

Figure 3: Option 2- a wharf at the same site as Option 1 for large vessels



B. Key assumptions used in Economic Analysis

- All costs and benefits expressed in 2018 constant prices;
- World Price Numeraire used to convert financial values to border equivalent economic prices;
- A Shadow Wage Rate Factor (SWRF) of 0.8 used to convert unskilled labour to border equivalent values;
- Skilled labour considered as a traded cost and assumed to be valued at its border price;
- A 70:30 split between materials and labour and also a 70:30 split between skilled and unskilled labour;
- A Standard Conversion Factor of 0.9 used to convert non-traded costs to their border equivalent value. Non-traded items are unskilled labour in the project capital expenditure (materials and skilled labour are traded) and vessel operating costs saved. Unskilled labour has been converted to its border equivalent value by applying the SCF and the SWRF to the proportion of unskilled labour in the capital cost. Vessel operating costs excluding fuel costs have been adjusted by the SCF since they are non-traded. The fuel component in the vessel operating cost has not been adjusted by SCF;
- Project economic lifetime of 50 years with no residual value thereafter;
- An Economic Opportunity Cost of Capital of 9% in real terms;
- Physical contingencies of 10% on base cost;
- Annual operations and maintenance cost at 3% of capital costs and in addition 2% of capital costs on an annualized basis to provide for maintenance dredging as a result of siltation caused by post-cyclone activity.
- Nivaga III - annual recurrent expenditure: AUD 1,153,697
- Manufolau - annual recurrent expenditure: AUD 1,123,549
- Total shipping expenditure: AUD 2,277,246, of which fuel cost: AUD 940,000
- Operating hours: 80% of time.
- Hourly ship operating cost: 325 AUD/h
- Hourly ship operating cost (excluding fuel): 191 AUD/h

- Hourly ship operating cost (fuel): 134 AUD/h
- Hourly ship operating cost (fuel) (economic price): 114 AUD/h
- Total hourly ship operating cost: 285 AUD/h

D. Ministry of Communication and Transport Budget Projections

Table: Ministry of Communication and Transport Budget Projections (AUD'000s)

Item	2014a	2015f	2016f	2017b	2018p	2019p	2020p	2021p
Revenues	7,021	9,578	9,585	8,865	9,041	9,223	9,333	9,445
Taxes	48	58	88	198	202	206	208	211
Fees & charges	6,973	9,520	9,497	8,667	8,839	9,017	9,125	9,234
Marine Dept.	1,389	1,619	1,930	1,435	1,463	1,493	1,511	1,529
.TV	5,514	7,734	7,411	7,051	7,192	7,336	7,424	7,512
Other charges	70	167	156	181	184	188	190	193
Expenditures	4,428	6,359	5,253	5,520	5,648	5,760	6,565	6,634
Recurrent expenditures	4,383	5,122	5,243	5,253	5,358	5,465	6,267	6,333
Staff (incl. travel & comm.)	2,241	2,342	2,988	2,960	3,020	3,080	3,117	3,154
Goods and services	365	444	320	389	397	405	410	415
Fuel and oil	1,034	761	1,339	1,044	1,065	1,086	1,099	1,112
Maintenance	627	1,475	481	694	708	722	731	739
Other	116	100	115	166	168	172	174	176
Non-recurrent expenditures	45	1,237	10	267	272	277	280	284
Project expenditures					18	18	755	755
Maintenance							737	737
Land lease					18	18	18	18
Ministry Balance	2,593	3,219	4,332	3,345	3,393	3,463	2,768	2,810

b = budget, e = estimate, p = projection.

Source: Consultant estimates based on the Tuvalu National Budget.

D. Macro-economic context

Tuvalu is considered a fragile micro-state due to its remoteness, lack of economies of scale and vulnerability to climate change. Although it has a land size of only 26km² it has a large exclusive economic zone of almost 800,000 km² with substantial fish stocks and revenue from fishing licences accounts for 48% of its national revenue. The most recent population estimate was 11,300 and population growth rate of 1.2% per annum with 8% of the population over 65 years. ¹ Real Gross Domestic Product (GDP) growth was 2.2% and 2.6% respectively in 2014 and 2015, and increased to 3.0% in 2016 due to large scale infrastructure projects for recovery from Cyclone Pam.² Growth is estimated at 3.2% in 2017 and is projected to ease slightly to and 3.0% through 2018 and 2019³. Inflation, as measured by the consumer prices index (CPI) has remained within the 1%-3% range over the last five years but increased to 3.5% in 2016 with increased economic activity post Cyclone Pam and is expected to stabilise thereafter. Government finances reported budget surpluses from 2012–2015, due to strong revenue from fishing licenses, despite significant increases in recurrent expenditure with rising overseas medical treatment costs, overseas education scholarships and salaries and wages of the civil service. IMF forecasts that small budget deficits will arise in 2016 and 2017 due to reduced

¹ ADB Key Indicators, 2017

² IMF Article IV Consultation, 2016

³ Government of Tuvalu, National Budget 2017, Asian Development Outlook, ADB, 2018

income from fishing licences and notes the fiscal challenge of managing revenue volatility coupled with long term costs associated with climate change. In order to manage revenue volatility, the Tuvalu Trust Fund (TTF) was created in 1987 by GoT and its development partners with an initial fund of AUD 27 million. This has grown to AUD 148 million at September 2015 and is over 300% of GDP. Although the TTF is not available to finance the budget, the Consolidated Investment Fund (CIF) which is funded by the excess of TTF's market value to a pre-determined "maintained value" can be used for budget support. Debt sustainability is an issue for Tuvalu with debt at 58% of GDP. While some of the debt is concessionary with multi-lateral lending agencies, debt amounting to 35% of GDP is on non-concessionary terms for two fisheries related joint ventures and is guaranteed by GoT.

D. Detailed tables for the cost effectiveness analysis

OPTION 1 (wharf for workboats)			
Discounted Cost (AUD'000's)			
	Capex	Opex	Total Cost
2018	4,222		4,222
2019	9,852		9,852
2020		704	704
2021		704	704
2022		704	704
2023		704	704
2024		704	704
2025		704	704
2026		704	704
2027		704	704
2028		704	704
2029		704	704
2030		704	704
2031		704	704
2032		704	704
2033		704	704
2034		704	704
2035		704	704
2036		704	704
2037		704	704
2038		704	704
2039		704	704
2040		704	704
2041		704	704
2042		704	704
2043		704	704
2044		704	704
2045		704	704
2046		704	704
2047		704	704
2048		704	704
2049		704	704
2050		704	704
2051		704	704
2052		704	704
2053		704	704
2054		704	704
2055		704	704
2056		704	704
2057		704	704
2058		704	704
2059		704	704
2060		704	704
2061		704	704
2062		704	704
2063		704	704
2064		704	704
2065		704	704
2066		704	704
2067		704	704
2068		704	704
2069		704	704
PV of Costs OPTION 1 (workboats)			16,283

OPTION 2 (wharf for vessels)			
Discounted Cost (AUD'000's)			
	Capex	Opex	Total Cost
2018	26,985		26,985
2019	62,965		62,965
2020		4,497	4,497
2021		4,497	4,497
2022		4,497	4,497
2023		4,497	4,497
2024		4,497	4,497
2025		4,497	4,497
2026		4,497	4,497
2027		4,497	4,497
2028		4,497	4,497
2029		4,497	4,497
2030		4,497	4,497
2031		4,497	4,497
2032		4,497	4,497
2033		4,497	4,497
2034		4,497	4,497
2035		4,497	4,497
2036		4,497	4,497
2037		4,497	4,497
2038		4,497	4,497
2039		4,497	4,497
2040		4,497	4,497
2041		4,497	4,497
2042		4,497	4,497
2043		4,497	4,497
2044		4,497	4,497
2045		4,497	4,497
2046		4,497	4,497
2047		4,497	4,497
2048		4,497	4,497
2049		4,497	4,497
2050		4,497	4,497
2051		4,497	4,497
2052		4,497	4,497
2053		4,497	4,497
2054		4,497	4,497
2055		4,497	4,497
2056		4,497	4,497
2057		4,497	4,497
2058		4,497	4,497
2059		4,497	4,497
2060		4,497	4,497
2061		4,497	4,497
2062		4,497	4,497
2063		4,497	4,497
2064		4,497	4,497
2065		4,497	4,497
2066		4,497	4,497
2067		4,497	4,497
2068		4,497	4,497
2069		4,497	4,497
PV of Costs OPTION 2 (vessels)			104,063

Option : Existing Discounted Values (AUD'000s)			Option 1 (wharf for workboats) Discounted Values (AUD'000s)			Option 2 (wharf for vessels) Discounted Values (AUD'000s)		
	Travel Time	Vessel Opex		Travel Time	Vessel Opex		Travel Time	Vessel Opex
2018			2018			2018		
2019			2019			2019		
2020	3	428	2020	2	246	2020	1	123
2021	3	427	2021	2	245	2021	1	245
2022	3	427	2022	2	245	2022	1	123
2023	3	426	2023	2	245	2023	1	122
2024	3	426	2024	2	245	2024	1	122
2025	3	426	2025	2	244	2025	1	122
2026	3	425	2026	3	244	2026	2	122
2027	3	425	2027	3	244	2027	2	122
2028	3	424	2028	3	243	2028	2	122
2029	3	424	2029	3	243	2029	2	122
2030	3	423	2030	3	243	2030	2	121
2031	3	423	2031	3	243	2031	2	121
2032	3	423	2032	3	243	2032	2	121
2033	3	423	2033	3	243	2033	2	121
2034	3	423	2034	3	243	2034	2	121
2035	3	423	2035	3	243	2035	2	121
2036	3	423	2036	3	243	2036	2	121
2037	4	423	2037	3	243	2037	2	121
2038	4	423	2038	3	243	2038	2	121
2039	4	423	2039	3	243	2039	2	121
2040	4	423	2040	3	243	2040	2	121
2041	4	423	2041	3	243	2041	2	121
2042	4	423	2042	3	243	2042	2	121
2043	4	423	2043	3	243	2043	2	121
2044	4	423	2044	3	243	2044	2	121
2045	4	423	2045	3	243	2045	2	121
2046	4	423	2046	3	243	2046	2	121
2047	4	423	2047	3	243	2047	2	121
2048	4	423	2048	3	243	2048	2	121
2049	4	423	2049	3	243	2049	2	121
2050	4	423	2050	3	243	2050	2	121
2051	4	423	2051	3	243	2051	2	121
2052	4	423	2052	3	243	2052	2	121
2053	4	423	2053	3	243	2053	2	121
2054	4	423	2054	3	243	2054	2	121
2055	4	423	2055	3	243	2055	2	121
2056	4	423	2056	3	243	2056	2	121
2057	4	423	2057	3	243	2057	2	121
2058	4	423	2058	3	243	2058	2	121
2059	4	423	2059	3	243	2059	2	121
2060	4	423	2060	4	243	2060	2	121
2061	4	423	2061	4	243	2061	2	121
2062	4	423	2062	4	243	2062	2	121
2063	5	423	2063	4	243	2063	2	121
2064	5	423	2064	4	243	2064	2	121
2065	5	423	2065	4	243	2065	2	121
2066	5	423	2066	4	243	2066	2	121
2067	5	423	2067	4	243	2067	2	121
2068	5	423	2068	4	243	2068	2	121
2069	5	423	2069	4	243	2069	2	121
PV	27	3,531	PV	21	2,027	PV	13	1,111
PV of Travel + Vessel Opex		3,558	PV of Travel + Vessel Opex		2,048	PV of Travel + Vessel Opex		1,124
			Improvement in PV Travel + vessel Opex		1,509	Improvement in PV Travel + vessel Opex		2,434
			Cost per \$ saved		10.8	Cost per \$ saved		42.8