86	\$7.09	\$7.55	\$7.78	\$8.01	\$8.24	\$8.47	\$8.70	\$8.92	\$9.15	\$9.15	\$9.38	\$9.38	\$9.61	\$9.61	\$9.84	\$9.84	\$10.07	\$10.07	\$10.30	\$10.53	\$10.53	\$10.75	\$10.75	
Mega \$220,000	\$24.09	\$26.33	\$28.72	\$31.73	\$34.76	\$37.82	\$39.61	\$41.26	\$42.91	\$44.77	\$47.20	\$48.15	\$50.07	\$51.04	\$52.02	\$53.98	\$54.98	\$56.20	\$58.00	\$59.02	\$61.07	\$62.11	\$64.20	\$65.26	\$67.13	\$69.28	\$69.28
Total	\$31.29	\$33.76	\$36.60	\$39.84	\$43.34	\$46.62	\$48.65	\$50.52	\$52.40	\$54.49	\$57.15	\$58.33	\$60.25	\$61.45	\$62.42	\$64.62	\$65.61	\$67.07	\$68.86	\$70.11	\$72.16	\$73.43	\$75.75	\$76.81	\$78.91	\$81.06	\$81.06
Crew Port Days ('000)																											
Boutique \$78,000	\$0.15	\$0.15	\$0.15	\$0.15	\$0.15	\$0.15	\$0.15	\$0.15	\$0.15	\$0.15	\$0.15	\$0.15	\$0.15	\$0.15	\$0.15	\$0.15	\$0.15	\$0.15	\$0.15	\$0.15	\$0.15	\$0.15	\$0.15	\$0.15	\$0.15	\$0.15	\$0.15
Mid \$78,000	\$0.69	\$0.72	\$0.77	\$0.79	\$0.85	\$0.87	\$0.90	\$0.92	\$0.95	\$0.97	\$1.00	\$1.02	\$1.02	\$1.05	\$1.05	\$1.08	\$1.08	\$1.10	\$1.10	\$1.13	\$1.13	\$1.15	\$1.18	\$1.18	\$1.20	\$1.20	\$1.20
Mega \$78,000	\$2.05	\$2.24	\$2.44	\$2.70	\$2.96	\$3.22	\$3.37	\$3.51	\$3.65	\$3.81	\$4.02	\$4.10	\$4.26	\$4.34	\$4.43	\$4.59	\$4.68	\$4.78	\$4.94	\$5.02	\$5.20	\$5.29	\$5.46	\$5.55	\$5.71	\$5.90	\$5.90
Total	\$2.90	\$3.11	\$3.37	\$3.65	\$3.96	\$4.24	\$4.42	\$4.59	\$4.75	\$4.94	\$5.17	\$5.28	\$5.44	\$5.55	\$5.63	\$5.82	\$5.91	\$6.04	\$6.19	\$6.30	\$6.48	\$6.59	\$6.80	\$6.89	\$7.07	\$7.25	\$7.25
Overall Total	\$42.29	\$45.58	\$49.34	\$53.64	\$58.29	\$62.65	\$65.27	\$67.73	\$70.21	\$72.90	\$76.40	\$77.93	\$80.37	\$81.92	\$83.15	\$85.97	\$87.23	\$89.05	\$91.36	\$92.96	\$95.55	\$97.18	\$100.13	\$101.45	\$104.16	\$106.86	\$106.86



Table #5: 'Project Case' – Calculation of Increases in Expenditure Generated / Output Values

	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	
Output 2016 Values																											
Base Case	\$22.12	\$22.48	\$23.26	\$23.94	\$24.68	\$25.36	\$25.76	\$25.73	\$26.09	\$26.10	\$26.46	\$26.82	\$26.90	\$27.26	\$27.30	\$27.70	\$27.74	\$28.14	\$28.18	\$28.54	\$28.62	\$28.98	\$29.51	\$29.42	\$29.92	\$29.86	
Project Case	\$42.29	\$45.58	\$49.34	\$53.64	\$58.29	\$62.65	\$65.27	\$67.73	\$70.21	\$72.90	\$76.40	\$77.93	\$80.37	\$81.92	\$83.15	\$85.97	\$87.23	\$89.05	\$91.36	\$92.96	\$95.55	\$97.18	\$100.13	\$101.45	\$104.16	\$106.86	
3% inflation	1.00	1.03	1.06	1.09	1.13	1.16	1.19	1.23	1.27	1.30	1.34	1.38	1.43	1.47	1.51	1.56	1.60	1.65	1.70	1.75	1.81	1.86	1.92	1.97	2.03	2.09	
Output Current Year Values																											
Inflation 3% pa																											
Base Case	\$22.12	\$23.15	\$24.68	\$26.15	\$27.78	\$29.40	\$30.76	\$31.65	\$33.05	\$34.05	\$35.56	\$37.12	\$38.35	\$40.03	\$41.29	\$43.15	\$44.51	\$46.51	\$47.97	\$50.04	\$51.69	\$53.91	\$56.54	\$58.06	\$60.82	\$62.52	
Project Case	\$42.29	\$46.94	\$52.35	\$58.62	\$65.61	\$72.63	\$77.94	\$83.30	\$88.93	\$95.11	\$102.67	\$107.87	\$114.58	\$120.30	\$125.78	\$133.93	\$139.97	\$147.19	\$155.53	\$163.01	\$172.58	\$180.78	\$191.85	\$200.23	\$211.74	\$223.73	
Discount .93	1.000	0.930	0.865	0.804	0.748	0.696	0.647	0.602	0.560	0.520	0.484	0.450	0.419	0.389	0.362	0.337	0.313	0.291	0.271	0.252	0.234	0.218	0.203	0.188	0.175	0.163	
Output Current Year Values - Increase																											
Project Case	\$20.17	\$23.79	\$27.67	\$32.46	\$37.83	\$43.23	\$47.18	\$51.65	\$55.88	\$61.06	\$67.12	\$70.75	\$76.23	\$80.27	\$84.49	\$90.78	\$95.46	\$100.69	\$107.56	\$112.97	\$120.89	\$126.87	\$135.31	\$142.17	\$150.92	\$161.21	
Discount	1.000	0.930	0.865	0.804	0.748	0.696	0.647	0.602	0.560	0.520	0.484	0.450	0.419	0.389	0.362	0.337	0.313	0.291	0.271	0.252	0.234	0.218	0.203	0.188	0.175	0.163	
Output Current Year Values % Increase																											
Project Case	\$20.17	\$22.13	\$23.93	\$26.11	\$28.30	\$30.08	\$30.52	\$31.08	\$31.27	\$31.78	\$32.48	\$31.84	\$31.91	\$31.25	\$30.59	\$30.57	\$29.89	\$29.32	\$29.13	\$28.45	\$28.32	\$27.64	\$27.41	\$26.79	\$26.44	\$26.27	
Total																											
																											\$743.67

Based on the above expenditure parameters, the following increased economic impacts have been calculated.

The following **Table 6** applies ratios of output to the value added and employment derived from economic modelling carried out for BMT WBM in the 2012 Demand Study. The employment to output ratios are from those of the Demand Study modified to take account of inflation at 3% per annum over 2026 to 2041.

Table #6: Summary of Additional Economic Impacts

	2016	2021	2026	2031	2036	2041
ADDITIONAL IMPACT – Current Year Values						
Output \$m	20.2	43.2	67.1	90.8	120.9	161.2
Total value added \$m	18.3	39.1	60.8	82.1	109.4	146.1
Employment						
Direct	109	219	292	353	406	424
Flow-on	64	132	175	212	244	256
Total employment	173	351	467	565	650	680

2.5 ANALYSIS

The AEC report estimated that total expenditure generated by cruise ships in 2012/13 was \$11.6 million.

However the sector is growing rapidly and even with no action to improve the port, based on the 2014 Demand Study Update, expenditure generated is expected to more than double by 2021 to \$29 million (in nominated year values including 3% inflation) and increase again in the following five years to \$36 million.

Based on the assumptions about growth in Section 2.3, the dredging of the channel and other improvements has the potential to cause the following increases in output and employment by 2026 and 2041.

Table #7: Estimated Increases in Output and Employment, 2026 & 2041⁽¹⁾			
		With project	(No action)
Output	2026	\$103 m	(\$36 m)
	2041	\$224 m	(\$63 m)
Employment	2026	718	(251)
	2041	946	(266)
Increase in output over no action	2026	\$67 m	
	2041	\$161 m	
Increase in employment over no action	2026	467	
	2041	680	

⁽¹⁾ Note: Nominated year values.

Net Present Value (NPV) of the increased benefits in terms of value added over a period (2016 to 2041) is estimated as follows (discount rate 7% 'nominal' / 4% 'real'):

	<u>2016 Values</u>	<u>2014 Values</u>
NPV Increased Output	\$744 m	\$701 m
NPV Increased Total Value Added	\$673 m	\$634 m

Thus, over the 25 years from 2016, additional passenger crew and other expenditure generated through transit visits as a result of the project, is estimated to add some \$634 million in value to the regional economy in current 2014 dollars, ie. an average of about \$24 million per annum and result in about 680 more jobs by 2041.

3.0 ECONOMIC EFFICIENCY/BENEFIT COST ANALYSIS, CRUISE SHIP VISITS

3.1 GENERAL

The following benefit cost analysis looks at direct cost efficiencies in the operations under review – the efficiency for passengers, ships and crew of mega cruise ships of 2000 passengers or more berthing at Trinity Wharf as opposed to shore transfers at Yorkeys Knob.

Benefit cost analysis involves a 'Project Case' compared with a 'Base Case'. The 'Base Case' would be continuing with the existing situation of Yorkeys Knob transfers.

It is usual to use a project period. Many analyses use 30 years. This analysis uses a 25-year period.

Benefit cost analysis seeks to identify benefits and costs by years stretching over the project period but discounting those after the base year by a discount rate to arrive at a sum of benefits and costs, ie. a total Net Present Value of benefits and costs, ie. NPVs.

Infrastructure Australia advises use of a 7% 'real' discount rate but tested at 4% and 10%. Use of a 'nominal' rate implies that the whole analysis incorporates an inflation rate. Use of a 'real' rate implies that no inflation is included and the project's benefits and costs are all at the base year dollars. (It should be noted that all the above rates are well above current low risk official interest rates in Australia of 2.5% 'nominal' and about 0% 'real'.)

The following benefit cost analysis works on a project period being 25 years from base year 2016 to 2041.

It uses a discount rate of 7% 'nominal', ie. equivalent of 4% 'real' with some testing at 10% 'nominal' / 7% 'real' and 13% 'nominal' / 10% 'real'. NPVs are calculated in 2016 prices.

3.2 CAPITAL COSTS

Capital costs are taken to be those supplied by Ports North.

Estimated Capital Costs:

	<u>2014 prices</u>
Environmental impact statement	\$5.35 m
Design project management and statutory fees	\$7.71 m
Dredging and marine replacement	\$58.89 m
Wharf and services upgrade	\$11.82 m
Monitoring and offsets	\$18.00 m
Total	\$101.73 m
Total at 2016 prices	\$107.93 m

Dredging is estimated to be carried out over a 23-week program (38 weeks including mobilisation) and for the purposes of this analysis, take place in the second half of 2015.

If this date is not achieved, a later start period and project period would have little effect on this project's total economic impacts and benefit cost analysis.

3.3 MAINTENANCE COSTS

Dredging maintenance costs are estimated in 2014 prices at \$1.98m per annum, less current dredging costs of \$1.54m, a net cost of 'Project Case' over 'Base Case' of \$0.44m. NPV over base year plus 25 years at 7% 'nominal' (4% 'real') is \$7.3m and \$7.8m in 2016 prices.

The HFO facility is assumed to be operated commercially and its operating costs are not brought to account in this analysis.

3.4 DIRECT BENEFITS – MOVING FROM YORKEYS KNOB TO CAIRNS SEAPORT

3.4.1 General

Using Yorkeys Knob results in a number of disbenefits compared with berthing at Cairns seaport Trinity Wharf:

- a) Ship to shore transfer costs of passengers;
- b) Shore to city transfer costs of passengers;
- c) Cost of time lost for passengers;
- d) Restrictions on crew taking shore leave.

The following is worked on the basis of a typical 2,000 passenger mega class cruise ship and based on advice from cruise companies and agents operating and handling cruise ships through Cairns / Yorkeys Knob.

3.4.2 Number of passengers getting off / not getting off / visiting city

Advice indicates that the complications of a ship to shore transfer and coach transfers to the city results in substantial numbers deciding to stay on the ship.

The proportion would vary depending on age and other demographics of the passengers, other shore visits in days before and after, and weather conditions on the day. Industry opinion varied about the proportions typically going ashore in the Yorkeys Knob situation, ranging from 60% to 80%. For the following, 75% is used as an average.

By contrast, available information indicates some 95% would disembark the ship if it berthed at Trinity Wharf.

The other question is what happens to the passengers when they arrive on shore. While it varies between domestic and international visitors, industry advice indicates that, on average, for Yorkeys Knob:

- = Very few stay and walk around Yorkeys Knob;
- = About one-half transfer into the city;
- = About one-half go on tours (more international, less domestic).

We thus have a typical scenario of movements as follows for a 2,000 pax ship:

Stay on ship	500
Go ashore	1,500
Go on tours	750
Go to city	750

3.4.3 Cost to passengers not leaving ship

The question arises about how to treat those who do not disembark the ship. Presumably the extra costs and lower quality of experience acts as a deterrent to passengers leaving the ship. For these passengers, it is the reverse of 'generated' traffic in a road benefit cost study and the convention is to bring the dis-benefits to account at one half the benefit.

Of course there is still some value to the passengers of staying on board. Industry advice indicated that cost to passengers of cruise ship voyages (without additional spending on shore excursions, etc.) ranges from lows of about \$100 per day to well over \$200 per day. For the following calculations, an average of \$200 per day is used. The dis-benefit to the 400 who would have gone ashore if the ship berthed at Trinity Wharf is conservatively brought to account at one-third of the value of a day's cruising, ie. \$67.00. One half this gives \$33.50 in 2014 prices and \$35.00 at 2016 prices.

This gives a cost per visit of \$14,000 or \$7 per passenger on board.

3.4.4 Effects of weather

Ship to shore transfers become difficult if the winds are over 15 knots. While the ship can swing around to place tenders that are loading or unloading in the ship's lee, there are days when shore trips become impossible and passengers need to remain on board.

It is believed that it is only known a short time in advance whether these conditions will apply and that the shore tenders will still need to be paid for whether used in full or not.

Industry information indicated that the number of weather cancellations varies from year to year but that average was about 10% of visits. The following uses 10% of visits, (ie. 2 out of 20 visits).

In this situation, there is a dis-benefit to quality of the tour to the passengers. Of course there is still some value to the passengers of staying on board. Just how to value this could be the subject of argument.

As with those staying on board, one-third has been brought to account of an estimated \$200 value of a day's cruising, (ie. about \$67) for the 1,500 who would have gone ashore, (ie. about \$100,500 per occurrence). On the basis of this occurring on 10% of occasions, cost per visiting ship would average \$10,050 or \$5.02 per passenger on board.

3.4.5 Shore transfer costs

Industry information indicates that hired tenders in the form of catamarans will be used for shore transfers, mainly 2 but up to 4 reported. Based on industry information, an average of 2.3 is used. Hire of catamarans is estimated to average per visit \$27,600 in 2014 values and \$29,000 in 2016 values.

Industry information varies on whether ship's tenders are used to supplement the catamarans. This can only occur when the vessel is within three nautical miles of the coast.

A scenario based on ship's tenders also being used indicated that while the same capacity was available in the tenders as two catamarans, they were only used in the morning to affect a speedier transfer ashore. It was reported that they travelled at half the speed of the catamarans.

The indications are that they could account for an extra third to a half of the catamaran movements.

Direct costs include fuel estimated to be of the order of \$2,000 for a day's operation. On top of this are tender operation crew costs. Marginal costs involved included extra maintenance and depreciation costs of the tender boats. It is difficult to get an accurate measurement of total cost, but it would be expected to be of the order of at least \$5,000 per operation.

This would bring the total cost of shore transfer operations up to of the order of \$34,000 or an average of \$23 per passenger transferred or about \$17 per passenger on board.

3.4.6 Transfers to the city

Industry information indicates cost is \$15 per passenger (\$16 in 2016 prices) and would typically apply to 750 of the passengers, ie. \$11,250 per visit.

3.4.7 Passengers on tours

This is taken as imposing no extra cost due to commencing at Yorkeys Knob compared with commencing in the city.

3.4.8 Time costs

The Yorkeys Knob route causes substantial loss of time for passengers.

For road benefit cost analysis, Austroads⁽¹⁾ have established value of benefit of time saved for car-borne drivers and passengers of \$13.17 per hour (2010 prices) for a non business person. (Time of persons on business is valued much higher.) This translates through to an estimated 2016 price of \$15.47 per person.

Opinions varied a little as to the delays that occurred. Based on industry opinion, the following estimates:

On ship waiting to board, tenders, up to 2 hours	say an average of 1 hour
Ship to shore	30 minutes
Shore to city by shuttle bus	30 minutes
City to shore by shuttle bus	30 minutes
Boarding delay up to 1 hour	say average 30 minutes
Shore to ship	30 minutes

In addition, if berthed at Trinity Wharf, safety margin for the ship to recover passengers, (ie. latest boarding time) will be extended compared with being offshore. This is estimated to add half an hour.

Thus the total lost time cost is estimated at 3.50 hours for passengers to the city and 2.50 hours for those on tour.

Value of time cost compared with the Trinity Wharf alternative is calculated per ship as follows:

Those to city 750 x 3.5 hours @ \$15.47	\$40,610
Those on tour 750 x 2.5 hours @ \$15.47	\$29,010
Total	\$69,620

⁽¹⁾ *Note: Austroads – 2012, “Guide to Project Evaluation Part 4 Project Evaluation Data, Section 3.5, Table 3.4”*

3.4.9 Crew impacts

A 2,000 passenger ‘mega’ class ship could be expected to have approximately 760 crew.

The Demand Study works on the basis that a Yorkeys Knob landing results in no crew being able to go ashore. (While for some of the operators some crew may go ashore, overall numbers are likely to be minor and not significantly affect the assessment.)

This compares with an estimated 60% that would go ashore if the ship berthed at Trinity Wharf.

When ships use Yorkeys Knob transfers, apart from other factors including ship operational needs, even if the crew were able to go ashore like the passengers, they face the prospect of the additional cost of shore transfers, and transfers to the city. Crew generally have shorter time off with time losses of transfers a major disincentive. Advice from cruise ship companies is that many of the crew are quite sensitive to transfer costs and that most would not go ashore even if there was only a \$10 transfer cost.

It is likely that most crew would want to go to the city for time off. Like passengers they face a major time waste penalty if they did of the order of 3 hours, ie. about \$45.00 plus a bus fare of \$15.00, ie. about \$60.00.

The value of crew not disembarking as compared with Trinity Wharf can be treated as a ‘generated’ movement and as per benefit cost analytical convention, brought to account at half, ie. about \$30.00.

It is estimated average cost to crew per ship would be \$13,680.

3.4.10 Ship operating expenses

Use of Yorkeys Knob facilities attracts a charge of about \$5,000 per visit (\$5,300 in 2016 dollars). This however is offset against charges to use Trinity Wharf including pilotage.

This will vary depending on the type of ship. However based on industry information, this is estimated to average about \$35,000 in 2016 prices.

There could be a marginal additional cost of fuel if the ship proceeds into the port as against laying offshore.

However for most vessels, maintaining position at sea is estimated to cost in additional fuel, 1 tonne per hour over 12 hours at a cost of \$12,000. At Yorkeys Knob, opportunities are foregone for minor maintenance while at wharf.

There is an extra workload on crew of maintaining position at sea and carrying out shore transfers that can result in additional overtime payments including bridge staff, engine room, and crew involved in the shore transfers using the ship's tenders apart from those actually operating the tenders. Shore transfer days are reported as being more taxing on the deck crew than most other days.

The situation where most current schedules result in three days in a row of shore transfers (Whitsundays, Yorkeys Knob, Port Douglas), with no opportunity for port days, is regarded as unsatisfactory. Cruise companies would welcome the opportunity of a port call at Cairns for operational reasons, especially for crew morale and satisfaction.

It is difficult to estimate the balance of costs. A notional amount of \$16,000 per visit dis-benefit of staying offshore is brought to account with \$12,000 of this being fuel costs.

3.4.11 Benefits of improved fuel availability

While there would be additional economic efficiency benefits of fuel suitable for cruise ships being available in Cairns, we have found it difficult to obtain information to be able to quantify those benefits.

3.5 ANALYSIS

The following provides an analysis of the direct operating benefits/costs internal to cruise shipping operations of dredging the channel, wharf improvements, and providing HFO at the port. Costs are worked in 2016 dollars. The impacts are estimated for a typical 2,000 pax mega class vessel.

Table #8: Calculation of Net Benefits to Mega Class Cruise Ships (2016 Prices)		
	Yorkeys Knob Cost	Trinity Wharf Cost
PASSENGER MOVEMENT IMPACTS		
Total Number of pax	2,000	2,000
Remain on board	500	100
Go ashore	1,500	1,900
Transfer to city	750	1,400
Go on tours	750	500
SHIP TO SHORE TRANSFER	\$34,000	Nil
TRANSFER TO CITY		
City travel 750 @ \$15.00	\$11,250	Nil
City time 750 @ \$15.47 x 3.5 hours	\$40,600	Nil
Tours time 750 @ \$15.47 x 2.5 hours	\$29,000	
DIS-BENEFIT OF NOT GOING ASHORE		
400 x \$35.00 x 0.5	\$14,000	Nil
DIS-BENEFIT WEATHER CANCELLATIONS ON PASSENGERS		
	\$10,050	
CREW MOVEMENT IMPACTS		
Those ashore.....76 x \$23.00	\$1,800	Nil
Not ashore.....380 x \$30.00	\$11,400	
SHIP OPERATIONS		
Port/service berthing charges	\$5,300	\$35,000
Net operating dis-benefits of laying offshore	\$16,000	
TOTAL	\$173,400	\$35,000
NET BENEFITS	\$138,400	
NET BENEFITS PER PASSENGER ON BOARD	\$69.20	

Table #9 (over page) applies an estimated benefit per passenger on board to the existing and increased passenger numbers in mega class ships at a rate of \$70.00 per passenger at 2016 prices.

Based on the growth scenario in the Demand Study 2016 to 2025 and the projected growth over the period 2026 to 2041, the upgrading of the channel would have the following NPV of direct benefits as a result of mega class ships being able to come into the port.

Table #10: NPV of Net Benefits to Ship, Passengers & Crew	
Discount Rate	2016 Prices
Nominal 7% (Real 4%)	\$251 m
Nominal 10% (Real 7%)	\$181 m
Nominal 13% (Real 10%)	\$136 m

Table #9: NPV of Net Benefits to Mega Class Cruise Ships, 2016 Prices

Years	Discount			Mega PAX Increase	Benefits \$70 per Passenger	Discount Real			Discount Real 10%
	4%	7%	10%			4%	7%	10%	
0	1.00	1.00	1.00	115,260	\$8,068,200	\$8,068,200.00	\$8,068,200.00	\$8,068,200.00	\$8,068,200.00
1	0.96	0.93	0.91	125,985	\$8,818,950	\$8,466,192.00	\$8,201,623.50	\$8,025,244.50	\$8,025,244.50
2	0.92	0.87	0.83	137,400	\$9,618,000	\$8,848,560.00	\$8,367,660.00	\$7,982,940.00	\$7,982,940.00
3	0.89	0.82	0.75	151,800	\$10,626,000	\$9,457,140.00	\$8,713,320.00	\$7,969,500.00	\$7,969,500.00
4	0.85	0.76	0.68	166,320	\$11,642,400	\$9,896,040.00	\$8,848,224.00	\$7,916,832.00	\$7,916,832.00
5	0.82	0.71	0.62	180,960	\$12,667,200	\$10,387,104.00	\$8,993,712.00	\$7,853,664.00	\$7,853,664.00
6	0.79	0.67	0.56	189,540	\$13,267,800	\$10,481,562.00	\$8,889,426.00	\$7,429,968.00	\$7,429,968.00
7	0.76	0.62	0.51	197,400	\$13,818,000	\$10,501,680.00	\$8,567,160.00	\$7,047,180.00	\$7,047,180.00
8	0.73	0.58	0.47	205,320	\$14,372,400	\$10,491,852.00	\$8,335,992.00	\$6,755,028.00	\$6,755,028.00
9	0.7	0.54	0.42	214,200	\$14,994,000	\$10,495,800.00	\$8,096,760.00	\$6,297,480.00	\$6,297,480.00
10	0.68	0.51	0.39	225,855	\$15,809,850	\$10,750,698.00	\$8,063,023.50	\$6,165,841.50	\$6,165,841.50
11	0.65	0.48	0.35	230,400	\$16,128,000	\$10,483,200.00	\$7,741,440.00	\$5,644,800.00	\$5,644,800.00
12	0.62	0.44	0.32	239,580	\$16,770,600	\$10,397,772.00	\$7,379,064.00	\$5,366,592.00	\$5,366,592.00
13	0.6	0.41	0.29	244,215	\$17,095,050	\$10,257,030.00	\$7,008,970.50	\$4,957,564.50	\$4,957,564.50
14	0.58	0.39	0.26	248,880	\$17,421,600	\$10,104,528.00	\$6,794,424.00	\$4,529,616.00	\$4,529,616.00
15	0.56	0.36	0.24	258,300	\$18,081,000	\$10,125,360.00	\$6,509,160.00	\$4,339,440.00	\$4,339,440.00
16	0.53	0.34	0.22	263,055	\$18,413,850	\$9,759,340.50	\$6,260,709.00	\$4,051,047.00	\$4,051,047.00
17	0.51	0.32	0.2	268,920	\$18,824,400	\$9,600,444.00	\$6,023,808.00	\$3,764,880.00	\$3,764,880.00
18	0.49	0.3	0.18	277,500	\$19,425,000	\$9,518,250.00	\$5,827,500.00	\$3,496,500.00	\$3,496,500.00
19	0.47	0.28	0.16	282,375	\$19,766,250	\$9,290,137.50	\$5,534,550.00	\$3,162,600.00	\$3,162,600.00
20	0.46	0.26	0.15	292,215	\$20,455,050	\$9,409,323.00	\$5,318,313.00	\$3,068,257.50	\$3,068,257.50
21	0.44	0.24	0.14	297,180	\$20,802,600	\$9,153,144.00	\$4,992,624.00	\$2,912,364.00	\$2,912,364.00
22	0.42	0.23	0.12	307,200	\$21,504,000	\$9,031,680.00	\$4,945,920.00	\$2,580,480.00	\$2,580,480.00
23	0.41	0.21	0.11	312,255	\$21,857,850	\$8,961,718.50	\$4,590,148.50	\$2,404,363.50	\$2,404,363.50
24	0.39	0.2	0.1	321,210	\$22,484,700	\$8,769,033.00	\$4,496,940.00	\$2,248,470.00	\$2,248,470.00
25	0.38	0.18	0.09	331,500	\$23,205,000	\$8,817,900.00	\$4,176,900.00	\$2,088,450.00	\$2,088,450.00
Total	16.61	12.65	10.07	6,084,825	\$417,869,550	\$251,523,689	\$180,745,572	\$136,127,303	\$136,127,303



4.0 POTENTIAL BENEFITS – HOME-PORTING CRUISE SHIPS

4.1 GENERAL

The powerful attractions that can be accessed out of Cairns lead to the only adventure class vessels home-ported in Queensland to be based in Cairns.

The attraction of home-porting vessels in Cairns to open up new markets is already being signalled by the “Paul Gauguin” using Cairns as a port of embarkation in a cruise pattern via Papua New Guinea and Solomon Islands ports to Fiji and Fiji to South Pacific islands to Tahiti and return.

P&O have recently announced plans to base the “Pacific Eden” in Cairns for cruises into the Coral Sea / Pacific area using a passenger ship that can currently berth at Trinity Wharf.

Cairns is well placed to provide cruises to a wide range of Asia Pacific ports as well as across northern Australia.

For comparison, distance Brisbane to Suva is approximately 3,000km. This is the equivalent of Cairns north to the Micronesian and central Pacific islands via Papua New Guinea ports. From Sydney to Suva is almost as far as Cairns west to Bali via Darwin. At the same time, Cairns Suva is only 10% further than Brisbane Suva and the same distance as Sydney to Suva.

On the other hand, home-porting is generally located at the major metropolitan centres to draw on a local ‘base’ market.

The population in northern Queensland is growing and the total from Gladstone north is now at the 1 million mark. The Cairns / Far North region, as the largest in population of the individual regions, has a population that has not yet reached the 300,000 level.

Development of home-porting in Cairns will thus need to depend much more on ‘fly-in’ traffic as opposed to local clientele.

Up to 2,000 passengers joining a cruise ship on a given day with a large proportion seeking to ‘fly-in’ raises issues of airline service capacity and hotel room capacity. By comparison, Cairns airport currently averages about 5,500 inbound passenger movements a day. Cairns region has close to 11,000 hotel/motel rooms of which about 7,000 are in the Cairns urban area.

The home-porting of the 1,500 passenger Pacific Eden at Cairns for a season of eight round trip cruises will start providing a better picture of the likely pattern of economic impacts.

For this analysis, only home-porting of mega sized ships with 2,000 or more passengers that cannot currently enter the port will be relevant.

The following assessment first identifies what economic impact benefits and economic efficiencies are likely to be involved per cruise ship voyage and then illustrates how this might translate to Net Present Values over a project period given assumptions about the extent of home-porting of mega ships that might develop.

4.2 ADDITIONAL ECONOMIC IMPACT

Analysis provided by Cruise Lines International Australia (CLIA) indicates that typical home-porting in Australia is likely to generate the following expenditure in the home port per voyage depending on size of vessel:

Fuel.....	\$0.6 - \$0.7 m
Other ⁽¹⁾	\$0.5 - \$0.7 m
Total	\$1.1 - \$1.4 m

⁽¹⁾ Note: Includes food and beverages, supplies, repairs, port charges, ship services (water, waste management), logistics (stevedoring, transport).

This does not include elements:

- Local spend on marketing;
- Passengers from other cities flying in with potential for overnight stays and ‘rub off’ expenditure at local airport;
- Expenditure generated by crew and their families based in the home port.

Data from the Cruise Down Under AEC report (op cit) Indicates that for 69 visits by cruise ships based in Brisbane, expenditure generated by passengers and crew in 2012/13 averaged \$1.66 million per visit.

For Cairns, special factors are likely to be as follows.

Food and beverage and supplies – In initial phases, if home-porting is sporadic and seasonal, companies may choose to simply send containers out of Brisbane from established suppliers. Full benefits will not accrue until home-porting is well established and local supplies develop. Cruise companies now often like to source unique products from the ports they visit, eg. fresh fish, tropical fruits, etc. If overnight calls are involved, they may also hire local entertainers to provide a regional experience for their guests.

Marketing – Local spend on marketing could be expected to be lower as a much higher proportion of passengers would be from other cities and regions.

Transport and accommodation – Because a higher proportion of passengers would be from other cities and regions, this factor is likely to be much higher than for vessels home-ported in the metropolitan centres. Experience reported with the “Paul Gauguin” indicates that a significant proportion would fly in one or two days beforehand with the associated benefits of increased spending on accommodation, tours, food, shopping, etc.

The above considerations indicate that a mega ship based in Cairns would result in expenditure generated of the order of \$2 million per voyage.

Year 2012/13 data from the Cruise Down Under AEC report indicates that approximately 300 home-ported voyages occur in Australia each year with more from Sydney 211, Brisbane 69, Melbourne 15, and Perth 9. Not all these would be mega ships with over 2,000 passengers.

To obtain some sense of magnitude of impacts over the project period, the following works on 11 mega ship size voyages home-ported in Cairns, (ie. 1 vessel for a season of 11 voyages) by 2021 and 2 vessels from 2031 resulting in 22 voyages.

Industry advice has been that this is likely to be conservative and that if one mega ship was home-ported at Cairns, a second would tend to follow.

The availability of fuel as a result of the project is also likely to increase home-porting by mid-sized vessels but this has not been brought to account.

Table #11 shows 2016 Net Present Value of expenditure generated totalling \$363m of this modest level of home-porting'

Table #11: Potential Expenditure Generated by Home Port Vessels (2016 Values)								
	Discount 4%	Discount 7%	Discount 10%	Home Port Expenditure	Discount 4%	Discount 7%	Discount 10%	
Years	%	%	%	\$m	\$m	\$m	\$m	
0	1.00	1.00	1.00	0.00	0	0	0	0
1	0.96	0.93	0.91	0.00	0	0	0	0
2	0.92	0.87	0.83	0.00	0	0	0	0
3	0.89	0.82	0.75	0.00	0	0	0	0
4	0.85	0.76	0.68	0.00	0	0	0	0
5	0.82	0.71	0.62	22.00	18	16	14	
6	0.79	0.67	0.56	22.00	17	15	12	
7	0.76	0.62	0.51	22.00	17	14	11	
8	0.73	0.58	0.47	22.00	16	13	10	
9	0.7	0.54	0.42	22.00	15	12	9	
10	0.68	0.51	0.39	22.00	15	11	9	
11	0.65	0.48	0.35	22.00	14	11	8	
12	0.62	0.44	0.32	22.00	14	10	7	
13	0.6	0.41	0.29	22.00	13	9	6	
14	0.58	0.39	0.26	22.00	13	9	6	
15	0.56	0.36	0.24	22.00	12	8	5	
16	0.53	0.34	0.22	44.00	23	15	10	
17	0.51	0.32	0.2	44.00	22	14	9	
18	0.49	0.3	0.18	44.00	22	13	8	
19	0.47	0.28	0.16	44.00	21	12	7	
20	0.46	0.26	0.15	44.00	20	11	7	
21	0.44	0.24	0.14	44.00	19	11	6	
22	0.42	0.23	0.12	44.00	18	10	5	
23	0.41	0.21	0.11	44.00	18	9	5	
24	0.39	0.2	0.1	44.00	17	9	4	
25	0.38	0.18	0.09	44.00	17	8	4	
Total	16.61	12.65	10.07	682.00	363	238	162	

At the level of home-porting modelled, Net Present Value of economic benefits is estimated as follows.

	<u>2016 Values</u>	<u>2014 Values</u>
NPV Increased Output	\$363 m	\$342 m
NPV Increased Total Value Added	\$328 m	\$309 m
(including 'flow-on' effect)		

Additional employment generated (including 'flow-on' effects) is estimated to be of the order of 331 by 2041.

4.3 ECONOMIC EFFICIENCY BENEFITS

Home-porting in Cairns allows cruise passengers who wish to visit ports, especially to the north of Cairns, to save an estimated 2 days of a 'dead leg' from Brisbane (4 days on a return journey) that could be substituted with visits to ports and experiences the passenger would wish to experience.

Assuming average cost of a cruise day at \$200 saving of four days, gives a benefit of \$800 per passenger. This would be added to for passengers from the northern regions and international origins north of Cairns by extra cost of travel to Brisbane. But it would be reduced by the extra cost of travel from Brisbane for passengers from that region. This could be expected at the minimum at present to be about \$350. For passengers from further south however, it would be at the marginal extra cost of an airfare to Cairns over that to Brisbane that could be expected to be substantially less. For Sydney, best return fares can be lower than from Brisbane or higher by only \$30-\$40 return.

Economic efficiency benefit cost for the passengers could thus be expected to average of the order of \$700, and for a 2,000 passenger ship of the order of \$1.4m per voyage.

This would give a Net Present Value of benefits based on the home-ported cruise mega ship voyages of 11 per annum after 2021 and 22 per annum after 2031:

Table #12: NPV of Net Benefits to Ship & Passengers

<u>Discount Rate</u>	<u>2016 Prices</u>
Nominal 7% (Real 4%)	\$254 m
Nominal 10% (Real 7%)	\$167 m
Nominal 13% (Real 10%)	\$113 m

5.0 WIDER BENEFITS TO QUEENSLAND & AUSTRALIA AS A CRUISE SHIP DESTINATION

5.1 GENERAL

In addition to the positive regional impacts, upgrading the channel into Trinity Wharf and provision of fuel can be expected to have wider positive impacts on Queensland and Australia as a cruise ship destination.

The wider benefits are likely to come at two levels:

- The impacts from Cairns' attractiveness as a cruise port;
- Impacts from progressive development as a home port;
- The opportunity for visits to intermediate destinations in the Whitsundays, Townsville and destinations to the north of Cairns.

5.2 TRANSIT PORT BENEFITS – QUEENSLAND & AUSTRALIA

Demand for cruising in Queensland depends on customer satisfaction.

Interviewing with cruise ship operators, indicates that Cairns is regarded as an iconic 'marque' port with sophisticated and diverse offerings that substantially adds to the marketability of cruises that include Cairns in their itinerary.

In presenting Cairns to the market, the alternative of being able to berth at Trinity Wharf right next to the Cairns Business District (CBD) area is regarded as very much superior to Yorkeys Knob transfers. This is clearly illustrated by the foregoing benefit cost analysis and by the fact that none of the mid-sized cruise ships that currently can come into Trinity Wharf use the Yorkeys Knob transfer alternative.

While mega ship itineraries may or may not include Whitsundays, Townsville, Cooktown, etc., it is significant that virtually all itineraries include Cairns if they can enter the port and even if they need to use the Yorkeys Knob transfer, few do not include Cairns.

Brisbane as a home port competes with Sydney, Melbourne, Fremantle and New Zealand, home ports and their respective range of cruise offerings. In turn, Australia and New Zealand home ports, although heavily dependent on the domestic market, compete to some degree with overseas cruise destinations.

Apart from wider benefits from customer satisfaction through being able to visit Cairns via Trinity Wharf, further benefits arise from impacts on ships' operations.

The availability of fuel as part of the project raises the prospects of cruises out of Brisbane and Sydney being able to extend their itineraries further north into the currently underdeveloped cruising areas of the northern Coral Sea, Papua New Guinea, Solomon Islands and Micronesia and undertake longer cruises east into the Pacific.

It will also assist extension of cruises west into the Arafura Sea, Darwin, Indonesia area from Queensland. Thus the fuel availability factor will help expand Queensland's offerings into these areas. (This effect is further covered in relation to Home-porting below.)

As covered in Sections 3.4.9 and 3.4.10, cruise ship operators also report that successive days of shore transfers without crew leave possibilities, is a negative for them. The ability of crew to go ashore when berthing at Cairns enhances the operational attractiveness of Queensland related itineraries. Crew morale improves and in turn guest satisfaction with the cruise.

It should be noted that within the Cairns region, there will be an effect of spreading the benefits further afield. Yorkeys Knob transfers limit the potential length of stay to one day and within that day to daylight hours. Being able to have passengers come back later in the evening and to extend the stay to two days will enable passengers to travel further out in the region to experience its attractions with major potential benefits beyond the immediate Cairns area to Port Douglas, Cape Tribulation, Cassowary Coast and the Tablelands.

It is difficult to estimate this wider favourable impact on Queensland as a cruising destination.

Latest Cruise Down Under AEC report for 2012/13 estimated value of expenditure created by the cruise industry in Queensland ports other than Cairns/Yorkeys Knob and Port Douglas was \$364.3m. and impact on Gross State Value Added including 'flow-on' effects of the order of \$293m.

Opinion varied in the industry about what the impact would be in terms of generally increasing cruising through other Queensland ports. Responses ranged from negligible to an increase of 10-12%. To illustrate the scale of potential impacts, a conservative increase of 2% additional would add on 2012/13 figures, expenditure of \$7.3m per annum, ie. \$8.0m in 2016 values and to Gross State Value Added of \$6.2m.

This amount taken over the 2016-2041 project life would have a NPV value of output of \$133m and Gross State Value Added of \$103m in 2016 values (\$109m in 2014 values).

5.3 TRANSIT PORT BENEFITS – PAPUA NEW GUINEA / PACIFIC COUNTRIES

While many of the ports north of Cairns are not currently well developed for cruise visits, clearly larger vessels home-ported in Cairns and fuel availability will open up new tour itineraries for Queensland based vessels that will add substantially to cruise ship activity in ports north of Cairns. Papua New Guinea and Pacific Islands are important to Australia for strategic as well as commercial reasons and home-ported vessels in Cairns are likely to contribute to development of their ports for cruise shipping making a contribution to their economic development and their economic ties with Australia.

6.0 BENEFIT COST ANALYSIS – NON-CRUISE SHIPPING

6.1 GENERAL

Other shipping of a size affected by the current channel depths includes cargo ships carrying fuel and fertilisers inward and bulk sugar outwards, and occasional visits by larger naval vessels.

Prospectively, other shipping, could, on an horizon through to 2041, include ships carrying other fuel types such as LNG inward, fuel especially ethanol outward, bulk mineral shipments, other bulk agricultural commodities and larger container ships.

6.2 CARGO SHIPPING

Cairns seaport has two types of cargo shipping:

- a) Near north supply trade.
- b) Bulk cargoes.

The near north supply trade is currently to supply the major Freeport McMoRan mine in Papua Indonesia and Seaswift and Toll supply to the Torres Strait and to Weipa. This is a very high value trade estimated to be carrying goods worth of the order of \$500m per annum. However, ships are smaller and current channel depths are sufficient now and in the future. Current depths are also sufficient for the smaller LPG carriers that call about 12 times per annum.

The main bulk cargo shipping is of Handimax size vessels with an average operating cost advised of the order of \$20,000 a day.

Average number of ships a year is estimated at about:

Fuel	40
Sugar ships.....	15
Fertiliser ships	7

This gives a total of about 62 a year.

All these ships are of a size that cannot enter the port at low tide, even with restricted loads. This means they are subject to 6 – 8 hour timing constraints for tide inbound and outbound. Even at high tide most cannot enter or depart fully loaded. This results in many of the movements having to share their loads with other ports, in most cases Townsville.

Information from shipping agents indicates that the need to share loads with Townsville occurs as follows.

Sugar	2 per annum
Fertiliser	3-4 per annum
Fuel.....	40 per annum

Cost penalty differs depending on whether a ship is coming in from the north and returning north or from the south.

For ships from the north, the cost penalty arises from the need to travel 13 hours down to Townsville and 13 hours return and the cost of berthing at a second port.

This cost penalty is estimated at one day extra ship operation (\$20,000) plus costs to berth at an additional port (\$50,000), ie. a total of \$70,000 per voyage.

For ships from the south, the additional cost is restricted to the cost of an additional port of call of about \$50,000.

It is estimated that the following additional costs are incurred.

Sugar	2 occasions per annum to north.....	\$140,000
Fertiliser	Av 3½ occasions per annum from north	\$245,000
Fuel.....	15 per annum from north.....	\$1,050,000
	25 per annum from south.....	\$1,250,000
Total		\$2,685,000 pa

This gives an NPV of efficiency benefits of upgrading the channel assuming no growth as follows.

Discount Rate

<u>Nominal</u>	<u>Real</u>	<u>NPV</u>
7%.....	4%.....	\$46.4 m
10%.....	7%.....	\$33.3 m
13%.....	10%.....	\$25.3 m

It should be noted that the above figures do not bring to account any growth factor over the project period.

There has been little growth in all three of these cargoes in recent years for the following reasons.

- Fuel – limited airport growth and both aircraft and motor vehicles becoming more fuel efficient.
- Sugar – limited expansion in the catchment area.
- Fertilisers – limited expansion plus changes in farming practices resulting in less fertiliser usage.

However, given the influences of growth in Asia on demand for tourism, minerals and basic agricultural commodities, growth seems likely to take place in the future.

If the Aquis project proceeds and achieves its visitor objectives, it is expected that over a 12-year period, required workforce and population will expand by of the order of 110,000, ie. by about 40%, ie. 2.8% per annum, over and above underlying growth rates.

The Cairns region's long term average growth rate has been at a rate of 1.9% per annum and that of the city of Cairns, 2.7% per annum.

By and large, demand for fuel could be expected to grow much in line with population growth. Increased demand for cruise ship fuel would be part of this growth and strongly increased demand for fuel for the airport could be expected. On the other hand, more fuel efficient cars will play a role in offsetting this.

The sugar industry is currently going through an expansion phase in the Tablelands area that is likely to result in some increase in volumes of sugar through Cairns in the future. Prospects for agricultural expansion in the region over a 25-year project period are excellent with potential impacts on fertiliser usage.

Under a conservative growth scenario, averaging 2% pa. for fuel and 1% pa. for fertilisers and sugar, Net Present Value of benefits as identified above translates into the following.

Table #13: Estimated Net Present Value of Efficiency Benefits - Bulk Cargo Vessels With No Growth and Modest Growth Scenarios

Discount rate 'Nominal'	'Real'	No growth scenario	Modest growth scenario
7%	4%	\$46.4 m	\$59.8 m
10%	7%	\$33.3 m	\$40.7 m
13%	10%	\$25.3 m	\$29.8 m

In relation to fuel, there could be some changes in types of fuels over a 25-year project period.

Growth in fuel consumption however, could take the form of locally produced ethanol. In the case of local production of ethanol, this could result in a reverse trade. The sugar industry has advised that if this occurs, the ethanol is likely to be railed from the Tablelands to Cairns for blending and the surplus consigned to southern markets by ship. There is a possibility of greater use of LNG to replace petrol and diesel use. LNG requirements seem likely to be met by equivalent sized ships to those carrying petroleum. Increased demand from cruise ships for fuel, especially of HFO, is likely to be supplied from Asia. There have been some suggestions received that cruise ships could switch to LNG in the future.

Cairns, along with Mourilyan, remains a prospective export port for minerals from hinterland mining areas. Both are the closest to parts of the mineral fields. At present, Mourilyan has the logistical advantage of having a B-double route down the Palmerston Highway. Almost certainly, the situation on the Kuranda Range Road will change over the project's life for it to become a B-double route also.

Cairns seaport has a logistical advantage of having the hinterland railway running past portside storage. A 12km link would need to be established into Mourilyan.

In terms of existing wharf facilities and frontage, Cairns seaport offers the larger opportunity.

In relation to the development of container shipping services in the future, the current depth of the channel acts as a barrier to container ships of a size currently servicing northern ports, entering the port of Cairns. While Townsville has some services at present from Asia including direct imports, Cairns and its hinterland has now passed Townsville and its hinterland in population and this long term trend seems likely to continue and accelerate if the Aquis project proceeds. The Aquis proposal itself seems likely to generate a substantial need for imports. Any container shipping trade is likely to involve outward movement of some mineral products in containers and agricultural produce.

While Mourilyan might have some attractions for this, Cairns will remain the major prospective market for inbound cargo and for any transshipment trade to the near north. Motor vehicles are being shipped from Japan in specialist carriers direct into northern ports and if Cairns is to participate in this trade, deepening and widening of the channel would be necessary.

Thus, the above NPVs of benefits in **Table #13** above seem likely to understate the full extent of benefits over the project period.

Apart from economic efficiency benefits, it should be noted that the value of sugar products shipped are of the order of \$60-\$80m per annum, fertilisers of the order of \$20-\$30m per annum and petroleum products of the order of \$90m per annum. Fertilisers are a major input into the region's \$1.1bn agricultural sector and fuel an input, to varying degrees, into almost every sector of the economy.

6.3 NAVY

While the vessels stationed at the Cairns Naval Base are not likely to be of a size that require a deepened channel, the deepening of the channel will enable some larger naval vessels to enter the harbour including those of foreign countries that regularly visit Australia and call at ports for R&R (eg. especially from the United States). Although advice is that some of the very large naval vessels would require the channel to be deeper than planned.

Apart from Cairns being a desired port of call for R&R purposes, it is likely to enhance the operational role of Cairns as a navy base if larger ships were able to come in to the port, even if the ships permanently stationed in Cairns are of a size that do not need a deeper channel, especially in times of emergency.

It is difficult to quantify this in benefit cost/economic efficiency terms.

However, obviously the spending through R&R visits and operational visits could bring an economic benefit of increased spending in addition to that identified for the cruise ships in Section 2.

7.0 ECONOMIC IMPACT – CONSTRUCTION ACTIVITY

7.1 GENERAL

The dredging and other works associated with the project can be expected to create an addition to Gross Regional Value Added in the period the works are carried out and an increase in direct and ‘flow-on’ employment. It will also result in activity in the lead up period and subsequently over the project period.

The construction expenditure (2014 prices) consists of the following elements.

<u>Construction Period</u>	
Dredging and marine replacement	\$59 m
General construction.....	\$12 m
(Wharf and Services Upgrade)	
<u>Lead Up Period</u>	
Professional services	\$8 m
(Design and Project Management)	
Scientific and technical services.....	\$5 m
(Environmental Impact Statement)	
<u>Following Period</u>	
Professional, scientific and technical services	\$18 m
(Monitoring)	
Total	\$102 m

The following provides estimates of total ‘Value Added’ including ‘flow-on’ and employment generated including ‘flow-on’ in 2014 prices based on Cairns’ regional input / output multipliers. (See Technical Notes, [Appendix 1](#), for basis of calculations.)

Table #14: Estimate of Impacts, 2014 Prices

	Initial expenditure	Initial Employment (full year)	Total value added including flow-on	Est employment including flow-on
<u>Construction Period</u>				
Dredging and marine replacement	\$59 m	88	\$48 m	365
General construction	\$12 m	12	\$9 m	67
<u>Lead Up Period</u>				
Professional, scientific and technical services	\$13 m	54	\$11 m	97
<u>Following Period</u>				
Professional, scientific and technical services	\$18 m	75	\$15 m	137
Total	\$102 m	229	\$83 m	666

The following calculates Net Present Value of the addition to Gross Regional Value added in 2014 prices including 'flow-on' effects.

Table #15: Estimate of Net Present Value, Total Value Added including 'Flow-on', 2014 Prices	
Construction Period	
Dredging and marine replacement	\$49 m
General construction	\$9 m
Lead Up Period	
Professional, scientific and technical services	\$11 m
Following Period	
Professional, scientific and technical services	\$10 m
Total	\$79 m

(Note: It is assumed for these calculations that 'Lead Up' period (professional, scientific and technical services) occur in 2012, 2013 and 2014. 'Following' period (monitoring) is taken as annually 2016 to 2041. Construction works are taken to be in 2015. However if this timing is not achieved, a later date and project period would make little difference to the final estimates.)

Construction activity is thus estimated to create an addition to Gross Regional Value Added of the order of \$79m over the life of this project.

Employment created through construction related activity including 'flow-on' effects is estimated approximately as follows.

Table #16: Estimate of Construction Activity - Employment Generated	
	No.
2012	32
2013	32
2014	32
2015	432
2016-2041	5 per annum

Employment generated by construction activity including 'flow-on' is estimated to peak at about 430.

8.0 OVERALL ANALYSIS

8.1 GENERAL

There are two ways of measuring the benefits of the project – Economic Impact and Economic Efficiency (benefit cost analysis).

8.2 ECONOMIC IMPACT – CRUISE SHIP VISITS

Economic impact of visiting cruise ships in terms of expenditure generated in the local economy was estimated in the Cruise Down Under/AEC report (op cit) to be \$11.6m per annum in 2012/13.

However, the fact that approaching a half of cruise ships visiting the area are not able to come into Cairns seaport and that this was because of their size, means that significant expenditure is being lost.

Looking forward, the sector is currently growing strongly and is expected to grow strongly into the future. With most of the growth being in ship sizes not currently able to enter Cairns seaport, the relatively small current amount of economic impact expenditure is likely to grow strongly with major benefits accruing from deepening the channel and having available, fuel types suitable for large cruise ships.

The analysis indicates that if the project proceeds by 2026, increase in expenditure generated by cruise ship visits, including 'flow-on' effects, would rise to \$103m per annum in current prices and \$224m per annum by 2041, generating employment including flow-on effects of 500 by 2026 and 680 by 2041.

NPV 2014 values (at a 7% 'nominal'/4% 'real' discount rate) of the additional value added in the economy generated over the project period 2016 to 2041 is estimated at \$634m at 2014 prices.

8.3 ECONOMIC EFFICIENCY (BENEFIT COST ANALYSIS) – CRUISE SHIP VISITS

A major justification for the project also stems from Economic Efficiency gains in terms of direct benefits.

The current situation where the larger cruise ships need to stand off the coast and ferry passengers into Yorkeys Knob and then bus most of them into the city is very inefficient; in extra costs of shore transfers and bus transfers, but also in time cost. Also in these circumstances, crew are generally unable to come ashore for leave and passengers are discouraged from coming ashore, especially if weather conditions are not good.

The above cost efficiency benefits are offset, in part, by higher port charges. Operating costs of coming into Trinity Wharf however, are more than outweighed by the extra crew and operating costs of remaining at sea and benefits of being able to carry out maintenance activities while wharfside. Fuel availability will add to the potential benefits.

The indications however, are that the net additional costs to passengers, the ship and crew of landing via Yorkeys Knob is about \$70 per passenger on board the ship in 2016 dollars.

With the projected growth in larger cruise ship visits, it is estimated that over the 25-year project period, 2016 to 2041, the direct benefits to the cruise ship trade of deepening the channel, wharf improvement, and installing facilities for fuel types used by larger ships would have a Net Present Value in 2016 prices of \$250m at a discount rate of 7% 'nominal' (4% 'real').

8.4 HOME-PORTING

Cairns has long been a home port for smaller cruise vessels and is starting to be used as a home port for mid-sized vessels carrying up to 1,500 passengers. The likelihood of vessels larger than 2,000 passengers that would need the channel upgraded to operate from Cairns is difficult to forecast. To obtain some idea of order of magnitude, benefits that might accrue from home-porting, a conservative scenario was researched where one, 2,000 passenger vessel was home-ported in Cairns for 11 voyages from 2021 and two from 2031, resulting in 22 voyages. This level of home-porting of mega ships is estimated to result in the following.

Economic impact is estimated to involve an expenditure of \$2m per departure and the additional value added to the economy generated over the project period 2016-2041 of the order of \$309m in 2014 prices at a discount rate of 7% 'nominal' (4% 'real').

In terms of economic efficiency, home-porting in Cairns would cut 2 days each way sailing from / to Brisbane for cruises northwards, with benefits estimated to have a Net Present Value of \$254m at a discount rate of 7% 'nominal' (4% 'real').

8.5 WIDER BENEFITS TO OTHER QUEENSLAND & AUSTRALIAN PORTS

Cairns is considered by cruise companies as an 'iconic' / 'marque' port of call that is included in almost all cruise ship itineraries along the Queensland coast.

The ability of ships to come into the port has an effect of enhancing the Queensland cruise ship experience for passengers, has substantial operational benefits for cruise companies including availability of fuel, and enhances opportunities for expanding tours to the north.

Upgrading the Cairns seaport will upgrade Queensland's attraction as a cruise destination, with benefits to other Queensland ports that recorded expenditure generated by cruise ships in 2012/13 of \$364.3m.

It is difficult to estimate what the impact would be on these other Queensland ports but to obtain a sense of order of magnitude, an increase of 2% only would have benefits in increased expenditure with a Net Present Value over the project period of \$133m with an impact on Gross State Value Added of about \$103m (\$109m in 2014 prices).

8.6 NON CRUISE SHIPS

Calculated NPV (2016 prices) of savings to existing larger fuel, fertiliser and sugar ships being able to enter the port without tidal restrictions are estimated to be of the order of \$59.8m at a discount rate of 7% 'nominal' (4% 'real').

8.7 ECONOMIC IMPACT - CONSTRUCTION ACTIVITY

Net Present Value of additional Gross Value Added to the economy including 'flow-on' effects at 2014 prices is estimated to be of the order of \$79m with creation of 666 job years.

8.8 CAPITAL AND MAINTENANCE COSTS

NPV of capital and maintenance costs is estimated as follows.

Table #17: NPV of Capital & Maintenance Costs (Discount Rate 7% 'nominal (4% 'real'))		
NPV Capital Cost	(2016 prices)	\$107.9 m
NPV Maintenance Costs	(2016 prices)	\$7.8 m
Total	(2016 prices)	\$115.7 m
Total	(2014 prices)	(\$109.1 m)

8.9 CONCLUSIONS

8.9.1 Economic impact

<i>Table #18: Economic Impact – NPV of Estimated Additions to Regional & State Gross Value Added (2014 Prices, Discount Rate 7% 'nominal'/4% 'real')</i>	
Additional cruise ship visits	\$634 m
Construction activity	\$79 m
Sub total	\$713 m
Additional from home-porting (as modelled)	\$309 m
Additional impacts on other Queensland ports (as modelled)	\$109 m
Total	\$1,131 m
Navy	Unknown
Larger non-cruise shipping trade stimulated	Unknown

In terms of economic impact, estimated Net Present Value 2014 prices of additional value added in the economy stimulated by cruise ship visits is estimated at \$634m. NPV of impacts during the construction activity is estimated at \$79m. This could be further increased by economic benefits of home-porting, with an estimate of \$309m on the basis of the modest extent of home-porting modelled. On top of this would be rub off benefits to other ports, especially in Queensland of making Queensland a more attractive destination overall for cruise shipping. At a conservative modelled increase of 2%, this would add a further \$109m. This takes the total to over \$1.1bn.

It is estimated that by 2041 the upgrading would be resulting in an additional 680 jobs in the region from cruise ship visits alone. A further estimated 670 jobs would be created by construction activity, mainly in the year dredging and construction took place, but with some lead in planning and follow on monitoring effects. Home-porting at the level modelled and impacts on other ports in Queensland are estimated to create further additional jobs in the region and elsewhere in the State of the order of 400 by 2041, taking the total to over 1,000.

8.8.2 Economic efficiency

Table #19: Economic Efficiency - NPV Direct Costs & Benefits (2016 Prices, Discount Rate 7% 'nominal'/4% 'real')		
<u>COSTS</u>	<u>Direct</u>	
	Port dredging & deepening, HFO & wharf	\$107.9 m
	Port dredging maintenance	\$7.8 m
	Total	\$115.7 m
<u>BENEFITS</u>	<u>Direct</u>	
	Visiting cruise ship operations	\$250.0 m
	Larger bulk cargo vessels	\$60.0 m
	Sub total	\$310.0 m
	Cruise vessel home-porting (modelled)	\$242.0 m
	Total	\$552.0 m
	Larger non-bulk cargo vessel (growth)	Unknown
	Navy	Unknown
	<u>Identified Direct Benefit Cost Ratio</u>	
	Without home-porting	2.68
	With home-porting (modelled)	4.77

In terms of economic efficiency, the indications are that as a public project there is a healthy direct Benefit Cost Ratio of the order of 2.7. This could be further increased with efficiencies from modelled home-porting to 4.8. Growth in larger non-bulk vessels and navy usage could increase this further.

The following table gives estimate of the Benefit Cost Ratio at higher discount rates.

Table #20: Estimated Benefit Cost Ratio at Higher Discount Rates				
	7% 'nominal / 4% 'real' \$m	10% nominal / 7% real \$m	13% nominal / 10% real \$m	
<u>Cost</u>				
Port dredging & deepening	107.9	107.9	107.9	
Port dredging maintenance	7.6	5.8	4.6	
Total cost	115.5	113.7	112.5	
<u>Benefits</u>				
Visiting cruise ship operations	250.0	190.0	152.5	
Large bulk cargo vessels	60.0	45.6	36.6	
Sub total	310.0	235.6	189.1	
Cruise vessels home-porting (modelled)	242.0	159.7	108.9	
Total	552.0	395.3	298.0	
<u>Benefit Cost Ratio</u>				
Without home-porting	2.7	2.1	1.7	
With home-porting	4.8	3.5	2.6	

Benefit Cost Ratio remains positive even at 10% 'real', 13% 'nominal'.

CAIRNS SHIPPING DEVELOPMENT EIS

Appendices



APPENDIX 1

Technical Notes and Terms

Inflation

Where values have needed to be adjusted for inflation up to 2014 values, actual inflation as indicated by Consumer Price Index Brisbane is used.

For projections into the future, an average rate of 3% per annum is used in line with practice by Infrastructure Australia.

Discount Rates

Following the advice of Infrastructure Australia, discount rates used are 4% 'real' (7% 'nominal'), 7% 'real' (10% 'nominal'), 10% 'real' (13% 'nominal').

The difference between 'real' and 'nominal' rates is an assumed inflation rate of 3% per annum.

Gross Regional (State) Value Added

This is a summation of 'value added' by all entities in the Regional (State) economy and approximate Gross Regional (State) Product less indirect taxes.

'Flow-on' Effects

Expenditure in an economy will produce 'flow-on' effects as businesses spend on inputs and as incomes are spent on goods and services.

A total including 'flow-on' effects will include the sum of these effects in terms of expenditure referred to as 'output', value added and employment.

Input Output / Multipliers

Factors used for the calculation of multiplier impacts are taken from "Northern Australia Research Group – Input/Output/Multipliers – Modified National Model, Cairns Region SA4, 2014" as follows.

	Initial expenditure (Output)	Est total value added incl flow-on	Initial employment	Est total employment incl flow-on
Heavy & civil engineering construction	1.00	0.82	1.33	5.39
Non-residential construction	1.00	0.79	0.99	5.62
Professional, scientific & technical services	1.00	0.81	4.15	7.59

It should be noted that these are based on national ratios in broad classifications with 'flow-on' effects modified to take account of industry structure in the region. They should be treated as giving 'order of magnitude' estimates only.

LIST OF REFERENCES

- Cairns Cruise Shipping Development Strategy – Demand Study Update Report – BMTWBM, December 2012.
- Access Economics (2009), The Australian Cruise Sector, Report for Carnival Australia.
- AEC Group, Economic Impact Assessment of the Cruise Shipping Industry Australia, 2012 – 2013, Final Report prepared by Cruise Down Under.
- DEEDI (2010), Queensland Mega and Adventure / Expedition Cruise Ship Market Demand Study 2012, Report by Doyle Tourism Services (with the AEC Group) for the Queensland Department of Employment, Economic Development and Innovation (DEEDI).