



**The Economic Impact
of
Pacific Highlands Development Project
on the Economy of the Tweed**

Report to Terranora Group Management

CLIENT COMMERCIAL-IN-CONFIDENCE

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EXECUTIVE SUMMARY

In June 2006 the Tweed Economic Development Corporation (TEDC) undertook an economic assessment of Terranora Group Management's Pacific Highlands development project.

The project in Bilambil Heights, NSW covers a 184.5 hectare land development footprint, which is proposed to be developed in stages over 10 -15 years into residential and commercial/retail components.

Summary of Results

The results from this analysis are rough estimates only: these could be revised once more accurate information becomes available.

Estimated Overall Value to Tweed Shire Council (at current rates)

Total Domestic Water, Sewerage and Contribution Plans: \$45,456,000
Total eventual annual Rates Income: \$ 1,166,941

Economic Impact: Construction

Indicator	Direct	Indirect	Total
Output in \$t	1,278,368	1,438,911	2,717,280
Value Added in \$t	348,609	568,974	917,583
Income in \$t	218,805	333,327	552,132
Employment in FTE	6,222	10,590	16,813

This indicates that the initial or direct construction output or turnover activity of \$1,278 million is associated with an addition \$1,439 million of output from other local businesses and industries, and a total of \$2,717 million. Similarly, the project is associated with an initial or direct 6,222 positions or jobs (not people), and a total of 16,813 FTE positions.

Most of the indirect activity consistently occurs within the *Property and Business Services, Retail Trade* and *Transport* sectors.

Economic Impact: Operational Activity

Indicator	Direct	Indirect	Total
Output in \$t	70,950	63,760	134,710
Value Added in \$t	32,839	26,193	59,032
Income in \$t	24,741	15,856	40,596
Employment in FTE	826	525	1,351

This indicates that the initial or direct operational output or turnover activity of all those businesses located on the completed Pacific Highlands is estimated to be about \$ 71 million. This is associated with an addition \$64 million of output from other local businesses and industries, and a total of almost \$135 million. Similarly, the operational activity is associated with an initial or direct 826 positions or jobs (not people), and a total of 1,351 FTE positions.

Most of the indirect activity consistently occurs within the *Retail Trade, Health and Community Services* and *Education* sectors.

Economic Impact: Increased Household Consumption

It is estimated that the Pacific Highlands development project, when completed, will be home to 3,743 people. Of these, 2,436 will be newcomers to the Tweed and 1,307 people will be relocating from existing residences in Tweed Shire.

The household expenditure of the 2,436 new residents, in terms of the impact on Tweed businesses, was estimated to be approximately \$18.204 million.

Indicator	Direct	Indirect	Total
Output in \$t	18,204	15,402	33,606
Value Added in \$t	7,966	6,323	14,289
Income in \$t	5,376	3,815	9,191
Employment in FTE	179	127	306

The initial or direct impact of \$18.204 is associated with an addition \$15 million of output from other local businesses and industries, and a total of almost \$34 million. Similarly, the increased household expenditure is associated with an initial or direct 179 positions or jobs (not people), and a total of 306 FTE positions.

1. Introduction

In late May 2006, the Tweed Economic Development Corporation (TEDC) was asked to undertake some economic modelling work for Terranora Group Management with regards to the proposed Pacific Highlands Master Planned Community at Bilambil Heights in northern NSW.

This report is therefore a brief economic assessment of the Pacific Highlands development project, based on information supplied by Terranora Group Management and TEDC expertise.

2. Background

WT Partnership was instructed by Terranora Group Management to prepare an indicative broad order of construction cost estimate for the proposed Pacific Highland Master Planned Community development at Bilambil Heights. It is understood that the purpose of the estimate is to provide a broad indication of the likely construction costs in order to assist in the preliminary economic assessment of the project.

It is understood that the Pacific Highlands development project will cover approximately 184.5 hectares in Bilambil Heights, NSW and will eventually include:-

- Hillside, medium and low density housing
- Retirement village
- Nursing home
- Private school
- Hospitality training school
- Village retail centre/s
- Galleries
- Health spa
- Open space and conservation

Later sections of this report give further details of the various components of the overall development project.

3. General Economic Comments

Relevant to and of interest to the Pacific Highlands development project, TEDC's ongoing research indicates the following information:

3.1 Tweed Population Growth Rates

Tables 3.1 and 3.2 show the actual and predicted resident population estimates for the Tweed from 1985/86 to 2026.

Table 3.1 Estimated Resident Population Tweed Shire 1985-2002

Year	85/86	87/88	89/90	92/93	94/95	96/97	98/99	00/01	01/02
Population	44,450	48,570	52,150	58,278	63,019	67,065	69,969	74,577	76,229

Source: ABS Cat No. 3218.0, 3209.1, 3234.1, Compiled by Tweed Council, Corporate Research

Population change 1999/00-00/01 is estimated at approximately 3.65%, and in 2000/01-01/02 at 2.17%.

Table 3.2 Actual and predicted populations (medium level), persons of total population, Tweed Shire 1996-2026

Year	1996	2001	2004	2014	2024	Total Growth
	Actual	Actual	Predicted	Predicted	Predicted	1996-2024
Total	66,968	74,232	80,000	97,000	114,000	47,032
Annual Average Change		2.17%	1.94%	2.12%	1.75%	2.42%

Source: *Population Data and Projections*, Tweed Shire, 2004

This indicates a resident population increase of 34,000 for the twenty years from 2004 to 2024.

3.2 Tweed Residential Zoned Land

The Tweed Shire Council supplied the information showed in Table 3.3.

Table 3.3: Tweed Shire, Future Development Areas

New Release Area	Total Potential Population	Status	Estimated population still to reside	Date when total population will reside	Comment
Coastal					
West Kingscliff	2,038*	Currently being released	2,038	2008	Kingscliff development study being drafted
Koala Beach	3,400	Currently being released	600	2008	Remaining lots have been approved
Leisure Gardens Estate (Seabreeze)	2,000	Currently being released	740	2008	Stages 2 and 3 approved
Black Rocks	2,000	Currently being released	1,080	2008	
Casuarina	3,600	Currently being released	2,000	2009	Development approx. half completed
SALT	1,409	Currently being released	1,409	2011	Earthworks completed – housing to commence shortly
Kings Forest	10,000	LEP amendment currently under review	10,000	2024	Discussions continuing regarding environmental issues
Total	24,447		17,867		
Rural West					
West Murwillumbah	2,840	Currently being released	1,500	2007	Remaining earthworks almost completed
Total	1,000		500		
Urban North					
Terranora "Village"	300	Being developed	300	2007	
Area E	5,000*	LEP amendment required	5,000	2011	Master plan submitted. Objection from RTA being addressed
Bilambil Heights	8,000	Rezoning completed	8,000	2013	Development dependent on improvement to road network, particularly Tugan bypass
Cobaki Lakes	10,000	Initial DA consent. Earthworks commenced	10,000	2024	Development dependent on improvement to road network, particularly Tugan bypass
Total	23,300		23,300		
Total of Release Areas	50,587		42,667		

Source: *Population Data and Projections, Tweed Shire*, Tweed Shire Council, 2004

Tweed Shire Council advised that Table 3.3 does not include any residential land around Kingscliff.

These figures indicate that the Pacific Highlands residential development at Bilambil Heights will be associated with about 15.8% of total future population.

3.3 Value to Tweed Shire Council

The Pacific Highlands development project, scheduled to be constructed and occupied over 10 -15 years, will result in significant income to Council in terms of initial planning contributions and, eventually, rates.

- **Domestic Water, Sewerage and Contribution Plan** estimates (\$94 and 96)¹ (at current rate base):

This suggests:

\$24,000/tenement x 1,894² total = \$45,456,000 total over the entire development project

- **Rates Income** estimates (at current rate base):

Residential:

On the completion of the project, this suggests a total of:

\$574/annum x 1,894 = \$1,097,156/annum
(Estimated from the Tweed Council estimates of current average rate per residential assessment (\$574) by 1,894 eventual residential properties)

Commercial and Retail:

\$1,773 x 45³ = \$79,785/annum
(Estimated from the Tweed Council estimates of current average rate per business assessment (\$1,773 per annum) by 45 (eventual) business activities).

On completion of the development project, when 1,894 tenements are sold and occupied and 45 business enterprises are operating, Tweed Council might therefore expect a rate income of

\$1,166,941 per annum total (at current values).

¹ Tweed Shire Council estimates

² Estimated by WT Partnership, Table 4.1 refers

³ Indicative Estimate, Table 4.1 refers

4. Economic Impact Assessments

Background

For this assessment, the Pacific Highlands development project can be considered in three economic components: 1) *construction*, 2) *operational activities* and 3) *increased household consumption*

Conceptually, the Pacific Highlands project will have an economic impact on the Tweed local economy by way of its direct (initial) activities and by way of its indirect (flow-on) activities.

Direct construction activity can be defined as that economic activity undertaken to complete all infrastructure and building required to complete the development project. This would include all land works, houses, offices, shops and schools construction.

Direct operational activity can be defined as all economic activity occurring in Pacific Highlands once the development project is completed. This would include the business activities of the retirement villages, nursing homes, schools, commercial and retail outlets.

It should be noted that this economic assessment does not include the value of the any financial aspect of the development project. It does not for example cover the value of the residential properties.

All three phases of the Pacific Highlands development project will have a flow-on or indirect effect on the local economy as other local firms and businesses are affected by the initial or direct activity. For example, local business services firms might be involved in legal and accounting support, and local transport industries will be involved in the supply of stock for the various retail businesses which will eventually operate in Pacific Highlands.

Methodology

The Tweed Economic Development Corporation Ltd (TEDC) has recently developed a regional economic modelling system for the local government areas of the Northern Rivers NSW local government areas, including the Tweed Shire. The system, which was specially designed and developed for regional level use, involves innovative, best practice, robust, accurate and dynamic computer generated planning tools. TEDC has the capacity and expertise inhouse to run a range of economic analyses for a variety of end users.

The system is known “An Economic Model for the Tweed and Northern Rivers” and consists of two main components: a regional database (or transaction table) specially collected for the Tweed Shire and a computer based modelling system, based on input-output methodology, capable of manipulating the database.

Appendices 3 and 4 give further information.

The estimates of the direct impacts or effects for the overall Pacific Highlands development project were estimated by Terranora Group Management. The economic model was run to provide estimates of the indirect and total effects.

The following should be noted:

- These data are based on preliminary information and estimates and should be regarded as indicative only. These could be revised once more accurate information becomes available
- It is estimated at this stage that the entire project will take 10-15 years to complete. By the end of this time, all tenements will be sold and houses built and occupied, and all businesses constructed and operational. The assessment is undertaken on a single year – i.e. total construction activity is rolled into a single year and a single year of operational activity is estimated. The latter is the equivalent to that which will occur once all retail, commercial and industries are constructed and fully operational
- The employment estimates are in fulltime equivalents (FTE) and represent *the overall jobs or positions*. It is emphasised that FTE in this case does not reflect the actual number of people employed. Construction activity on the overall project is likely to occur over several years and it is highly probable that the same labour force would be involved
- The employment estimates for all three components of this study have been estimated by the model, and are therefore based on the current economic structure and existing industry patterns in the Tweed. Given the preliminary nature of the data supplied, TEDC considers that estimates from the model would be the most realistic at this stage
- All values are in 2006 values. The Tweed transaction table which was in 2002/3 was updated appropriately for this study.

4.1 Construction

The following should be noted:

- Construction costs: these were supplied by WT Partnership and are considered to be “a indicative broad order of the likely construction costs” for the purposes of a preliminary economic assessment
- It is estimated that the construction of the overall project will take place over approximately 10-15 years. In order to simplify the economic analysis at this stage, the construction phase was modelled as if it had occurred over a single year: i.e. all construction activity was represented in a single nominal year
- In lieu of no better details at this stage, it is presumed that all construction activity follows the patterns as exist in the current Tweed economy.

Direct Effects

The following construction estimates were supplied and verified by the Terranora Group Management. All construction activity was considered to fall within the Construction sector of the Tweed input-output table or database; Appendix 2 shows the industry classification scheme for the Tweed.

Table 4.1: Pacific Highlands, Total Construction Estimates

Precinct	Description	No. of Residences	Ea m2	Construction Costs
A	Village Centre			
	Community Club			\$2,160,000
	Village Shopping Centre			\$6,480,000
	Boutique Hotel, 50 rooms			\$38,400,000
	Tavern			\$1,848,000
	Hospitality Training school			\$1,080,000
	Local Business Suites			\$3,240,000
	Child Care			\$660,000
	Car parking, part in ground		498	\$7,470,000
	Village residential	143	200	\$61,776,000
B1	Retirement Village	209	100	\$45,144,000
	Central Facilities			\$7,500,000
	Manager			\$450,000
	Car parking, external		210	\$630,000
B2	100 Bed Nursing Home	100	60	\$12,960,000
	Central Facilities			\$3,750,000
	Manager			\$450,000
	Car parking, external		40	\$120,000
D	Low Density Housing	115	400	\$66,240,000
E	Low Density Housing	94	400	\$54,144,000
F	Medium Density Housing	83	300	\$38,844,000
G	Retirement Village	165	100	\$29,700,000
	Central Facilities			\$7,500,000
	Manager			\$450,000
	Car parking, external		166	\$498,000
H1	Private School			\$15,000,000
	Car parking, external			\$1,000,000
H2	School - special studies area			\$3,000,000
	Car parking			\$500,000
I	Hilltop Village Commercial			
	Arts & Craft Centre			\$768,000
	Galleries			\$960,000
	Cafes			\$768,000
	Health Spa			\$2,160,000
	Local Shops			\$864,000
	Car parking, part in ground		110	\$1,650,000
	Hilltop Village Residential	290	200	\$125,280,000
	Reservoir Incl in Englobo			
J				
K1	Retirement Village	188	100	\$40,608,000
	Central Facilities			\$7,500,000
	Manager			\$450,000
	Car parking			
K2	Car parking, external		189	\$567,000
	100 Bed Nursing Home	100	60	\$13,680,000
	Central Facilities			\$3,750,000

	Manager			\$450,000
	Car parking, external		40	\$120,000
L	Hillside Housing	52	400	\$34,944,000
M	Low Density Housing	185	400	\$106,560,000
N	Hillside Housing	35	400	\$23,520,000
O	Low Density Housing	31	400	\$17,856,000
P	Local Centre			\$3,000,000
Q	Retirement Village	104	100	\$22,464,000
	Central Facilities			\$7,500,000
	Manager			\$450,000
	Car parking, external		110	\$330,000
	Infrastructure and building pads			\$66,000,000
	Englobo Civils			\$30,000,000
	Landscaping and footpaths			\$83,000,000
	ESD Initiatives			\$50,309,650
			4,983	\$1,056,502,650
	Design & PM Fees			\$105,650,265
	Contingency			\$116,215,292
	TOTAL	1,894	4,983	\$1,278,368,207

Source: WT Partnership, 27 June 2006

Table 4.1 indicates that the total cost of construction of all aspects of the overall development project is estimated to be in the vicinity of \$1,278 million. This is the *direct effect* of all construction activity associated with the overall Pacific Highlands development project as defined. These data were inserted into the input-output modelling system and the indirect and total effects of the overall construction of the project were generated.

Indirect and Total Effects

Table 4.2 shows some of the results obtained from the model, indicating the probable indirect and total effects that might be expected. Appendix 1 gives the various definitions used in this assessment.

Table 4.2: Summary, Direct, Indirect and Total Effects, Pacific Highlands, Construction Estimates, Tweed

Sector	Direct (Initial)	Indirect (Flow-on)	Percent	Total	Percent
Output in \$t					
Construction	1,278,368	125,886	8.75	1,404,254	51.68
Property and Business Services	-	266,133	18.50	266,133	9.79
Retail Trade	-	174,358	12.12	174,358	6.42
Transport	-	145,630	10.12	145,630	5.36
All Other Sectors	-	726,904	50.51	726,905	26.75
Total	1,278,368	1,438,911	100.00	2,717,280	100.00
Value Added in \$t					
Construction	348,609	34,329	6.03	382,938	41.73
Property and Business Services	-	120,274	21.14	120,274	13.11

Retail Trade	-	70,500	12.39	70,500	7.68
Transport	-	66,041	11.61	66,041	7.20
All Other Sectors	-	277,830	48.83	277,830	30.28
Total	348,609	568,974	100.00	917,583	100.00

Income in \$t

Construction	218,805	21,547	6.46	240,352	43.53
Retail Trade	-	54,784	16.44	54,784	9.92
Property and Business Services	-	53,091	15.93	53,091	9.62
Transport	-	31,038	9.31	31,038	5.62
All Other Sectors	-	172,867	51.86	172,867	31.31
Total	218,805	333,327	100.00	552,132	100.00

Employment in FTE

Construction	6,222	613	5.79	6,835	40.66
Retail Trade	-	2,156	20.36	2,156	12.82
Property and Business Services	-	1,549	14.63	1,549	9.22
Transport	-	889	8.39	889	5.29
All Other Sectors	-	5,383	50.83	5,384	32.01
Total	6,222	10,590	100.00	16,813	100.00

Some rounding errors occur

Output

In terms of the *indirect and total effect*, the construction costs of \$1,278 million are associated with a flow-on or indirect effect on the output of the local economy in the magnitude of \$1,439 million. The total impact in terms of output is approximately \$2,717 million.

Sectors in the Tweed economy most likely to be affected by the construction of the Pacific Highlands development project are *Property and Business Services* (with a total impact of \$266 million or almost 10% of the total), *Retail Trade* (\$174 million or over 6%) and *Transport* (\$146 million or 5%).

Value Added

In terms of value added, the project is associated with an initial or direct value of approximately \$349 million. This is associated with a further \$569 million in indirect effects, and a total of \$918 million. The sectors most likely to be affected are *Property and Business Services* (\$120 million or 13% of total value added), *Retail Trade* (\$71 million or almost 8%) and *Transport* \$66 million or 7%).

Wages and Salaries

The project is estimated to have an initial or direct impact of almost \$219 million of household income (wages and salaries). The indirect effect is approximately \$333 million and the total impact \$552 million. Again, the sectors most likely to be most affected are *Retail Trade*, *Property and Business Services* and *Transport*.

Employment

The initial or direct effect of the construction phase of the project on FTE is estimated at about 6,222 positions (not people) over the life of the entire project. These jobs are associated with a further 10,590 positions and a total impact of 16,813. The caveats at the beginning of this section are again stressed.

The results and the tables shown above are summaries only. Full results are available on request.

4.2 Operations

- Operational activity: these were estimated by the Terranora Group Management in conjunction with the TEDC. They are broad indicators only

Direct Effects

In terms of this economic assessment, the operational aspects of the Pacific Highlands development project can be considered by way of the ongoing economic activity of those industries and business included in the overall development project.

The following operational estimates were suggested, for the approximate 45 businesses likely to be located in Pacific Highlands.

Table 4.3: Estimated Operational Turnover, Pacific Highlands, Tweed

Precinct	Description	Annual Turnover
A	Village Centre	
	Community Club	\$2,000,000
	Village Shopping Centre	\$16,000,000
	Boutique Hotel, 50 rooms	\$6,000,000
	Tavern	\$4,000,000
	Hospitality Training school	\$3,500,000
	Local Business Suites	\$4,000,000
	Child Care	\$900,000
B1	Retirement Village	\$1,000,000
B2	100 Bed Nursing Home	\$5,200,000
G	Retirement Village	\$750,000
H1	Private School	\$3,000,000
I	Hilltop Village Commercial	
	Arts & Craft Centre	\$5,000,000
	Cafes	\$3,000,000
	Health Spa	\$5,000,000
	Local Shops	\$1,600,000
K1	Retirement Village	\$900,000
K2	100 Bed Nursing Home	\$5,200,000
P	Local Centre	\$3,000,000
Q	Retirement Village	\$500,000
	TOTAL	\$70,550,000

Source: Estimated by Terranora Group Management, 21 June 2006

These data were reformatted to comply with the sectors in the Tweed input-output database. Table 4.4 refers; Appendix 2 shows the industry classification scheme for the Tweed.

Table 4.4: Concordance, Industry Sectors: Input-Output Classification, Pacific Highlands, Tweed

Tweed Industry Sector	Input-Output Sector and Percentage
Cafes	100% Accommodation, Restaurants and Cafes
Boutique Hotel, 50 rooms	100% Accommodation, Restaurants and Cafes
Private School	100% Education
Hospitality Training school	100% Education
Child Care	100% Education
Retirement Village	100% Health and Community Services
100 Bed Nursing Home	100% Health and Community Services
Health Spa	100% Personal Services
Local Business Suites	100% Property and Business Services
Tavern	75% Retail Trade, 25% Recreation and Entertainment
Galleries	75% Recreation and Entertainment, 25% Retail Trade
Community Club	100% Recreation and Entertainment
Arts & Craft Centre	80% Retail Trade, 20% Recreation and Entertainment
Village Shopping Centre	100% Retail Trade
Local Shops	100% Retail Trade
Local Centre	100% Retail Trade

Table 4.5 indicates these data, resorted into input-output sectors and allocated values.

Table 4.5: Operational Activity, Pacific Highlands, by Input-Output Sectors, Tweed

Sector	Value
Accommodation, Restaurants and Cafes	\$9,000,000
Education	\$7,400,000
Health and Community Services	\$13,550,000
Personal Services	\$5,000,000
Property and Business Services	\$4,000,000
Recreation and Entertainment	\$4,300,000
Retail Trade	\$27,700,000
Total	\$70,950,000

Tables 4.3 and 4.5 indicate that, on completion, the total turnover of all retail, business and light industries eventually operating in Pacific Highlands might be in the vicinity of \$71 million. The data from Table 4.5 were inserted into the input-output modelling system and the indirect and total effects of all eventual business activity were estimated.

Indirect and Total Effects

Table 4.6 shows some of the results obtained from the model, indicating the probable indirect and total effects that might be expected in association with the operational estimates, totalling \$70.95 million as indicated above. Appendix 1 gives the various definitions used in this assessment.

Table 4.6: Summary, Indirect and Total Effects, Pacific Highlands, Operational Estimates, Tweed

Sector	Direct	Indirect	Percent	Total	Percent
Output Impacts, \$t					
Retail Trade	27,700	11,541	18.10	39,241	29.13
Property and Business Services	4,000	14,711	23.07	18,711	13.89
Health	13,550	1,721	2.70	15,271	11.34
Accommodation, Cafes and Restaurants	9,000	5,501	8.63	14,501	10.76
All Other Sectors	16,700	30,286	47.5	46,986	34.88
Total	70,950	63,760	100.00	134,710	100.00
Value Added Impacts, \$t					
Retail Trade	11,200	4,666	17.82	15,867	26.88
Property and Business Services	1,808	6,648	25.38	8,456	14.33
Health	6,890	875	3.34	7,765	13.15
Education	4,835	837	3.20	5,672	9.61
All Other Sectors	8,106	13,167	50.26	21,272	36.03
Total	32,839	26,193	100.00	59,032	100.00
Income Impacts, \$t					
Retail Trade	8,703	3,626	22.87	12,329	30.37
Health	5,741	729	4.60	6,470	15.94
Education	3,777	654	4.12	4,431	10.91
Accommodation, Cafes and Restaurants	2,444	1,494	9.42	3,937	9.70
All Other Sectors	4,076	9,353	58.99	13,429	33.08
Total	24,741	15,856	100.00	40,596	100.00
Employment Impacts, FTE					
Retail Trade	342	143	27.17	485	35.90
Health	161	20	3.90	182	13.46
Accommodation, Cafes and Restaurants	97	59	11.30	156	11.57
Education	96	17	3.15	112	8.30
All Other Sectors	130	286	54.48	416	30.77
Total	826	525	100.00	1,351	100.00

Some rounding errors occur

Output

In terms of the *indirect and total output*, the *direct operational output* of almost \$71 million is associated with a flow on or indirect effect on the output of the local economy in the magnitude of nearly \$64 million. The total impact in terms of output is approximately \$135 million.

Sectors in the Tweed economy most likely to be affected by the operational activity of the businesses located in Pacific Highlands are *Retail Trade* (\$39.241 million total effect - direct \$ 27.7 million plus indirect \$39.241 million or over 29% of the total effects), *Business Services* (total impact of almost \$18.711 million (direct of \$4.0 million plus indirect of \$14.711 million or almost 14% of the total) and *Health and Community Services* (Indirect of \$1.721 million or 11% of total effects).

Value Added

In terms of value added, the business activities located in Pacific Highlands are associated with an initial or direct value added of \$32.839 million, an indirect effect of a further \$ 26.193 million, and a total effect of over \$ 59.032 million. The sectors most likely to be affected are *Retail Trade* (\$15.867 million or over 26% of total impacts)

Property and Business Services (\$8.456 million or 14% of total value added) and *Health and Community Services* (\$7.765 million or about 13% of total effects).

Wages and Salaries

The eventual business activity in Pacific Highlands is estimated to have an initial or direct impact of approximately \$24.741 million paid by way of household income (wages and salaries). The indirect effect is approximately \$15.856 million and the total wages and salaries paid \$40.596 million. The sectors most likely to be most affected are *Retail Trade*, *Health and Community Services* and *Education*.

Employment

The model estimates that, at the level of turnover estimated (\$70.950 million), approximately 826 FTE direct positions might be expected. These jobs are associated with a further 525 positions and a total impact of 1,351 jobs. The caveats at the beginning of this section are again stressed.

Table 4.6 shows that the direct jobs associated with \$70.950 million of business activities are most likely to be found in the *Retail Trade*, *Health and Community Services* and *Accommodation and Cafes and Restaurants* sectors. The indirect or flow-on positions are likely to be found primarily in the same sectors, as are the total positions.

4.3 Increase in Household Consumption

The estimates from WT Partnership indicate that, once completed, the overall Pacific Highlands development project will be associated with approximately 1,894 residential buildings or residences. Table 4.7 indicates the number of people actually residing there.

Table 4.7: Estimated Residents, Pacific Highlands

Precinct	Description	Number of Residences	People Density*	Estimated Number of Residents	Estimated Percentage Newcomers**	Estimated Number Newcomers
A	Village residential	143	1.7	243	60%	146
B1	Retirement Village	209	1.5	314	75%	235
B2	100 Bed Nursing Home	100	1.0	100	80%	80
D	Low Density Housing	115	2.6	299	60%	179
E	Low Density Housing	94	2.6	244	60%	147
F	Medium Density Housing	83	2.6	216	60%	129
G	Retirement Village	165	1.5	248	75%	186
	Hilltop Village Residential	290	2.6	754	60%	452
K1	Retirement Village	188	1.5	282	75%	212
K2	100 Bed Nursing Home	100	1.0	100	80%	80
L	Hillside Housing	52	2.6	135	60%	81
M	Low Density Housing	185	2.6	481	60%	289
N	Hillside Housing	35	2.6	91	60%	55
O	Low Density Housing	31	2.6	81	60%	48

Q	Retirement Village	104	1.5	156	75%	117
		1,894	2.0	3,743	na	2,436

*People Density: Sourced from Tweed Shire Council *Current and Future Population in Central Tweed Heads, 2004*, various ABS estimates and other data held by TEDC on Nursing Homes and Retirement Villages.

** Estimated Percentage of Newcomers: Sourced from various data held by TEDC.

Table 4.7 estimates that although 3,743 people will eventually reside in Pacific Highlands, 2,436 will be newcomers to the Tweed. The difference (1,307 people) will be relocating from existing residences in Tweed Shire into Pacific Highlands.

The following should be noted:

- The household consumption of the 2,436 newcomers who will be residing in the Tweed was modeled on the assumption that their incomes and spending patterns would be similar to those residing in the Tweed at present.
- The results from this analysis are rough estimates only: these could be revised once more accurate information becomes available.

Direct Effects

The direct effect of the household expenditure by the 2,436 new residents in the Tweed on industries in the Tweed was approximately \$18.204 million. It should be noted that this estimate does not include taxes and imports.

Indirect and Total Effects

Table 4.8 shows some of the results obtained from the model, indicating the probable indirect and total effects that might be expected in association with the increased household consumption estimates, totalling \$18 million as indicated above. Appendix 1 gives the various definitions used in this assessment.

Table 4.8: Summary, Indirect and Total Effects, Pacific Highlands, Increased Household Consumption, Tweed

Sector	Direct	Indirect	Percent	Total	Percent
Output Impacts, \$t					
Retail Trade	4,512	2,808	18.23	7,320	21.78
Property and Business Services	2,653	3,571	23.18	6,224	18.52
Accommodation, Cafes and Restaurants	2,217	1,296	8.42	3,513	10.45
Health	1,526	390	2.53	1,916	5.70
All Other Sectors	7,296	7,337	47.64	14,633	43.55
Total	18,204	15,402	100.00	33,606	100.00
Value Added Impacts, \$t					
Retail Trade	1,824	1,135	17.95	2,960	20.71
Property and Business Services	1,199	1,614	25.52	2,813	19.68
Accommodation, Cafes and Restaurants	825	482	7.63	1,307	9.15
Health	776	198	3.13	974	6.82
All Other Sectors	3,342	2,894	45.77	6,235	43.64
Total	7,966	6,323	100.00	14,289	100.00

Income Impacts, \$t					
Retail Trade	1,418	882	23.13	2,300	25.02
Property and Business Services	529	712	18.67	1,242	13.51
Accommodation, Cafes and Restaurants	602	352	9.23	954	10.38
Health	647	165	4.33	812	8.83
All Other Sectors	2,180	1,704	44.64	3,883	42.26
Total	5,376	3,815	100.00	9,191	100.00
Employment Impacts, FTE					
Retail Trade	56	35	27.39	90	29.60
Accommodation, Cafes and Restaurants	24	14	11.03	38	12.39
Property and Business Services	15	21	16.41	36	11.85
Health	18	5	3.66	23	7.46
All Other Sectors	66	52	66.00	119	38.70
Total	179	127	100.00	306	100.00

Output

In terms of the *indirect and total output*, the *direct household consumption* of approximately \$18.204 million is associated with a flow on or indirect effect on the output of the local economy in the magnitude of about \$15.402 million. The total impact in terms of output is approximately \$33.606 million.

Sectors in the Tweed economy most likely to be affected by the operational activity of the businesses located in Pacific Highlands because of this increased consumption are *Retail Trade* (\$7.320 million total effect - direct \$ 4.512 million plus indirect \$2.808 million or over 22% of the total effects), *Property and Business Services* (total impact of over \$6 million (direct of \$2.653 million plus indirect of \$3.571 million or almost 18.52% of the total) and *Accommodation, Cafes and Restaurants* (total of \$3.513 million or almost 11% of total effects).

Value Added

In terms of value added, the increased household consumption in Pacific Highlands is associated with \$7.966 million, an indirect effect of a further \$6.323 million, and a total effect of over \$14.289 million. The sectors most likely to be affected are *Retail Trade* (\$2.960 million or almost 21% of total impacts) *Property and Business Services* (\$2.813 million or almost 20% of total value added) and *Accommodation, Cafes and Restaurants* (total of \$1.307 million or over 9% of total effects).

Wages and Salaries

The eventual increase of household expenditure in Pacific Highlands is estimated to have an initial or direct impact of approximately \$5.376 million paid by way of household income (wages and salaries). The indirect effect is approximately \$3.815 million and the total wages and salaries paid \$9.191 million. The sectors most likely to be most affected are *Retail Trade*, *Property and Business Services* and *Accommodation, Cafes and Restaurants*

Employment

The model estimates that, at the level of household consumption indicated (\$18.204 million), approximately 179 FTE direct positions might be expected. These jobs are

associated with a further 127 positions and a total impact of 306 jobs. The caveats at the beginning of this section are again stressed.

Table 4.8 shows that the direct jobs associated with \$18.204 million of increased household consumption are most likely to be found in the *Retail Trade, Accommodation and Cafes and Restaurants* and *Accommodation, Cafes and Restaurants*.

Appendix 1: Some Definitions

- *Initial or direct effect*, in this assessment, is the value of the construction and operational phases of the Pacific Highlands development project as specified
- *Flow-on or indirect effect* which extends beyond the initial round of purchases and employment, and represent the additional value adding, income and employment generated resulting from second, third, and subsequent-round purchases flowing throughout the local economy.
- *Total impact*, which is the sum of the direct and indirect effects.

In this study, impacts are measured on four key economic indicators:

- *Gross output*. This represents the total value of production of the industries under consideration on all goods and services purchased in the chain of production by firms in the local economy
- *Gross regional product (GRP)*. Gross output measures are susceptible to multiple counting because they sum all the intermediate transactions over all stages of production during the production process. Consequentially, they can substantially overstate the contribution to economic activity. A preferred measure of the contribution to economic growth is value added. This is technically defined as wages and salaries and supplements paid to labour plus gross operating surplus plus indirect taxes on products and production less subsidies, but for practical purposes measures payments to factors of production (labour and capital), including net taxes on production. The sum of all industry value added is equal to gross regional product (GRP), so value added impacts refer to the contribution to GRP (or gross state product (GSP) at the state level and gross domestic product (GDP) at the national level). This is the accepted economic measure of what an economy produces
- *Household income*. This is the income earned by employees as part of the normal operations of the economy
- *Employment*. The number of full-time equivalent jobs generated.

Appendix 2: Tweed Input-Output Industry Concordance

Tweed Industry		Input-Output Industry Classification (IOIC) 1996-97	
1	Livestock	101	Sheep
		103	Beef cattle
		104	Dairy cattle
		105	Pigs
		106	Poultry
2	Cane growing		
3	Fruit, Vegetables and Other Agriculture	102	Grains
4	Horticulture	107	Other agriculture
5	Services to Agriculture	200	Services to agriculture; hunting and trapping
6	Forestry and Logging	300	Forestry and logging
7	Fishing	400	Commercial fishing
8	Mining	1100	Coal; oil and gas
		1301	Iron ores
		1302	Non-ferrous metal ores
		1400	Other mining
		1500	Services to mining
9	Food manufacturing	2101	Meat and meat products
		2102	Dairy products
		2103	Fruit and vegetable products
		2104	Oils and fats
		2105	Flour mill products and cereal foods
		2106	Bakery products
		2107	Confectionery
		2108	Other food products
		2109	Soft drinks, cordials and syrups
		2110	Beer and malt
		2111	Wine and spirits
		2112	Tobacco products
10	Textiles, clothing and footwear	2201	Textile fibres, yarns and woven fabrics
		2202	Textile products
		2203	Knitting mill products
		2204	Clothing
		2205	Footwear
		2206	Leather and leather products
11	Wood and paper products	2301	Sawmill products
		2302	Other wood products
		2303	Pulp, paper and paperboard
		2304	Paper containers and products
12	Printing and Publishing	2401	Printing and services to printing
		2402	Publishing; recorded media and publishing
13	Chemical products	2501	Petroleum and coal products
		2502	Basic chemicals
		2503	Paints
		2504	Medicinal and pharmaceutical products, pesticides
		2505	Soap and detergents
		2506	Cosmetics and toiletry preparations
		2507	Other chemical products
		2508	Rubber products
		2509	Plastic products

14	Non-metallic mineral products	2601	Glass and glass products
		2602	Ceramic products
		2603	Cement, lime and concrete slurry
		2604	Plaster and other concrete products
		2605	Other non-metallic mineral products
15	Metal products	2701	Iron and steel
		2702	Basic non-ferrous metal and products
		2703	Structural metal products
		2704	Sheet metal products
		2705	Fabricated metal products
16	Machinery, appliances and equipment	2801	Motor vehicles and parts; other transport equipment
		2802	Ships and boats
		2803	Railway equipment
		2804	Aircraft
		2805	Photographic and scientific equipment
		2806	Electronic equipment
		2807	Household appliances
		2808	Other electrical equipment
		2809	Agricultural, mining and construction equipment
		2810	Other machinery and equipment
17	Other manufacturing	2901	Prefabricated buildings
		2902	Furniture
		2903	Other manufacturing
18	Electricity, gas and water	3601	Electricity supply
		3602	Gas supply
		3701	Water supply; sewerage and drainage services
19	Construction	4101	Residential building
		4102	Other construction
20	Wholesale trade	4501	Wholesale trade
21	Retail trade	5101	Retail trade
		5401	Mechanical repairs
		5402	Other repairs
22	Accommodation, cafes and restaurants	5701	Accommodation, cafes and restaurants
23	Transport and storage	6101	Road transport
		6201	Rail, pipeline and other transport
		6301	Water transport
		6401	Air and space transport
		6601	Services to transport; storage
24	Communication services	7101	Communication services
25	Finance and insurance	7301	Banking
		7302	Non-bank finance
		7401	Insurance
		7501	Services to finance, investment and insurance
26	Property and Business Services	7701	Ownership of dwellings
		7702	Other property services
		7801	Scientific research, technical and computer services
		7802	Legal, accounting, marketing and business management services
		7803	Other business services
27	Public administration and defence	8101	Government administration
		8201	Defence
28	Education	8401	Education
29	Health and Community Services	8601	Health services
		8701	Community services
30	Recreation and entertainment services	9101	Motion picture, radio and television services

31	Personal Services	9201	Libraries, museums and the arts
		9301	Sport, gambling and recreational services
		9501	Personal services
		9601	Other services

Primary Input Sectors

	Sector Description
P1	Compensation of employees
P2	Gross operating surplus and mixed income
P3	Net Taxes
	Imports
P4	Gold Coast
P5	Rest of NSW
P6	Rest of Queensland
P7	Rest of Australia
P8	Overseas
P9	Interregional

Final Demand Sectors

	Sector Description
Q1	Household final consumption expenditure
Q2	Other Final Demand
	Exports
Q3	Gold Coast
Q4	Rest of NSW
Q5	Rest of Queensland
Q6	Rest of Australia
Q7	Overseas
Q8	Interregional

Appendix 3: An Introduction to the Tweed Economic Development Corporation and the Tweed & Northern Rivers Economic Model

The Tweed Economic Development Corporation Ltd

The Tweed Economic Development Corporation Ltd (TEDC) is an independent company limited by guarantee, established by Tweed Shire Council in 1997, to give leadership and direction to job-creating investment growth and business attraction in the Tweed Shire.

The TEDC is governed by an independent Board of Directors, consisting of nine (9) autonomous people of diverse private and public sector backgrounds, qualifications and experience.

Development of the Tweed & Northern Rivers Economic Model

For some years the TEDC had been confronted by massive change throughout the NSW Northern Rivers region, particularly in terms of rapid population growth and coastal population intensification. Growing tourist visitation had altered the historic agricultural dominance of the regional economies with service sector industries becoming increasingly more important.

By 2003, TEDC recognised the need for the introduction of reliable and accurate tools which would allow TEDC and the Northern Rivers local councils to better achieve their responsibilities in terms of planning and management and best support sustainable development throughout the region. A robust understanding of the local and regional economic structures, and the ability to manipulate and test various change agents and scenarios, was seen as imperative.

To this end, TEDC in 2004 obtained substantial funding from the Australian Government Department of Transport and Regional Services under the Sustainable Regions Programme. TEDC then commissioned, through the Sustainable Tourism Cooperative Research Centre, a research team from The Centre for Economic Policy Modelling at the University of Queensland to undertake the project which is now called “An Economic Model for the Tweed and Northern Rivers”.

The original project, completed in 2005, included the local government authorities (LGAs) of Tweed, Byron, Ballina, Lismore, and Kyogle. This was extended in late 2005 to include, at the request and cost of the NSW Government Department of Infrastructure, Planning & Natural Resources (DIPNR), the Richmond Valley Shire LGA.

An Economic Model for the Tweed and Northern Rivers

The economic modeling system, which was specially designed and developed for regional level use, involves innovative, best practice, robust, accurate and dynamic computer generated planning tools.

At an LGA level, it consists of two main components: 1) a regional database (or transaction table) specially collected for each LGA and 2) a computer based modelling system, based on input-output methodology, capable of analysing the database. In addition, TEDC manages an interregional table which is comprised of all the individual tables.

One of the strengths of the project was that the funding allowed for a data collection system of both primary and secondary data, with the primary data being collected over ten months by surveying businesses, individuals and industry associations across the six local government authorities (LGAs) by the on-the-ground University research team. The process also incorporated other published data available at a local, regional, state and national level in the construction of the regional sets of accounts (the regional databases). This allows for an unusually accurate and detailed understanding of each local economic structure, comparing most favourably with more traditional economic models which rely on more macro data and are most often constructed on a one-off basis.

The regional set of accounts is updated annually, which ensures the data remains current. At present, the Tweed transaction table has been updated to 2004/05, and the Richmond Valley Shire table is also that of 2004/5. The update to 2004/5 of the four other Northern Rivers LGA tables will follow shortly.

The system designed and implemented for TEDC and the local Councils allows a range of socio-economic modelling options. These vary from a first level understanding of the local economic structure in terms (for example) of industry output, value added and employment to a highly sophisticated input-output industry analysis. TEDC has maintained the capacity and expertise inhouse to run a range of economic analyses for a variety of end users.

Appendix 4 to this report gives further details on the input-output methodology underpinning the modelling systems.

The Research Team

The Research Team contracted by TEDC in 2004 to undertake the original project was headed by Professor Guy West and involved various members of the Centre of Economic Policy Modelling (CEPM), including Ms Barbara Bayne.

The CEPM is a centre for academic and contract research located within the School of Economics at the University of Queensland. It's focus is the development and application of economic modelling techniques, particularly in the fields of policy analysis and economic forecasting.

The CEPM, which is well recognised both nationally and internationally, has developed into a comprehensive research centre providing economic research and applied services including policy advice to a range of private and public sector enterprises.

Both Professor West and Ms Bayne are now contracted by TEDC on an ongoing consultancy basis. Their responsibilities include economic analysis using the model as well as training and mentoring of TEDC and Council staff. Ms Ainsley Currie, a full time member of TEDC staff, is working with Guy and Barbara to gain practical experience in economic modelling and analysis.

Appendix 5 to this report gives further details on Professor West, Ms Bayne and Ms Currie.

Applications of the Model

The Tweed & Northern Rivers Regional Economic Model has a significant number of applications for both the public and private sector.

The Modelling system will allow government authorities to:

- Improve planning and management of a range of issues through a better understanding of the local and regional economic structure;
- Provide detailed assessment of the industries that drive the local economy to identify optimal industry development initiatives;
- Identify existing economic strengths, weaknesses, opportunities and threats;
- Evaluate and compare alternative policy initiatives;
- Measure the significance of existing economic activities and industries on the socioeconomic fabric;
- Monitor, analyse and evaluate the structural changes that are occurring over time in the economy;
- Undertake “what-if” scenario projections; and
- Identify, evaluate and quantify the benefits of proposed development projects and business initiatives.

The Model will also allow private sector decision makers, on a cost-recovery basis, to:

- Analyse the regional economic impact of potential developments, strategic investment proposals or industry closure;
- Determine the size, contribution and economic relativity of any industry and quantify the direct and indirect economic impact of that industry in terms of its effects on the local economy;
- Analyse the impact of changes in economy policy, especially in taxes, tariffs, environmental regulations and competition;
- Undertake “what if” scenario projections;
- Add weight to feasibility studies, grant applications and lobbying; and
- Augment an industry’s financial reporting with information on the economic impact of that industry on the local/regional economy.

Independent Economic Impact Assessments

Using the Tweed & Northern Rivers Economic Modelling Tool, the TEDC has the capability in-house to undertake industry and economic impact assessments to assist in TEDC’s economic development activities and conduct policy analyses.

However, the TEDC also has the capacity to undertake independent economic impact analyses of the impact of proposed developments in the region of the Tweed and/or

Northern Rivers for external agencies, including the NSW Road & Traffic Authority's Assessment of the Ballina/Byron Motorway Bypass and various state-significant Tweed commercial interests.

National Award Winning Economic Modelling Tool

In 2005, the TEDC was awarded the inaugural "AusIndustry National Award for Innovation in Economic Development Excellence" for the development of the Tweed & Northern Rivers Economic Model, judged by industry peers as an innovative, best-practice economic modelling tool, which provides a robust foundation for the identification, measurement and evaluation of socio-economic development projects that best support sustainable development of the Tweed and Northern Rivers in an environment of rapid change.

Appendix 4: An Overview of Input-Output Modelling

The methodology described in this Appendix is consistent with state, national and international guidelines for conducting economic impact studies for the various governments and funding bodies using input-output analysis.

Economic Impact Assessment

Economic impact analysis work often depends on the ability to estimate the total effect on a local or regional economy from changes that take place within a particular industry or industries. These estimations frequently depend on input-output models that quantify the interactions between firms and industries within a particular study region.

Impact analysis is one form of analysis often undertaken within the input-output framework, and requires the calculation of multipliers. While it is possible to compute multipliers for a wide range of economic variables, those of most interest (as in this study) are typically output, value added, income and employment.

Direct (or Initial) Effects

Direct economic effects are the changes in local business activity occurring as a direct consequence of public or private business decisions, or public policies, programs or projects.

Indirect (or Flow-on) Effects

In general, the broader indirect or induced economic effects that follow from any type of direct effect are sometimes referred to as "multiplier effects", and they frequently make the overall economic impacts substantially larger than the direct effects alone.

These indirect or flow-on effects extend beyond the initial round of purchases and employment, and represent the additional value adding, income and employment generated resulting from second, third, and subsequent-round purchases flowing throughout the local and regional economy.

In most studies, the importance of a particular industry as an economic sector within the Northern Rivers NSW economy stems not only from its own size in terms of employment and output, but also from its linkages to other industries in the region.

The regional economy is composed of many industries and/or sectors that buy and sell from each other. These inter-industry purchases can be measured to show the relative strength of interindustry linkages for each industry in the regional economy.

For example, agricultural industries and farms and employees purchase goods and services that stimulate economic activity in other industries; macadamia farmers in the area purchase goods and services from contract harvesters, as well as fuel and parts

from local suppliers. Economic impact analysis makes it possible to estimate the dollar value of these linkages within the local economy.

Total (Direct plus Indirect) Effects

The total effect on the local or regional economy is the sum of the direct (or initial) impact plus the indirect (or flow) effect.

Input-Output Model

Regional modelling has undergone substantial change over the last two to three decades, with a broad range of economic models having been developed to assist analysts and decision-makers understand a variety of issues as they deal with increasingly complex economic and social matters. These often include likely future outcomes as well as the implications of alternative policies.

The choice of model depends on a number of criteria, primarily on the requirements of any particular use and on the data available. An input-output modelling system was selected as the most appropriate for this project.

Input-output revolutionised the study of economic structure. The first empirical interindustry model was developed by Leontief in the 1930's in his study of the American economy. Since then, input-output has developed from a relatively simple and naïve tool to one with a seemingly infinite variety of modifications and adaptations.

For many years, input-output was regarded as the workhorse of the regional macro modeller, and in some ways, this has not changed substantially; input-output still remains the core component of many models. What has changed is that the science of modelling, including input-output, has become more complex both in terms of trying to capture a wider subset of reality and in terms of its mathematical structure.

Input-output analysis remains without doubt one of the most powerful and comprehensive methods available for studying the impacts of industry activity. The strength of input-output is based on its detailed interindustry accounts and its ease of use and transparency.

Input-output models enable the derivation of sets of disaggregated multipliers, recognising that the total impact on output (income or employment) will vary according to the sector which experiences the initial increase in demand.

The main concept of the multiplier is based on the recognition that the various sectors that make up the economy are interdependent. This means that in addition to purchasing primary inputs, such as labour and imports, each sector will also purchase intermediate goods and services produced by other companies within the local economy.

Manipulation of the input-output tables allows estimation of different types of multipliers depending on the indicator of interest. The magnitude of these vary depending on the composite of the industry in which spending occurs and the size of the area economy as well as the spending patterns within the local economy and the portion that leaks out to outside areas.

Input-Output Tables

At the centre of any input-output analysis is the input-output, or inter-industry transactions, table. This quantifies in monetary terms the flows of goods and services between industries and sectors of the economy over a stated period of time.

The table shows, in a matrix form with rows (sales) and columns (purchases), the interactions and dependencies between industries within a (regional) system and with the outside (imports and exports).

Changes in Final Demand Modelling

This method measures the effect resulting from the loss of final demand sales by the activity or industry in question. This approach arises directly from the basic assumption of the input-output model that output is demand generated through final demand sales. The calculation procedure involves multiplying the simple input-output multiplier for the industry in question by the level of final demand sales of that industry.

This is simply an extension of the multiplier concept: the output data is fed into the input-output model and detailed results are generated in tabular format. The input-output structure provides the tools to allow the estimation of the final demand changes through the whole economy and estimate the total effect on the overall local and/or regional economy in question.

The results are auto-generated by the model and presented in terms of final demand (direct effect), industrial support, consumption, total (total effect), flow-on (indirect effect) as well as percentages.

Key Indicators

Impacts are most often measured in terms of four key economic indicators:

- *Gross output. This represents the total value of production of the industries under consideration on all goods and services purchased in the chain of production by firms in the local and regional economy*
- *Gross regional product (GRP) or Value Added.* Gross output measures are susceptible to multiple counting because they sum all the intermediate transactions over all stages of production during the production process. Consequentially, they can substantially overstate the contribution to economic activity. A preferred measure of the contribution to economic growth is value added. This is technically defined as wages and salaries and supplements paid to labour plus gross operating surplus plus indirect taxes on products and production less subsidies, but for practical purposes measures payments to factors of production (labour and capital), including net taxes on production. The sum of all industry value added is equal to gross regional product (GRP), so value added impacts refer to the contribution to GRP (or gross state product (GSP) at the state level and gross domestic product (GDP) at the national level). This is the accepted economic measure of what an economy produces

- *Household income.* This is the income earned by employees as part of the normal operations of the economy
- *Employment.* The number of full-time equivalent jobs generated.

Further Information

For further information on the methodology used in this study, please refer to the publication: *Introduction and Guide to Applied Input-Output Analysis*, TEDC 2005. A copy of this publication is available from TEDC.

Appendix 5: The TEDC Research Team

Professor Guy West is widely recognised as one of Australia's leading experts in input-output econometric modelling design development and application. One of his recent projects is the development of a multiregional, interindustry econometric forecasting and impact system. He is an accomplished computer programmer and has developed a number of specialised economic models for analysing structural change, as well as more generalised software for interindustry analysis. Experienced in regional economics with specialisation in applied quantitative economics. Current research interests include the theory and application of interindustry models particularly in an integrated spatial econometric framework, the nature of economic structure at the regional and national levels, and regional economic projection, planning and growth. This revolves primarily around the study and identification of economic structure, involving concepts such as fundamental economic structure, structural change and evolution.

Guy has had extensive involvement in over 80 collaborative government and industry research projects, both in Australia and internationally, in the area of economic impact analysis, planning, development and economic policy for federal, state and local government and the private sector.

Ms Barbara Bayne has a background in regional economics, economic modelling, training and marketing as well as aged care, disabilities and mental health. She has worked in both the private and public sectors. She has had substantial experience and expertise in the research and analysis of various research and consultancy projects, including policy and planning, evaluations, with particular emphasis on economic modelling, regional/urban development and policy, including regional structure, regional economic development approaches and analysis, regional and local strategic planning. She has been involved in many collaborative government and industry applied projects, both in Queensland and Australia, in the area of economic impact analysis, policy and planning as well as the development, implementation and training for services for federal, state and local government and the private sector.

She is a member of the Guardianship and Administration Tribunal of Queensland.

Ms Ainsley Currie has a Bachelor of Economics and a Bachelor of Business Management from the University of Queensland.

She has had several years experience both in a range of areas of economic development at a local government area and in business development within the education and training sector for private enterprise.

She has been a fulltime member of TEDC staff since 2004 and is currently involved in sustainable industry development initiatives, statistical research and land use planning and marketing.