



THE BARBADOS  
**LIGHT & POWER**  
COMPANY LIMITED

## ***We invite you to a Town Hall Meeting on our proposed Wind Turbine Project***

---

The Barbados Light & Power Company Limited invites you to attend a Town Hall meeting on **Saturday 24 February 2007** at the Phillipi Pentecostal Church, Josey Hill, St. Lucy from **6:30 p.m. to 8:30 p.m.** to discuss the Company's plans for a new wind powered electricity generating station at Lamberts, St. Lucy.



This is a further opportunity for residents and other interested persons to share their views and to receive additional information on the project. Representatives from the Ministry of Energy and the Environment, the Barbados Association of Medical Practitioners and other stakeholders will also be in attendance.

For further information, please contact:  
**Mr. Hallam Edwards** at 417-3200  
or **Mr. Roger Blackman** at 417-3279

## ***PREPARING FOR THE FUTURE... NOW!***

**Town Hall Meeting to discuss the proposed  
Wind-powered Electricity Generating Station at Lamberts, St. Lucy  
held at Philipi Pentecostal Church, Josey Hill, St. Lucy  
on Saturday Feb 24, 2007 – 6.30 to 8.30 pm  
Moderator: Basil G.F. Springer**

**Agenda**

6.30 pm	Welcome & Opening Remarks	Dr. Basil Springer  Recognise Dr Carlos Chase and other dignitaries  Hon Dennis Kellman  Minister Eastmond  Minister Thompson	<ul style="list-style-type: none"> <li>• Govt. renewable energy policy</li> <li>• BLPC Windfarm Project for which they are seeking approval from the Town &amp; Country Planning Dept</li> <li>• Environmental Impact Assessment</li> <li>• Public Consultations Nov 2006</li> <li>• Concerns of residents and other interested persons about the format of the consultation</li> <li>• Further issues were addressed by the EIA consultants</li> <li>• Structured Town Hall Meeting with presentation from 4 panellists</li> </ul>
6.40 pm	Overview of the Lamberts Windfarm Project	Mr. Roger Blackman, Snr Planning Engineer, BLPC	
6.50 pm	Government's Renewable Energy Policy	Mr. William Hinds, Min. of Energy & The Environment	
7.00 pm	Summary of Environmental Impact Assessment	Mr. Peter Rostern, Amec Consultants	
7.10 pm	Concerns of residents of Josey Hill	Mr. Leo Sobers / Ingram Cumberbatch	
7.30-8.30 pm	Interactive discussion between panellists and participants		
8.30 pm	Refreshments		



## *Lamberts Windfarm Project*



Town Hall Meeting  
24 February 2007



## **Wind - A Valuable Natural Resource**

- Wind is the fastest-growing energy source in the world.
- Global wind power capacity has tripled over the past five years, growing from 18,000 MW at the end of 2000 to more than 58,000 MW at the end of 2005.
- A record 11,300 MW of new wind power capacity was installed worldwide in 2005.
- There are more than 70,000 wind turbines installed worldwide.
- The current generation of computer controlled turbines has been in production for over 20 years.
- Turbines have now reached the stage where they are expected to be available to generate for over 90% of the year.

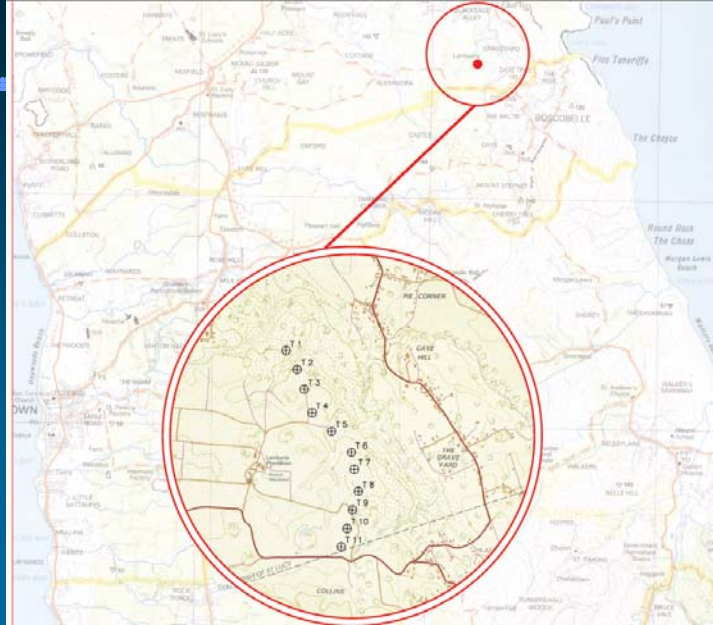
## Why Lamberts?

- The Lamberts East site was one of four sites designated by the Government in the National Physical Development Plan as suitable for wind energy developments.
- The Barbados Light & Power completed a feasibility study that considered environmental, technical, financial and wind information to rank the sites.
- The study determined that this site located on the Lamberts Plantation, St. Lucy was the preferred site.
- Measurements show that Lamberts has an excellent wind regime. There is sufficient wind for the turbines to be generating electricity for over 90% of the time.

- National Physical Development Plan, Map 4



## Site Layout

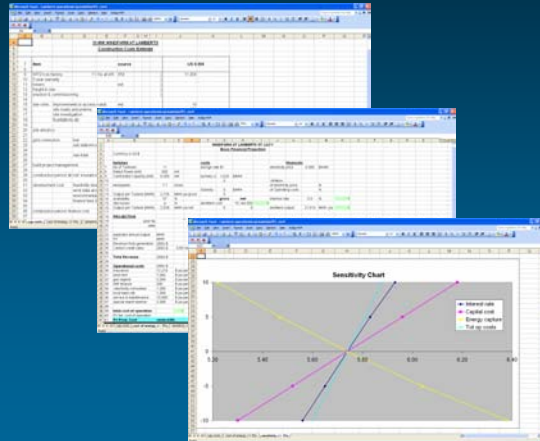


## Project Overview

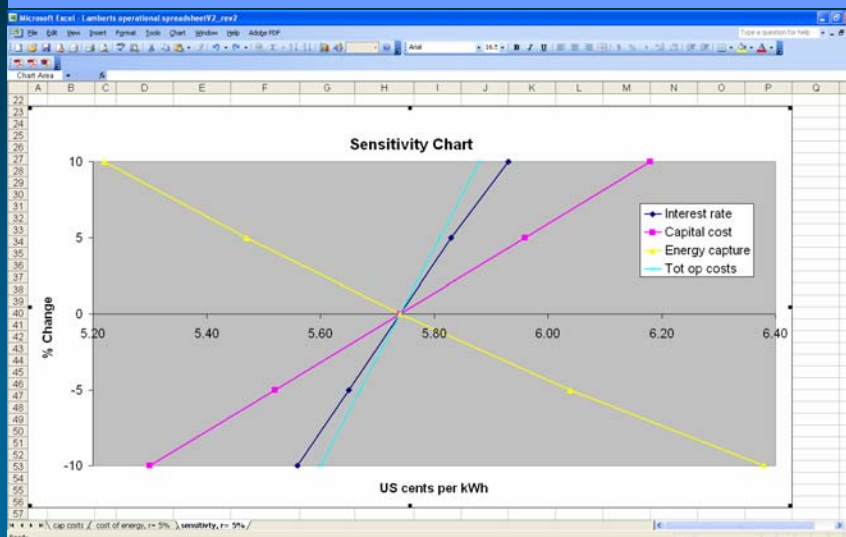
- The Lamberts East wind farm will consist of 11 wind turbines.
- Total installed capacity will be around **10 MW** and annual production **28 million kilowatt-hours**
  - *enough to meet the average annual needs of about 9,275 homes*
  - *reducing fuel costs by approximately BDS\$ 5.6 million per year*
- The Lamberts East wind farm is expected to represent approximately **2.6%** of electricity production in 2009.

# Economics

- Projected Capital Cost:  
*BDS\$30.4 Million*
- Average Production Cost:  
*BDS\$0.115 per kWh*

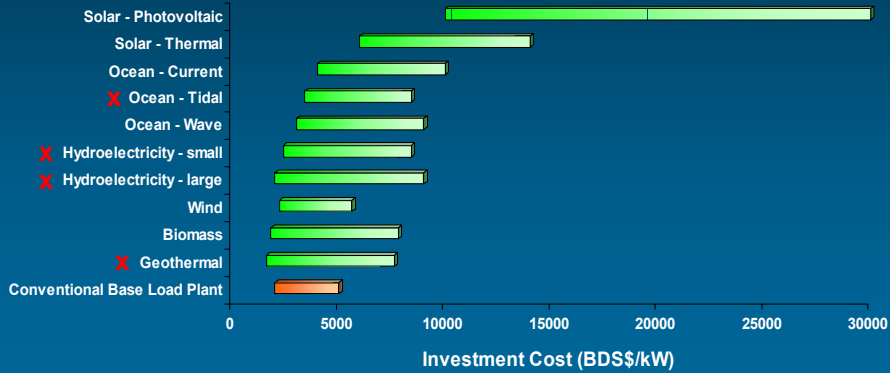


# Economics



# Renewable Energy (cont.)

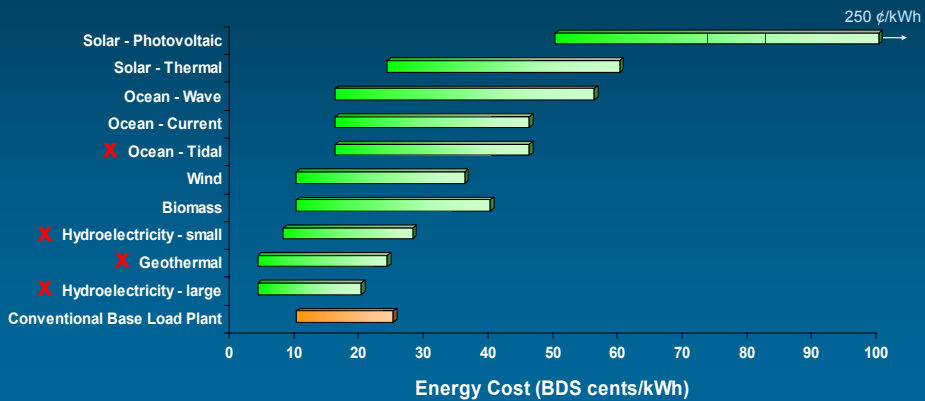
## • Comparison Of Capital Costs



Data taken from UNDP World Energy Assessment Report, September 2000

# Renewable Energy

## • Comparison Of Energy Costs

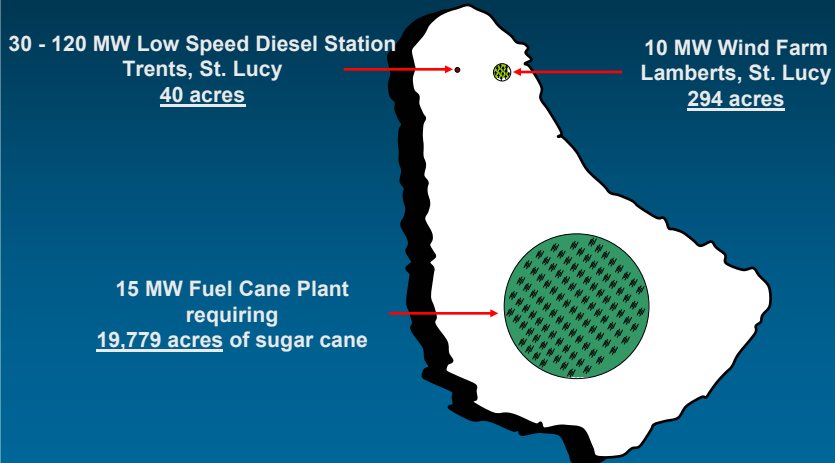


Data taken from UNDP World Energy Assessment Report, September 2000



THE BARBADOS  
**LIGHT & POWER**  
COMPANY LIMITED

# Technology Footprint Comparison



THE BARBADOS  
**LIGHT & POWER**  
COMPANY LIMITED

# Environmental Benefits

- Wind is a renewable energy resource
- Reducing electricity generation on hydrocarbon fuels reduces the amount of Carbon Dioxide the main greenhouse gas.
- A 10 MW Wind Farm could reduce Carbon Dioxide output by around **20,000 tonnes per year**, the equivalent of:
  - planting **6,700 acres of trees**
  - or
  - removing **4,400 cars** from the roads of Barbados
- Reduces the reliance on imported fuels

# Environmental Assessment

- **Approach**

- Define project components.
- Collect baseline data and information on project area.
- Complete assessment of potential effects for construction and operations.
- Propose mitigation.
- Assess residual environmental effects.

# Environmental Assessment

- **Assessment of Effects**

- Aesthetics
- Ecological
- Air Quality
- Noise
- Traffic
- Groundwater
- Electromagnetic Interference
- Shadow Flicker
- Waste Disposal
- Accidents and Malfunctions



## Land Take

- Land use is limited to the small area required for the wind turbine foundations and access tracks leading to them.
- Farming activities in the surrounding fields can continue undisturbed.



Photo: National Renewable Energy Lab



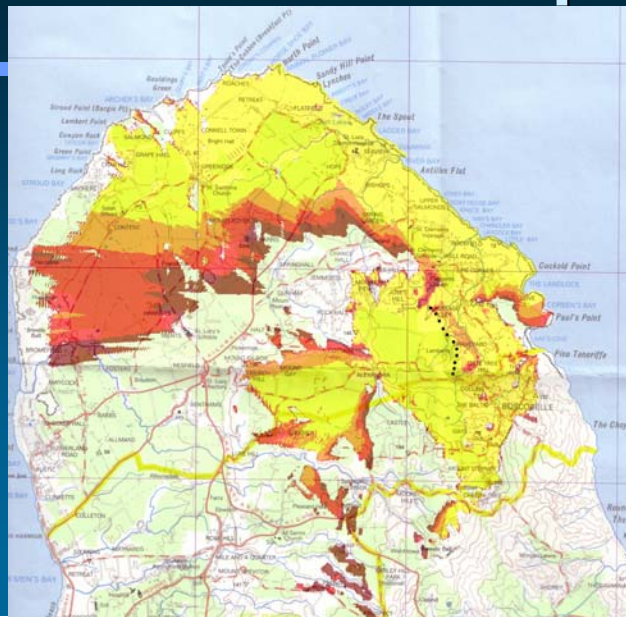
## Setback Requirements

- A 350 metre setback observed
- A minimum setback is required for both safety and performance reasons
- Setback requirements vary by country
- Setback is often expressed as a function of the wind turbine height.

# Setback Examples

New York State Energy Research and Development Authority, Albany, NY <i>New York State Guide, Oct. 2002</i>		Calculated Setback (metres)
Location	Requirement	
Fenner/Stockbridge, NY	1.5 x structure height + rotor radius	114
Martinsburg, NY	300 feet (rear and side lot lines)	92
Contra Costa County, CA	3 x structure height or 500 feet, whichever greater from all boundaries	228
Cook County, MN	Tower height	50
Waco County, OR	5 x rotor diameter	130
National Wind Coordinating Committee (NWCC) <i>Permitting of Wind Energy Facilities, NWCC Siting Subcommittee, Washington DC, Aug. 2002</i>		
Alameda	1.25 x total turbine height	95
Contra Costa	3 x total turbine height	228
Kern	1.5 x total turbine height	114
Merced	1.25 x total turbine height	95
Monterey	2 x total turbine height	152
Riverside	1.25 x to 3 x total turbine height	228
Solano	1.25 x total turbine height	95
Palm Springs	1.25 x total turbine height	95

# Visual Impact

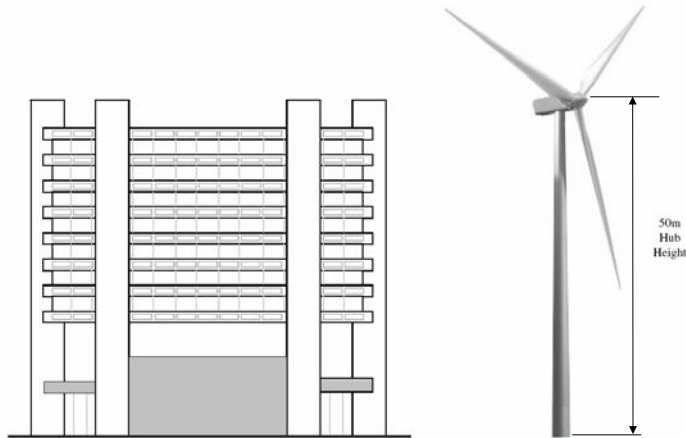


Visibility	
1 to 2	Dark Red
3 to 5	Red
6 to 8	Orange
9 to 11	Yellow

# Visual Impact

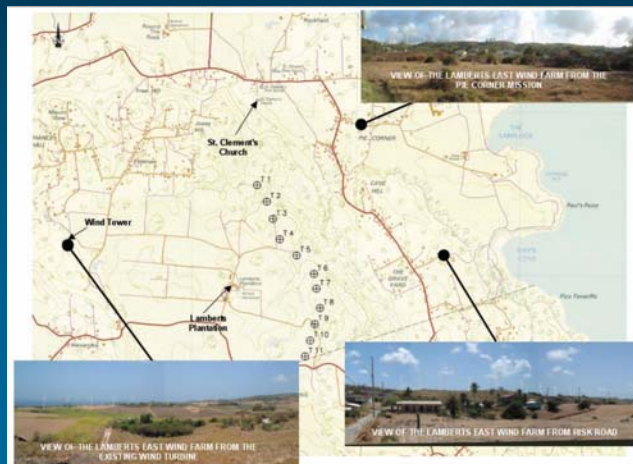
BARBADOS CENTRAL BANK BUILDING

TYPICAL 900kW WIND TURBINE



# Visual Impact

- Visual Impact can be indicated by photomontages.





THE BARBADOES  
**LIGHT & POWER**  
COMPANY LIMITED

# Visual Impact

VIEW OF THE LAMBERTS EAST WIND FARM FROM THE EXISTING WIND TURBINE



THE BARBADOES  
**LIGHT & POWER**  
COMPANY LIMITED

# Visual Impact

VIEW OF THE LAMBERTS EAST WIND FARM FROM RISK ROAD



# Visual Impact

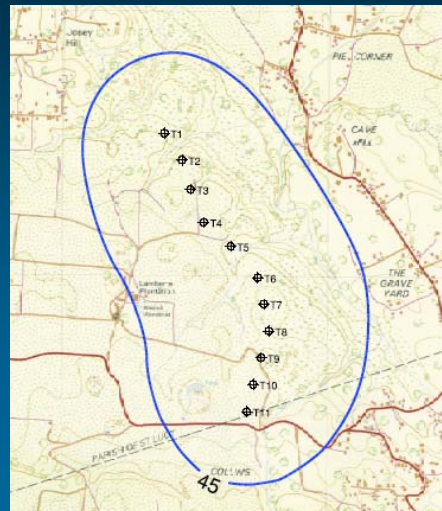
VIEW OF THE LAMBERTS EAST WIND FARM FROM PIE CORNER MISSION



# Noise

- Noise effects are minimal and below 45 dBA (equivalent to a quiet room) at the nearest dwelling at wind speeds of 8 m/s.
- At higher wind speeds, background sound levels increase at a greater rate than turbine noise.

Sound Source	Noise Level (dBA)
Quiet Room	50
Room with people talking	57 - 65
Office (air conditioned)	55 - 60
Dance Hall with music	80 - 100+
Truck passing	80 - 85
Frogs at night	90 - 100



# Low Frequency Noise

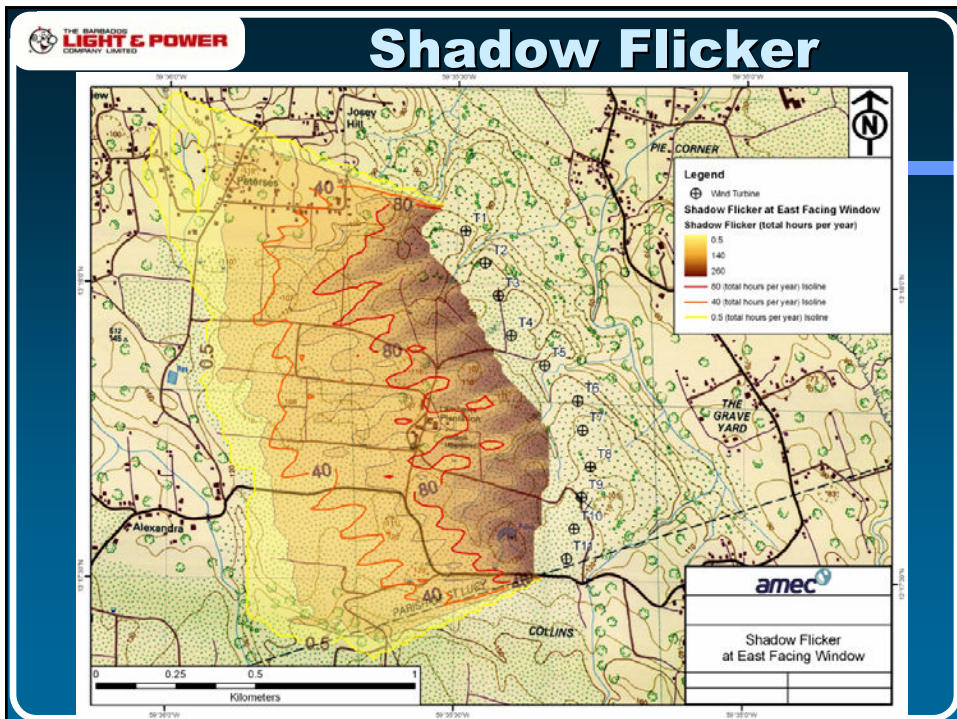
- Low Frequency Noise refers to sound energy below 200 Hz
- Concerns have been raised that Low Frequency Noise emitted by wind turbines could pose a threat to human health
- Based on our research, there is no published scientific literature supporting this claim

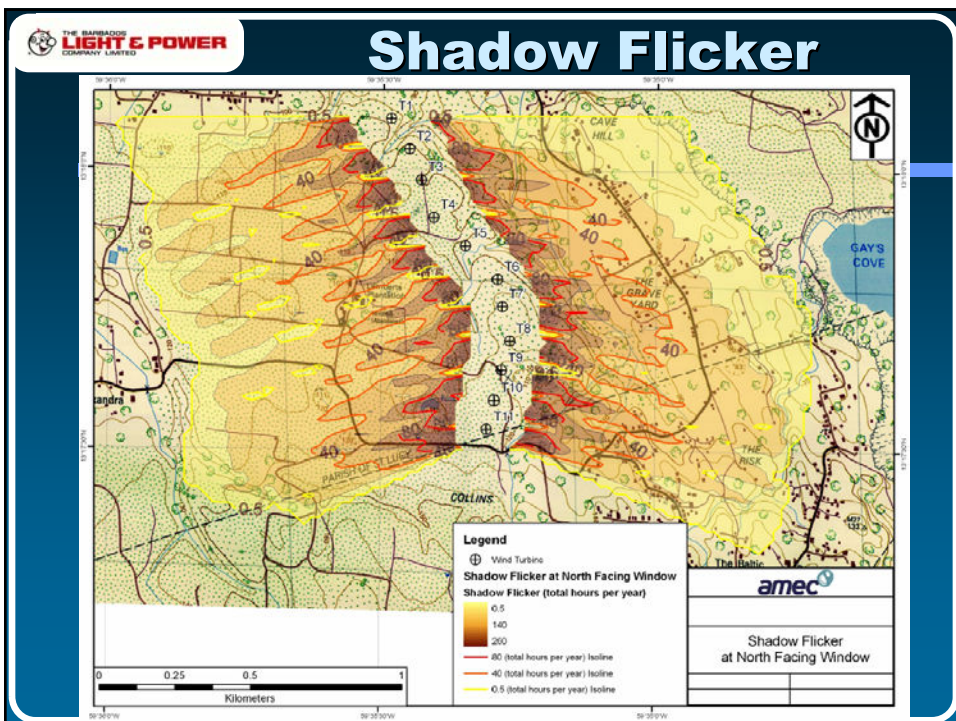
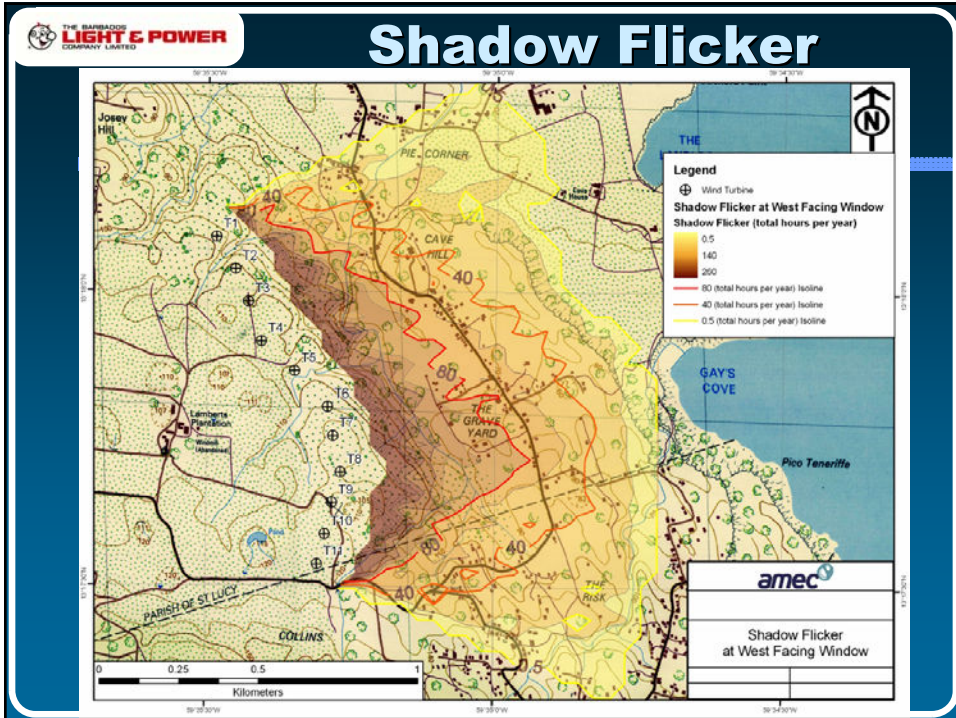
# Low Frequency Noise

- Dr Geoff Leventhall, a Fellow of the Institute of Physics and Institute of Acoustics (BWEA, 2005):
  - *"I can state quite categorically that there is no significant infrasound from current designs of wind turbines."*
  - *"The turbines produce a modulated higher frequency - the swish, swish - which people may not like, but this is not infrasound. There is no low frequency in it".*
  - *"There is negligible infrasound and very little low frequency noise from wind turbines - a few low level tones from the gearbox."*
- Dr GP van den Berg, University of Groningen, Netherlands:
  - *"Infrasonic harmonics of the blade passing frequency from modern, tall wind turbines must be considered inaudible."*
  - *"Wind turbines produce low frequency sounds, but it has not been shown that this is a major factor contributing to annoyance"*

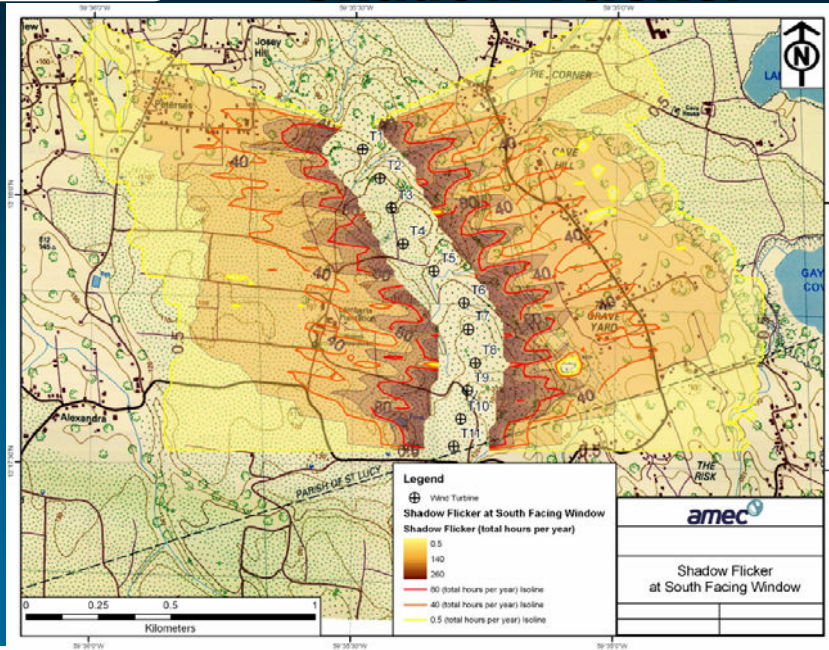
# Shadow Flicker

- Maps show the potential number of hours per year that residences in the vicinity of the project would experience Shadow Flicker
- Results show the maximum potential range of 40 hours to 80 hours per year for houses nearest the project.
- Actual effects will be lower as model does not account for:
  - Periods where sun is obscured by cloud
  - Periods where rotor is perpendicular to the sun
  - Periods where turbine is not operating (low or high wind)
  - Shading due to terrain or vegetation



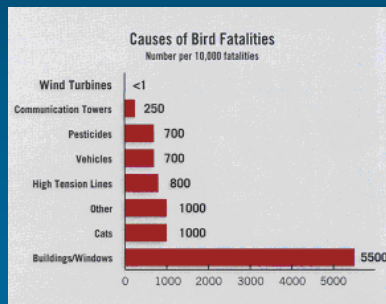


# Shadow Flicker



# Avifauna

- Based on studies at other wind farms and data collected on migratory and resident birds at Lamberts no significant impacts on avian populations expected
- RSPB in its 2004 information leaflet "Wind farms and birds" states "...in the UK, we have not so far witnessed any major adverse effects on birds associated with wind farms".



Source:  
Erikson, et. al, 2002.  
Summary of Anthropogenic  
Causes of Bird Mortality

## Avifauna



Pectoral Sandpiper



Yellowlegs



Golden Plover



Semipalmated Plover



Semipalmated Sandpiper



White Rumped Sandpiper

## Electromagnetic Interference

- No effects on airport radar
- No effects on cellular or satellite transmissions
- Effects on conventional antennae will depend on line of sight between transmitter and receiver
  - Recommendation that Light & Power monitor current signal quality and post development signal quality.
  - Mitigation is possible through improved antennae, satellite connection or repeaters



THE BARBADOES  
**LIGHT & POWER**  
COMPANY LIMITED

# Accidents and Malfunctions

- Safety
  - The wind industry has an excellent safety record.
  - There are more than 70,000 turbines across the world. In over 25 years of operation the industry has recorded only one accidental death of a member of public (a German skydiver).
  - Many wind farms are sited on public land, often with public footpaths passing through.
- Potential for spills is minimal:
  - There is no bulk storage of liquid chemicals or fuels required
  - Site is outside of sensitive zones for water protection



THE BARBADOES  
**LIGHT & POWER**  
COMPANY LIMITED

## Questions?

## Next Steps

- 2007
  - Obtain planning permissions
  - Obtain Board approval
  - Tender design
  - Evaluation of tenders
  - Contract negotiations
  - Detailed site investigations
- 2008
  - Commence civil work and equipment installation
- 2009
  - Commission wind farm