



MOUNT EMERALD WINDFARM

ECONOMIC IMPACT

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ABN: 99 734 489 175

Ref: J2592
April 2013

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1. INTRODUCTION

1.1 General

The proponents of the Mount Emerald Windfarm, Ratch Australia Corporation Limited, asked Cummings Economics to prepare an economic impact assessment of the proposed Mount Emerald Windfarm on the local economy.

Appendix 1 gives background on Cummings Economics.

Appendix 2 gives a list of documents and reports referred to in this report.

1.2 Outline of the Project

Mount Emerald Windfarm will involve the construction of approximately 70 wind turbines electricity generators on a rough plateau near Mount Emerald west of the Kennedy Highway between Atherton and Mareeba (see Location Map, Appendix 3 and Layout Map, Appendix 4).

A substation to connect to the electricity grid will be developed.

Access road into the site is already in place on the eastern side coming off roads connecting with the Kennedy Highway in the vicinity of Walkamin (see Map, Appendix 5).

It is proposed that each turbine will have a capacity of 3MW making total capacity of 210MW. The Windfarm will generate around 500,000MW hours of electricity a year.

1.3 Issues & Methodology

The following analysis looks at the project at three levels:

- 1) Direct and 'flow-on' impacts of the project itself on the regional economy;
- 2) Possible wider impacts including secondary and developmental/catalytic type impacts;
- 3) Economic efficiency in relation to public policy and funding aspects.

Economic Impact

This seeks to calculate direct and 'flow-on' impacts of the project on the regional economy during construction and operational phases.

To carry this out necessarily involves 'modelling' the economy of the Tablelands and the region and the expenditure impacts on Gross Regional Product and employment.

This report uses for this the *"Input Output Analysis and Modelling of the Regional Economies of Northern Queensland – North Australia Research Group Modified National Data Model"*.

However one of the issues is being able to isolate where initial expenditure will take place. In this case, it is important to isolate the 'initial' expenditure that takes place in the Tablelands area and in the wider Far North Queensland region including Cairns.

This has proved difficult to isolate. Capital cost, operating costs and employment are generally based on information supplied by Ratch Australia. Report by SKM for Clean Energy Australia, "*Wind Farm Investment, Employment and Carbon Abatement in Australia*", that identified patterns of expenditure by regional, state, and national levels for developments in regional areas of southern Australia was also used as a reference.

Wider Impacts

These are usually defined as 'secondary' and 'developmental or catalytic'.

Secondary

These are defined as impacts on businesses/activities not involved in 'direct' or 'flow-on' relationships with the projects.

In this case, some possible negative secondary impacts have been raised, in relation to surrounding activities. It is beyond our field of expertise to definitely assess whether such impacts will or will not occur.

Developmental/Catalytic

These impacts occur when the project so changes the economic structure in an area, that marginal changes in cost structures or market size that new types of activity become viable, eg. sealing of the Cooktown Road, makes new agricultural development viable.

Economic Efficiency

Because of there are government policies and incentives to encourage generation of electricity other than from fossil fuels, there are aspects of the project that make it a public project. This section looks at the project's economic efficiency as a generation option.

2. DIRECT & 'FLOW-ON' IMPACTS

2.1 Construction Phase

2.1.1 Direct Expenditure in the Region

Information supplied by Ratch Australia indicates capital costs set out in the first column of the following Table #1. The second and third columns, based on knowledge of local business structures and location, estimates the amount that might be initially spent within the Cairns/Far North Queensland region and more specifically within the Tablelands sub region.

Table 1: Estimated Capital Costs & Estimated Amount Initially Spent Within the Region

	<u>Capital cost</u> \$m	<u>Initial expenditure</u> within the FNQ region \$m	<u>Initial expenditure</u> within the Tablelands \$m
Roadworks	\$6.72	\$6.72	\$3.36
Infrastructure	\$0.66	\$0.66	\$0.44
Hardstand	\$0.10	\$0.10	\$0.10
Maintenance building	\$0.15	\$0.15	\$0.15
Fenced storage compound & fuel store	\$0.06	\$0.06	\$0.06
Landscaping	\$0.02	\$0.02	\$0.02
External communications	\$0.33	\$0.33	\$0.11
EPC contract	\$374.70	\$62.90	\$26.95
Wind turbines	\$256.70	-	-
Transport	\$31.80	\$6.00	\$1.50
Electrical works (substation etc.)	\$39.22	\$10.00	\$2.00
Civil works & allowance for ground conditions	\$46.90	\$46.90	\$23.45
Network Service Provider	\$0.28	\$0.28	\$0.28
Total	\$382.36	\$70.56	\$31.03

Note: Initial expenditure on 'road works' and 'infrastructure' is taken to be all taking place within the region but only 50% to 60% respectively directly on the Tablelands.

None of the initial expenditure on the wind turbines is taken to occur in the region. Some 20% of the transport cost is taken to be initially spent within the region and a quarter of that within the Tablelands.

Of the electrical works (substation, etc.), 75% is taken to be imported and only 25% is taken to be initially undertaken in the region in assembly etc., and of this about a third within the Tablelands.

It is thus estimated that of capital expenditure in the construction phase of \$382m, most will be initial expenditure outside the region but that about \$71m will occur in the region and about \$31m within the Tablelands. We thus have the following estimate of proportion of expenditure.

Table 2: Location of Construction Expenditure

	<u>\$m</u>	<u>Percent</u>
Within Tablelands	\$31 m	8%
Within rest of region	\$40 m	11%
Within Far North Qld region	\$71 m	19%
Outside region	\$311 m	81%
Total	\$382 m	100%

This compares with estimates in the SKM research that based on the Hallet project in southern Australia, about 15% of construction was in regional areas, 40% within the State, 20% rest of Australia and 40% overseas.

2.1.2 'Flow-on' Effects

Input/output multiplier tables are available for 106 industry classifications only and this means that they are often available for a broad industry classification only.

In this case, initial expenditure is taken to be in the classification of 'other construction' which will include a broad range of types of construction other than 'residential building' and 'construction trade services'.

For estimation of an impact on the Gross Regional Product, it is necessary to use a 'total value added multiplier', ie. the sum of the 'value added' in the 'initial' operation plus the 'value added' by enterprises that provide the chain of inputs involved.

Estimates of total 'value added' and employment based on North Australia Research Group Multipliers are as follows.

Table 3: Estimate of Total Value Added to the Regional Economy

	<u>Tablelands</u>	<u>Far North Qld</u>
Initial output	\$31.0 m	\$71.0 m
Multiplier ⁽¹⁾	0.851	0.934
Total Value Added	\$26.4 m	\$66.3 m

Table 4: Estimate of Employment Generated in the Regional Economy

	<u>Tablelands</u>	<u>Far North Qld</u>
Initial expenditure multiplier (No. per \$m) ⁽¹⁾	(2.813)	(2.813)
Initial employment	87	200
Flow-on multiplier ⁽¹⁾	(2.430)	(2.738)
Flow-on employment	211	547
Total	298	747

⁽¹⁾ Note: Other (non-dwelling) construction multipliers.

The following tables give percent impact in estimated Gross Regional Product and Employment on the regional economy of a one-year investment period.

Table 5: Impact on Gross Regional Product (GRP)

	<u>Tablelands</u>	<u>Far North Qld</u>
Estimated total value added	\$26 m	\$71 m
Estimated GRP	\$2 bn	\$13 bn
Estimated Impact	1.3%	0.5%

Table 6: Impact on Employment

	<u>Tablelands</u>	<u>Far North Qld</u>
Estimated total employment	18,000	140,000
Estimated employment generated	298	747
Estimated Impact	1.7%	0.5%

We thus have impact on the Tablelands' economy of about 1.7% and on the Far North Queensland regional economy of about 0.5%.

2.2 Operational Phase

2.2.1 Direct Expenditure & Employment

Based on advice from Ratch Australia, expenditure and employment generated during the operational phase will be about two to three times to that outlined in an SKM report based on the Hallet project in South Australia. This rate of increase represents the difference in scale between the two projects.

Estimated local expenditure and employment, on the basis that all employment and initial expenditure will be on the Tablelands is likely to be as follows.

Table 7: Operational Expenditure & Employment on Tablelands ⁽¹⁾

Expenditure		
Operations	\$5,250,000	⁽²⁾
Land rental payments	\$900,000	⁽³⁾
Community payments	\$200,000	
Total	\$6,350,000	
Employment		
Direct operational	15	
Estimated direct employment inherent in expenditure:		
Land rental	0.0	
Community payments	1.6	(\$0.200 m x multiplier 7.773) ⁽⁴⁾
Total	16.6	

Note ⁽¹⁾: As advised by Ratch Australia.

Note ⁽²⁾: Estimated 50% accruing locally of estimated total operating cost of \$150,000 per turbine.

Note ⁽³⁾: Estimated 2% of revenue.

Note ⁽⁴⁾: Government expenditure initial employment multiplier.

2.2.2 Estimated Total Impact including 'Flow-on' Effects

Estimated full economic impacts are estimated as follows on the basis that all the expenditure and employment will be on the Tablelands.

Table 8: Estimated Total Impact on Gross Regional Product & Employment including 'Flow-on' Effects - Tablelands

	Initial Expenditure	Multiplier	Total Value Added ⁽¹⁾
Operations	\$5,250,000	0.869 ⁽¹⁾	\$4,562,000
Land rental	\$900,000	0.896 ⁽¹⁾	\$806,000
Community payments	\$200,000	1.384 ⁽²⁾	\$277,000
Total	\$6,350,000		\$5,645,000

	Initial Employment	Multiplier	Total Employment
Operations	15.0	3.347 ⁽¹⁾	50.2
Land rental	0.0	3.397 ⁽¹⁾	3.2
Community payments	1.6	2.403 ⁽²⁾	3.8
Total			57.2

Note ⁽¹⁾: Electricity supply multiplier.

Note ⁽²⁾: Government administration multiplier.

2.2.3 Estimated Level of Impact on the Economy

Impact on the regional economy is thus estimated at:

Tablelands

Gross Regional Product	0.28%	(\$5.6m ÷ \$2 bn)
Employment.....	0.32%	(57.0 ÷ 18,000)

The project is thus estimated to have an effect of raising the current Tablelands' economy and employment by about 0.3% per annum.

Net Present Value of a stream of benefits of \$5.6m per annum to the Tablelands' Gross Regional Product over a 30-year period at a discount rate of 4% real (approximately 7% nominal) is of the order of \$100m per annum.

3. WIDER IMPACTS

3.1 Secondary Impacts

3.1.1 Surrounding Farming Operations

Some local farm owners have been recorded as opposing the development on the grounds of its potential to affect agricultural aviation operations such as crop spraying.

Report by Rehbein Airport Consulting to Transfield services "Mt Emerald Wind Farm Aeronautical Assessment" raised the possibility of the turbulence wake of the wind turbines affecting agricultural aviation operations at the low wind speeds that agricultural aviation operations are restricted to. Rehbein reports however that given the wind farm boundary, there should be minimal impact.

Indeed, on the eastern side where the majority of cropping activities takes place, the turbines seem to be set 600 metres in from the boundary.

While this is subject of further examination, the economic analysis parameters should there be any effects are as follows.

- a) The value of current and likely future crop production in the area requiring agricultural aviation services. (This can be established by review of ha's under given crops at present and likely in the future.);
- b) The additional costs of agricultural aviation services if the project proceeds. (This could be ascertained from inquiry among agricultural aviation operations.);
- c) The likely loss of value (a) in the light of (b).

Another way of approaching measurement of economic impact should be to seek to identify any impact of the project due to agricultural aviation effects on the value of adjacent land.

This report does not proceed with the foregoing analysis pending further technical advice on likely impacts on agricultural aviation services.

3.1.2 Tourism

Report by Cummings Economics, February 2013, indicates that tourism in the Tablelands area has a turnover of the order of \$170m.

It is worth noting that the look-out developed in association with the wind turbines at Windy Hill near Ravenshoe has become an attraction.

While the wind turbines will be visible from the Kennedy Highway that carries a majority of visitors to the Tablelands, they will be a long way away and it seems unlikely that their existence would have any negative impact.

The winery at Mt Uncle is a significant tourist attraction. However the wind farm is estimated to be about 5km away and it is difficult to see that there would be any significant negative impact.

4. ECONOMIC EFFICIENCY

There are a number of aspects that make a location of a wind farm on the Tablelands more economically efficient.

Government policy, through the carbon tax and through the mandated non fossil fuel supply requirements, means that a proportion of generated electricity supply will be from non fossil fuel sources regardless of location.

It is more efficient if the non-fossil fuel sources replace more expensive fossil fuel sources.

Fossil fuel sources are most expensive in real terms in those remote areas not in a grid and those areas furthest removed from fossil fuel generation sources that experience transmission losses. The electricity grid in the Far North Queensland region is among those areas furthest removed from fossil fuel generation sources. The closest coal fired base load generation at Collinsville is comparatively inefficient with high carbon emissions and has been subject to negotiations to close it down. The base load power stations from which most of the region's power is derived are located in Central Queensland over 1000km away. Substantial transmission losses are involved and the economic cost of replacing this power with a non fossil source are lower.

The second economic efficiency is related. Long transmission lines are more prone to being affected by disruptions. The whole area from Central Queensland to the Far North is cyclone prone with the area of highest cyclone frequency along the coast from Bowen to Townsville is in the middle of transmission routes.

Local sources of generation enhance power security in the Far North Queensland region.

In relation to various forms of non-fossil fuel power generation, the indications from the information available are that wind power in suitable locations is generally cheaper than solar power.

Existing hydro electricity generated in the region at the long established Barron Falls and Kareeya Power Stations can be expected to be cheaper. Expansion of hydro electricity through the proposed Tully Millstream scheme could bring a large block of additional power on stream but the capital investment needed to develop the scheme is very large. There were also substantial environmental issues involved and potential impacts on white water rafting tourism operations.

Biomass generation from sugar mills is also likely to produce relatively cheap non fossil fuel power, but apart from limited amounts of source fuel from bagasse by-product, there is little available resource that would not have environmental implications.

Although Pongamia plantings are likely to be the cheapest alternative for liquid biofuel production and could be used for electricity production, there are currently very limited plantings.

For the Far North Queensland region, wind power is a favourable option.

5. CONCLUSIONS

Main benefits are as follows:

- During the construction period, local benefits to the Tablelands' economy seem likely to be of the order of \$30m (out of estimated project cost of about \$382m), creating approximately 300 jobs (including flow-on effects).
- During the operating phase, annual benefits will be of the order of 57 additional jobs (including flow-on effects) and about \$5.6m per annum addition to the Tablelands' Gross Regional Product (ie.an approximate 0.3% increase in economic activity and employees). Net Present Value of an annual flow of benefits of \$5.6m per annum would be of the order of \$100m (over a 30-year period at discount rate 4% real (approximately 7% nominal).
- There will be economic efficiency gains in meeting government objectives, by replacing fossil fuel electricity supply in areas where long transmission distances from generation sources lead to extra costs due to transmission loss and susceptibility to power disruptions.

While issues of potential negative 'secondary' impacts have been raised in relation to agricultural aviation, adjacent farm operations and on visual amenity and tourism, the likelihood of any significant impacts seems small, but subject to further technical advice.

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APPENDICES



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W S (Bill) Cummings

Background

Bill Cummings is one of Australia's most highly experienced regional business economists. He was born and educated in Cairns, and completed an Economics Degree at the University of Queensland. This was followed by eight years high level experience in economics in Canberra, initially as a research officer in the Tariff Policy section of the Department of Trade and five years as the Economic Research Officer in the Canberra Secretariat of the Australian Chamber of Commerce.



This included researching and writing on major national policy issues of concern to the business community, preparing and presenting Tariff Board cases, especially supporting the Chamber's Export Council, and generally liaising with business, government and overseas commercial representatives on national economic policy issues.

In 1968, he returned north and for the next 13 years managed development and tourism promotion organisations, initially for five years at Ingham, where he was especially concerned with agricultural development. This was followed by eight years in Cairns as Manager of the Far North Queensland Development Bureau and its sub Board for Tourism & Travel, now Tourism Tropical North Queensland. This especially involved promotion and development of domestic and international tourism, arguing the case for upgrading of Cairns airport, boosting trade with Papua New Guinea, administering the region's crown industrial estate, achieving fishing industry infrastructure upgrading, and regional development strategies in general.

In 1981, he established his own economic research business which has subsequently also filled a need in the north for professional market research services under the trading name of Compass Research.

Over the years, the firm has addressed economic development questions ranging over almost all aspects of the north's economy with a heavy emphasis on tourism, primary industries, fishing, mining, retailing, university development and transport infrastructure including Cairns airport and seaport, and road development throughout the region and across the north.

Details

Full Name	William Samuel Cummings
Born	Cairns 09-08-1939
Education	B Econ Q'ld 1962, with majors in Economics, Accounting, Pure Maths I/Statistics/ Stat Maths. Further Studies, ANU Canberra, Economics & Political Science.

Work - Current: Principal, own Economic & Market Research firm,
CUMMINGS ECONOMICS & COMPASS RESEARCH, Cairns, since 1981.



1973 – 1981: Manager, Far North Queensland Development Bureau and Sub Board for Tourism & Travel/, 1978 changed to Far North Queensland Promotion Bureau, now Tourism Tropical North Queensland (TTNQ), Cairns.

1968 – 1973: Manager, Ingham District Research & Promotion Bureau, North Queensland.

1963 – 1968: Economic Research Officer, Tariff Officer & Secretary of Export Council, Australian Chamber of Commerce Canberra Secretariat. 1961 – 1963: Research Officer, Tariff Policy Section, Department of Trade, Canberra.

General Outline of Activities

1961 - 1968 Extensive post university top level experience in economics and research on national policy issues, preparation & presentation of Tariff Board cases, contact with all levels of government, overseas commercial representatives, media and business throughout Australia.

1968 - 1973

- Heavily involved in promotion of agricultural diversification, roads, mining development and reforestation.
- Served as an outside representative Commerce & Economics Faculty, James Cook University.
- Founding Secretary, North Queensland Travel Council & key role in 1971 ANTA Tourism Report on North Queensland.

1973 - 1981

- Responsible for the co-ordination of promotion of development in the Cairns/Far North Queensland region.
- Organised most tourist promotion activities out of North Queensland during this period all over Australia and FNQ Visitor Guiding systems.
- Administered State Crown Industrial Estates in the FNQ region and State industry support programs for manufacturing and industry

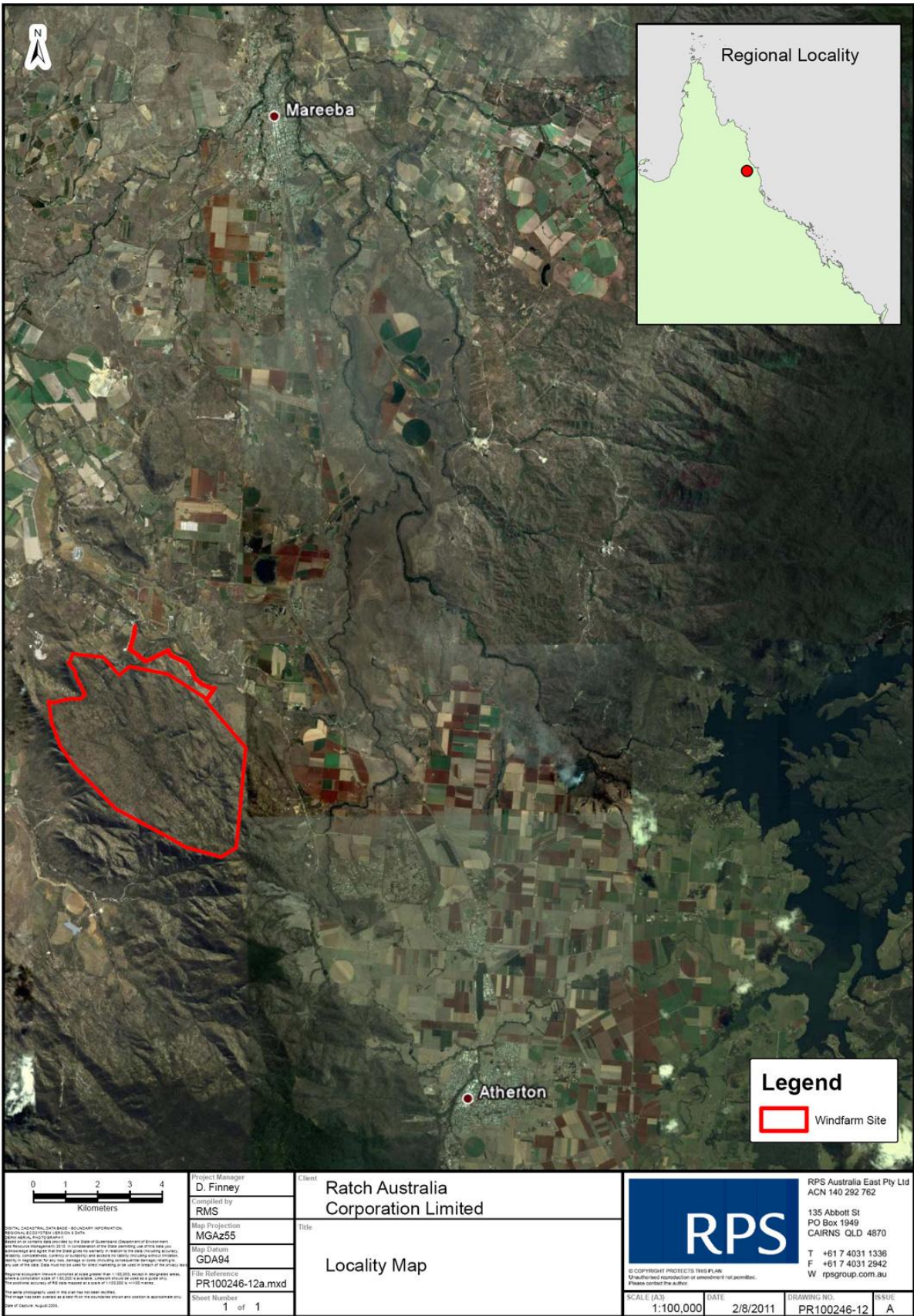
1981 to Present

- Provided key economic strategy direction to the region and author of various regional strategy reports.
- Publication of economic profiles/tourism profiles/property market analyses including Year Book/Data Base, Chamber of Commerce annual publications, and the 600 page Cairns 2020 – 2050 Business Research Manual.
- Numerous economic research tasks involving almost all sectors of the economy for private clients and key regional organisations including Councils, Tourism Organisations, the Regional Development Corporation, Chambers of Commerce, Port Authority, Newspapers, Casino, Convention Centre, Retailers Association of Queensland, Dept of State Development, Dept of Transport, Q'ld Dept of Primary Industries.
- Numerous market research tasks for clients ranging from Sydney through to the Torres Strait and across to the Northern Territory, including household surveys, street surveys, visitor surveys, focus groups, auditing of shopping centre pedestrian counts with clients including a range of government, statutory bodies and leading northern businesses.
- Served on numerous boards and committees including as Chairman of the Edward River Crocodile Farm Pormpuraaw Aboriginal Community, Deputy Chairman, North Australia Development Council, as a Governor in Council appointee to the Council of James Cook University, Advisory Council Cairns TAFE, Management Committees of Development Bureaus, Chamber of Commerce, and Federal Government Area Coordinating Committee.
- Current memberships include the Economic Society of Australia, Australia NZ Regional Science Association, the Australian Market & Social Research Society, and the Australia Papua New Guinea Business Council.

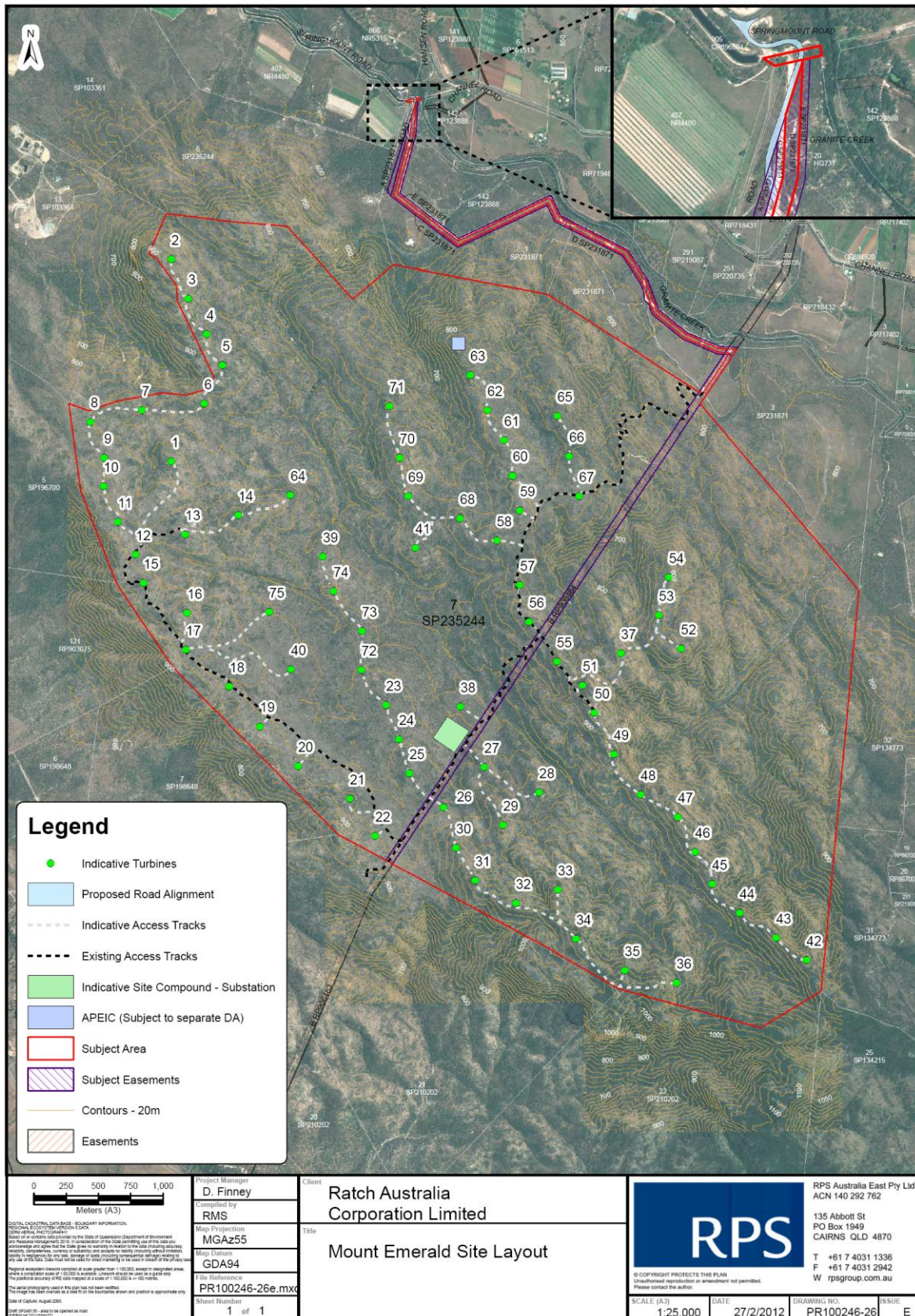
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Location



Turbine Locations



Ref: J2592
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Access Road

