The Lambert Plan

NORTH STRADBROKE ISLAND WATER SOLUTION

Our Present - Their Future

THE LAMBERT PLAN

North Stradbroke Island Water Solution

CONTENTS

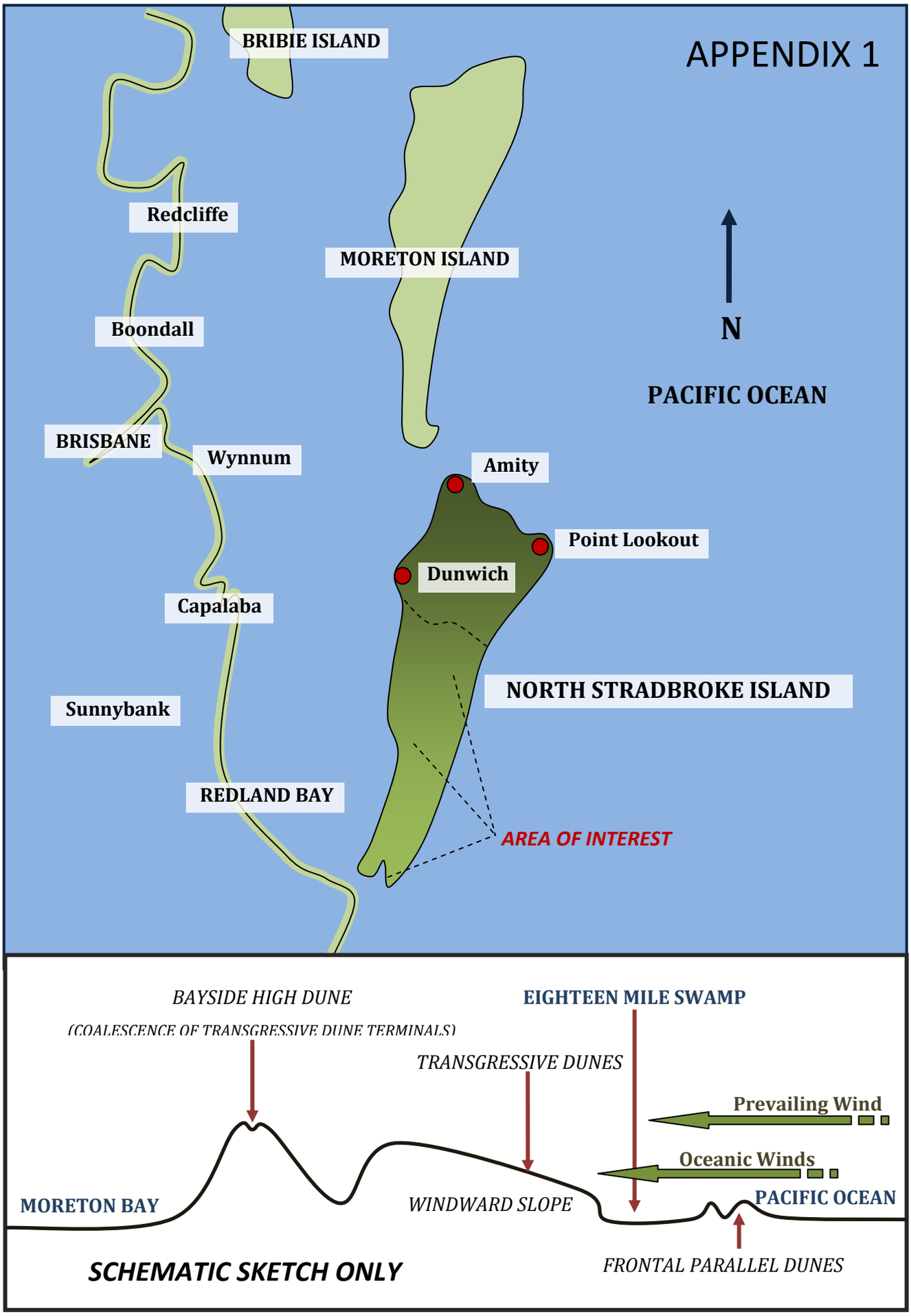
1. INTRODUCTION

The world's best scientists warned of the global warming threat back in the 1980's, however scepticism and lobbying delayed acceptance and concerted action until finally world research and modelling began to see the cloud lifted and the scepticism blown away. Still, lobbying and *lobby persuaded* politicians, delayed immediate and concerted actions against emission reductions, and it was not until adverse weather conditions began to materialise around the world that such confrontation, galvanised people concerns to the extent of forcing, so influenced politicians, to accept the full realisation of the catastrophic consequences of global warming.

Further, many of the world scientists are now alarmed at the acceleration of their predictions in the rate of ice melt in both Polar Regions. Extreme weather patterns are developing around the world and the social and infrastructure costs and trauma of the destruction, injury and death so caused, are becoming all too apparent. On the east coast of Australia adverse weather has seen the drier climatic events lower dam storage levels to that of significant duration and concern.

With the area of South Eastern Queensland predicted to contain a significant proportion of Australia's population in the foreseeable future, the development of climate change to drier climatic conditions for the south east area, must engender a very serious consideration of both alternate renewable energy and additional water supply resources.

The rate at which the above population prediction is being fulfilled together with compliance with Government Mandatory Renewable Targets (MRET) to reduce emissions by 2020 and 2050, will require the adoption of renewable energy generation as well as provisions for adequate water supply (to meet the predicted population needs), **as a matter of urgency.** The accomplishment of these developments must be implemented in concert with communities and due consideration to social and environmental issues, however it is the science that is setting the targets and without relaxing those targets, it is the responsibility of governments to establish the pathway to those goals in the best interests of the people, including the corporate sector. The science formulated targets, constitute an enormous but essential challenge, demanding strong, targeted, and committed leadership.


APPENDIX 1
BRIBIE ISLAND
Redcliffe
MORETON ISLAND
Boondall
N
PACIFIC OCEAN
BRISBANE
Wynnum
Amity
Point Lookout
Dunwich
Capalaba
NORTH STRADBROKE ISLAND
Sunnybank
REDLAND BAY
AREA OF INTEREST
BAYSIDE HIGH DUNE
(COALESCENCE OF TRANSGRESSIVE DUNE TERMINALS)
EIGHTEEN MILE SWAMP
TRANSGRESSIVE DUNES
Prevailing Wind
Oceanic Winds
MORETON BAY
WINDWARD SLOPE
PACIFIC OCEAN
SCHEMATIC SKETCH ONLY
FRONTAL PARALLEL DUNES

The latest United Nations report (18/11/07), with the data input two years outdated at the time of release, expresses the alarm at the acceleration of the climatic change predictions, making the securing of a reliable and sustainable water supply as well as actions in curbing greenhouse emissions a matter of extreme urgency.

The proposal set out below is a recommendation to significantly resolve the water requirement for the population area mentioned above using green energy to the extent that (in the operational sequence) not one kilogram of carbon will be disbursed into the atmosphere.

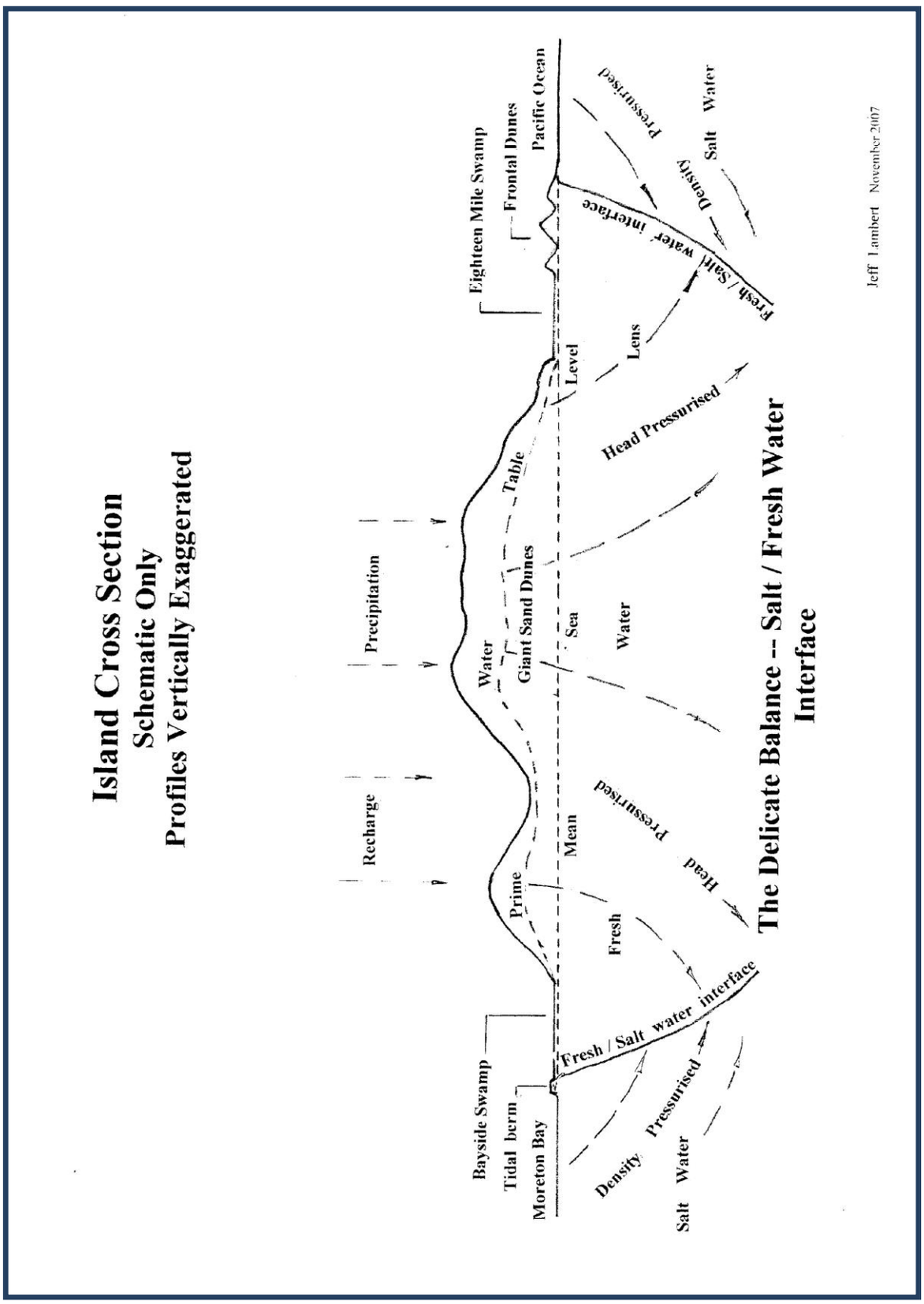
2. THE PROPOSAL

The proposal entails the establishment of a green powered desalination plant on North Stradbroke Island (Refer to Location Map – Appendix 1). The proposal establishes wind generation as the principle renewable energy adaptation in this instance because of the strong likelihood of suitable wind velocity and sustainability in the area proposed. Further, wind generation has already been established as (given favourable air movement criteria) the most technically advanced and economical renewable at present adaptable.

The Island is favourably disposed to large salt water volume intake and tidal flushing discharge requirements for a substantial desalination operation in keeping with additional needs of a projected population explosion in the SE Corner of Queensland.

Although both operations are proposed for North Stradbroke Island because of the merits discussed herein, that pairing does not apply as a necessity, in that the wind turbines may, subject to economical grid connection, be sited alternatively anywhere suitable wind conditions prevail. Similarly the

desalination may be sited elsewhere however until proved unviable or unacceptable the Island offers a dual scope of interest for both operations, and further advantages as highlighted herein.



3. ISLAND EXISTING AND PROPOSED DETRIMENTS

Extraction from the Island fresh water aquifer for supply to the mainland is stated as some 38 million litres per day (ML/d). Island residents claim that a further 22 ML/d is planned to bring the total to 60 ML/d. Islanders also claim that together with water used for mining that there is considerable draw down on areas where such level reductions in the prime water table are easily observable and apparent. (Blue Lake, the Eighteen Mile Swamp and the Keyholes). Brown Lake, a perched water table lake has also been observed in recent years to suffer significant loss, although such loss may or may not be attributable to the prime water table and associated interconnections but solely to the prolonged drought.

To some extent some reductions due to mining are related to localised reductions in levels at or adjacent to the draw off point, however this reduction is part of a cyclic water usage which returns practically all water used back into the Island aquifer. The balance is only upset to some extent in the displacement of water from one source to another for discharge. This is not normally a significant displacement and the balance is normally reconcilable within the prime water table freshwater envelope. Extraction for mainland consumption use however is a direct loss to the island water table. The amount taken (which will be further exacerbated under further extractions) must exhibit such loss in reduction of the prime water table. It is understood that such marked reductions (observed) are the prime concern of Island residents, including a very concerned Island Indigenous population as well as other concerned community groups.

It is submitted that there is a delicate balance between the fresh water and salt water interface around and beneath the Island surround. The density pressurisation of the sea water is only held at bay in the zone of interface by the volume and height differentiation of the fresh water lens contained in the sand mass. If the freshwater profile within the high dunes is reduced then such reduction will become apparent as a reduction in the outlet seepage levels at expression points of the prime water table such as the Eighteen Mile Swamp, Blue Lake and The Keyholes. This is tantamount to reducing the fresh water pressure holding at bay the salt water from intruding the fresh water confines.

Monitor Bores, if sampled at a depth where they may encounter the fresh / salt interface may detect such intrusion however although the knowledge of the position of

the interface is critical in order to detect intrusion, once detected it may be too late to stop or correct.

The timing of such extraction to a point of detection of the problem mentioned above depends on many geological and hydrological factors, not least the transmissivity of the sands and variations of same from stratum to stratum.

It is submitted that the loss of freshwater head by pumping (profile reduction) together with predicted dryer climate, extended droughts, and importantly the predicted rise in sea level further exacerbating the situation, tilts the balance significantly in favour of salt water intrusion and the death knell for Island periphery vegetation and ecology.

4. PROPOSAL SCOPE

Australia is more favourably positioned than most countries to develop renewable energy alternatives in solar, wind, geothermal, wave and tidal, however we now lag far behind many countries who have adopted renewable energy generation in less suitable environments. A lack of renewable energy research and Government inactions relating to same has seen a migration of our alternative energy ideas and brains attracted to overseas offers.

Wind energy is one of the most cost effective forms of renewable energy and has a leading role in reducing reliance on fossil fuels. Although many of our southern states enjoy the wind benefits of the southern ocean, nevertheless there remains scope for suitable areas in the states of New South Wales and Queensland. Some sites in these states have already been selected and brought into operation. Others are still awaiting the outcomes of a Federal carbon credit or trading scheme (or combination of both) to determine affects on the viability and investment scope. Other areas remain to be wind prospected in more detailed investigations.

5. ISLAND SCOPE

North Stradbroke Island, in fact, owes the vast mass of its present topographical extent and height to the actions of nature's winds. The source of the large sand mass is from long shore transported sands eroded from southern coastlines and deposited along offshore berms anchored on such features as the Point Lookout volcanic outcrops as well as other outcrops of rhyolite and lateritic sandstones now forming part of the island mass. The predominately sea deposited parallel dunes having then been

subjected to strong prevailing winds (mostly south easterly) eroding and transporting the resultant sand masses in series upon series of north westerly migration. They are known as transgressive dunes. The successive build up of migration after migration has seen the heights attain over 200 metres above present sea level with the migrations extending in series events up to 12 kilometres constituting the island major width.

Oceanic winds, in first encounter with land, are forced to lift, increasingly so to clear the rising topography and thus increasing velocity. The resultant wind velocity is further enhanced by the interaction of the cool ocean winds with the warmer land atmospherics. The high dunes of the island thus offer increased velocity of the ocean winds and in general, the higher the elevation of the swept area of the wind generator the greater the velocity. Although detailed investigation is required in selecting turbulence free sites, the Island thus offers scope for adequate and sustained winds of generation strength.

Desalination requires a tidal influenced body of water more particularly for the disbursement of the reject volume of salt water returned to a selected area. Salt water is generally in the order of 3.5% salt content and the discharge volume (approximately half of that of intake) is generally around 7%. Disbursement techniques, when implemented properly, quickly dilute the reject to near equivalent with the original intake.

North Stradbroke Island is suitably surrounded by relatively deep channels within Moreton bay in the south and west and fronting open sea (Coral Sea) in the north and east. There are a number of lowly elevated, possible desalination sites, to facilitate economical pumping heads, relevant to bay and ocean selection. Pipeline feed direct to an upgraded eastern pipeline connection already established on the island, or direct to the Leslie Harrison dam as a staging to Brisbane and suburban supply lines.

Wind eroded frontal dunes. Strong wind actions at sea level make their mark.
Photo from "North Stradbroke Island" Ellie Durbidge and Jeanette Covacevich

Strong wind effects at more elevated siting.
Photo taken by the late Bob Pattison, from "North Stradbroke Island" Ellie Durbidge and Jeanette Covacevich

6. ESTIMATED (ball park) ESTABLISHMENT COSTS

Under the circumstances of substantial and continuing opposition to both the Stradbroke Island aquifer extraction and the Traveston Crossing Dam, a combined withdrawal volume has been targeted for the desalination plant. Accordingly the wind generation capacity required to operate to those volumes has also been incorporated.

The combined output from Stradbroke Island groundwater extraction and the intended withdrawal from the proposed Traveston Crossing Dam approximates 252 million litres per day. (Traveston 192 million litres/day and Stradbroke 38 million litres/day (present) and a further 22 million litres /day (planned))

The estimated wind turbines for the proposed Sydney desalination plant of 500 million litres per day, numbers 75 generators of 1.66 MW each. On that basis the number required to generate the usage of the above target of 252 ML /day is 38 generators of 1.66 MW capacity each.

Given that costing of the location of wind generators on North Stradbroke Island would, because of location and transport, cost considerably more, a cost of $3 million per MW or $5 million per wind generator has been allowed. That is a project cost rather than an individual cost, accounting for roads, transformer and connection to the grid.

The total cost for 38 generators would then approximate $190 million. The cost of the Perth desalination plant came to $389 million for a capacity of 125 million litres per day. If we doubled that figure for a 252 million litre plant that would approximate $778 million Lets say $1000 million for completion on North Stradbroke Island (20% contingency) then the total project should approximate $1 19 billion, **excluding** the pipeline connections/upgrade mentioned herein.

The estimate for the completion of the Traveston Crossing dam is estimated at approximately $1.59 billion **excluding** the cost of the pipelines and pump stations involved in pumping supplies to Brisbane.

The Sydney Plant of double that output (500 million litres /day) is estimated at $1.75 billion.

APPENDIX 2

Wind turbines and birds

The issue: In the 1970s a small number of early US wind farms caused unusual numbers of bird deaths, bringing great scrutiny to bear on wind farms with regard to this issue. Properly sited, today's wind farms present minimal danger to bird populations. These potential dangers must also be put in perspective with the generally far greater hazards posed by land-clearing, residential sprawl, road traffic and man-made structures such as tall buildings and power lines. However, the greatest threat of all to birds and other animals is human-induced climate change which is decreasing the habitats of birds worldwide. Higher temperatures, droughts, forest fires and severe storms are occurring now as forewarned by climate experts concerned about rising levels of greenhouse gases.

"The alternative to using fossil fuels is to generate more electricity from renewable sources such as hydro-power, wind, sewage and landfill gas and solar power. When you join Royal Society for the Protection of Birds Energy you'll be maintaining the amount of renewable energy produced now, and helping to increase the amount of electricity generated from renewable sources in the future."

Royal Society for the Protection of Birds website

Summary

Do wind turbines present a risk to birds? Virtually all tall man-made structures present a collision risk to birds, yet the risk from wind turbines is very small when compared to structures like communication towers, tall buildings and transmission towers. And the impact of wind turbines on birds fades into insignificance in comparison with the impact that domestic cats have on wildlife.

Bird collisions with wind turbines are far less frequent than many imagine and, when they occur, are now better understood and documented than for any other type of man-made structure.

Research shows that depending on the site and species of bird, wind turbines can result in bird mortalities, but at an extremely low rate. For example, studies show that wind turbines in the US resulted in only 0.01 to 0.02 percent of total collision-related bird deaths. Danish radar research shows that birds -- by day or night -- tend to change their flight route some 100-200 metres before they arrive at a turbine, passing above at a safe distance. Early research at several Australian wind farms indicates that birds do in fact adapt their behaviour after wind turbines have been erected.

Despite this low level of risk, it is still important to investigate and take bird behaviour into account during the design stage and understand the causes and extent of any fatalities in order to minimise future impact as much as possible. This is why the Australian Wind Energy Association is actively engaged in researching this area in Australia. So far research has found that, although bird strike does occur, the impact of this on bird populations is sometimes exaggerated far out of proportion, especially considering the impact of other sources of bird mortality. Wind farm opponents are well aware that bird strike is a simple concept that can evoke powerful emotional responses, yet the truth is that all wind farm developers need to comply with planning guidelines, particularly the Commonwealth Environmental Protection and Biodiversity Conservation Act (EPBC), in the interests of minimising bird impact.

Risks to birds from wind turbines must further be weighed against the technology's environmental contribution as a clean energy source. For example, the Exxon Valdez oil spill alone is estimated to have killed between 375,000 and 500,000 birds. Climate change also poses a massive threat to birds, and wind power's ability to address this problem is acknowledged by the Royal Society for the Protection of Birds, which actively encourages new wind farm developments through its own green energy product.

Breakdown of issues and research

History: Early US turbines

Early wind energy facilities in the United States were often constructed without an understanding of how bird species used these sites. Bird collision with turbines at these facilities resulted in a number of bird fatalities, including deaths of raptor (bird of prey) species protected by law.

Information: Australian Wind Energy Association

7. CONSERVATION ISSUES

The area of stated interest lies generally within the area south of the Dunwich mid island road to the eastern causeway and excluding Blue Lake National Park. Much of the area has been disturbed due to mining, drill tracks, water supply pipelines, power lines and a water treatment plant for water leaving the island for mainland consumption.

Obviously the mining company will complete rehabilitation of those areas to the satisfaction of conditions applicable; however the criteria governing the acquisition of National Parks in relatively pristine state has, by and large, been lost to the fore mentioned activities. That is not to say that the area would not become an excellent flora and fauna conservation park, which could be adequately protected under special legislation from the demands of residential development which will inevitably arise for that area.

It is submitted that the erection of wind turbines would not be detrimental to flora or fauna in the area. Modern wind turbines have, by and large, had the earlier undesirable noise factors engineered out of them and improvements in wind dynamics of blade noise has been significantly reduced. As an example sheep and cattle graze quite contentedly beneath them and the limit of their area requirement is minimal.

In the past we have accepted the erection of huge transmission lines across the country, not to mention the street and housing overhead distribution in the necessary but intrusive configurations of electricity distribution. So long accepted, that its intrusive nature is reconciled to the almost absolute need for the convenience of electricity in our daily lives. It is puzzling therefore to hear criticism of wind generators more especially as they form part of an alternate energy complement that hopefully will cure the ills delivered by fossil fuels through the same electrification system we have accepted for so long. This mention is not to decry the use of electricity, rather to invite adoption of the visual acceptance of wind turbines just as we adopted the power plants and transmission infrastructures in the past.

The desalination operations, once again, have been vastly improved in recent years. There are concerns that have to be addressed and strictly monitored in the outlet facilities whereby due consideration is given to siting of outlets to facilitate the rapid dispersal of the concentrated residue. If we take the instance of an already operating plant at Perth the following results have been recorded. The plant is at Kwinana south

of Perth where intake and outlet is affected within Cockburn Sound. Cockburn Sound is a fraction the size of Moreton Bay; however tests have shown that due to the diffused technique and underwater jetting of the concentrate the salinity at 7.5 % quickly dilutes to 4 % within 50 metres of the discharge point. Less than 1% in excess of the input values of 3.5 %.

Good tidal conditions would soon dissipate the remaining small salinity excess and any heat affects, although it is believed that some concern is stated for the Kwinana dispersal area because of a *tidal restricting* causeway built across to Garden Island.

That is not to say that a good deal of research and planning is not required to facilitate and satisfy rigid requirements to ensure that this, probably the most important possible pollutant of green powered desalination, is satisfactorily affected. The rest is a matter of competent planning and housekeeping.

Bird impact due to wind turbines is generally a contentious matter, and has plagued the wind generation industry in the past (Refer to Appendix 2 – Bird Impact Article). The older type wind turbines turned quicker with little, if any, attention paid to migration flight paths. Modern wind turbines, suitably geared, turn much slower allowing for safer conduct of bird flight transit.

To ensure that such a green approach to provide future urban water requirements maximises the full potential of keeping the effort clean and green, it is recommended that environmental expertise such as the Griffith University be significantly involved in the planning and implementation.

8. CARBON CREDITS

It is important the proposed generating facility is **specific** to the desalination plant. Carbon credits would not be available from existing renewable energy already connected to the grid. The renewable energy planned would require to be specifically aimed at the energy consumption project.

9. EMPLOYMENT

The desalination operation would offer substantial employment to the Island's residential workforce in a range of trades and operator skills. Apart from the desalination plant itself employment of generator and transformer staff, maintenance

staff and park rangers would increase the above. .It may be seen to complement the present mining workforce in the near future and to replace same after mining completion.

ABOVE: Desalination plant in operation.

BELOW: Cordington Wind Farms, Portland Bay, Victoria.

10. BENEFITS

- The island offers elevated potential sites for wind generation ranging in height from 50 to 150 metres above sea level. The height of the turbines would increase that up to an extra 60-70 metres above sea level.

- The wind potential, strong at sea level, would be considerably enhanced at the heights mentioned above.

- There is limited scope elsewhere, in suitable strategic location with proximity to Brisbane, land tenure, ocean proximity to advantage the ocean winds, and with such height availability so close to the land / ocean divide.

- There is considerable scope for desalination operations in the surrounding waters, especially with the significant tidal flows influenced by South Passage and the Jumpinpin outflow.

- Such desalination production would eliminate, by replacement, the present problem of water table diminution on the island in supplying mainland water requirements, as well as eliminating the further extraction planned for the Island

aquifer. The island water supply to the three townships, being insignificant in the overall extraction, would be recommended for continuance in its present method.

- Such desalination production would eliminate the need to build the Traveston Crossing Dam, one of the most controversial projects in recent times, ranking with other controversial proposals such as the proposed selling of the Snowy scheme and the construction approval for the Tasmanian pulp mill.

- Wind generation is a proven and economical technology capable, as with the desalination plant, of incremental increase when required. Initial reliance on wind power may then not require total commitment to wind, but would offer time in which to research and possibly implement other aspects of renewable energies, eg solar, tidal, surge/wave action etc. The Island and surrounding waters offers further scope for all of these activities.

- Apart from flora and fauna attractions of tourism and botanical and fauna research, the southern extent of the Island and adjacent waters could well prove a renewable energy research domain and upon implementation of then proven techniques, a renewable energy source of significant value to power generation in SE Qld. Surge and or wave actions stand to pressurise seawater to afford desalination free of power with renewable energy used to return residues and transfer drinking water to the mainland.

- Grid power is already available traversing the extent of the Island to facilitate domestic, industry and mining requirements, and is therefore available for alternate energy connection.

- Employment, long term and offering speciality technology, would become available to the Island people.

- The area and surrounding waters offer institutions, such as universities and technical colleges a comprehensive platform to undertake research into alternate renewable

energies at a time when Governments will be pressured to encourage research and adopt alternate energies.

- The area is close to a major density population area with high expansion predictions. This location benefit extends positive and economical scope to provision of water supply, possible power supplementary supply and institutional and corporate research activities.

- An opportunity for indigenous people of the island to conduct tourism tours featuring the wind turbines, desalination plant, research projects, flora and fauna general information and aboriginal history etc.

11. PRECEDENCE

Perth became the first capital city in Australia to move to desalination. The plant at Kwinana south of Perth, is now in operation producing 125 million litres of drinking quality water per day. It is powered from the grid which accepts wind generation from Emu Downs wind farm near Cervantes approximately 200 kilometres north of Perth. Perth is now planning another such plant of equal capacity powered by renewable energy.

Plans for a desalination plant for **Sydney** are advanced. It is to be sited at Kurnell, and is planned for 500 million litres per day. Delivered by pumping under Botany Bay it is to be powered by an estimated 75 wind turbines.

Melbourne is presently investigating desalination, possibly at Port Phillip or Western Port Bay, and contemplating production of 300 million litres per day It is planned to be green powered.

Queensland's **Gold Coast** has commenced a desalination plant at Tugun. It is planned for a production of 125 million litres per day however, unfortunately, it is to be powered from grid electricity.

12. PREDICTING FUTURE WEATHER PATTERNS

The problems associated with predicting weather patterns into this era of global warming, leaves historical data a doubtful tool for prediction and therefore reduced

confidence levels in forward planning of aquifer and dam yields. Yet that is what is happening. It introduces a doubtful and possible imprecise factor into the equation of the calculation of future aquifer and dam deliverance and most importantly, guaranteed and sustainable aquifer levels and stream flow to maintain Island and river health. We are sapping aquifers and building dams in an era fraught with climatic uncertainty as to charge and recharge, of naturally exacerbated extremes of dry and wet. Deleterious enough, as that will be to the dependent river ecology under free river flows, it will be further exacerbated by the added problems of dam and water demand constraints.

Actions on the saving of water through more use efficiencies and recycling (both in domestic and industry usage), should maintain priority over new water uses no matter how cost saving the renewable energy.

However under the circumstances above, the only dependable large quantity water supply in the forecast environment ahead, lies in desalination. Provided it is green powered and the residue problems cited herein are catered for, it is inexhaustible and importantly, stands as a bulwark to the devastating conservation issues of the damming of our fragile rivers and overly depleting our natural groundwater aquifers.

I therefore submit this proposal for your urgent consideration

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