

Before The Board of Inquiry

IN THE MATTER OF  
The Resource Management Act 1991

AND

IN THE MATTER OF  
Applications for Resource Consent and  
Notices of Requirement by Transpower  
New Zealand Limited for the North Island  
Grid Upgrade Project

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AMMENDED Statement of Evidence of Allan Robert McCreadie  
For Ardmore Airfield Tenants and users Committee (AATUC)

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## **ERRATA**

My brief of evidence (electronic V6) presented to the Board of Inquiry 26/02/08 contains a confusion in that I appear to have claimed that the Ardmore circuit traffic will pass over the new lines. [“(r) (iv)” is particularly incorrect in this respect. ]

This is not correct, and virtually all circuit traffic takes place within the line defined by the proposed line replacement which forms the NNE boundary of the Ardmore MBZ (Sullivan Appendix 9 and 10). Faster and heavier aircraft can be an exception (as can a very full circuit). The night circuit is higher and therefore more extended.

ALL 03 Take-off traffic is potentially EXPOSED to the existing AND new lines, however, and the insidious nature of this occurrence is a good indication why lines are not appropriate to our environment if at all avoidable.

For an aircraft experiencing an ENGINE FAILURE or serious power loss from the 400ft point on straight climb-out, to the downwind turn from circuit cross-wind, the normal response would be to look for an into-wind landing site and stay on, or turn onto, that heading as soon as possible to avoid the risks of maneuvering at low level. Without continuous obstructions, a survivable arrival back on the ground is a reasonable possibility.

Unfortunately at Ardmore your options are already restricted by the other two lines (note accumulation effect) and the glide of the aircraft can bring you into potential conflict with the existing lines (to be replaced) from this ascending full-power (pre-failure) trajectory.

With the new much higher proposed lines (between 2 and 3 times as high) this exposure is increased by the same factor in time (i.e. 2 to 3 times as long). With the existing lower lines, the option of over-flying them (when turned back onto an into-wind heading) occurs much earlier.

The proposed lines will have therefore become much more of a physical barrier within which any forced landing following an engine failure after take-off from Runway 03 must be conducted. The pilot is faced with a much more difficult predicament in that once-available sites are now obscured; and in that there is an increasing requirement for low level maneuvering (engine-out). See loss of control concerns in body of evidence. A stall-spin accident of a novice in this artificially constrained environment, or line strike, would be equally attributed to the lines existence and height.

Thus the parallel-track, cross-wind climb out, down-wind of the proposed lines, is actually an extended-time potential exposure to them in our forced-landing concern situation – even though the normal track would not actually cross them.

Landing back onto Runway 21 in the circuit, or from any downwind rejoin should not take you out of the MBZ and over the proposed lines normally, so the new lines are only an obstacle to the heavier and faster circuit aircraft, unless there are a lot of aircraft in the circuit, and it becomes extended. This may account for 5% of Runway 21 ops but this has not been factored into the arithmetic below. (Starting point AirBiz p46 to which the additional circuit exposure (new lines only) needs to be added.)

New Lines exposure time additional for circuits from Runway 03:-

Taking approx 50% operations each Runway direction, and the 78% fixed-wing residual after the AirBiz "out and back" ops are subtracted gives 39% of total extra ops exposed. (0.39 fraction)

With an aircraft climbing at 500ft/min and a climb of 400ft to 900ft before and during cross-wind gives 1 min or 60sec exposure, approx every 7 mins (for a circuit).

Into-wind landing importance obviously varies with wind strength. Using wind-energy information, we can expect wind to be significant one day in three on average. However, no-or-low wind days mean higher across-ground speeds on landing, so larger paddocks, or cornerwise approaches, are required for a safe forced landing. All three sets of lines now restrict (artificially) the choices while cross-wind off Runway 03, so the new much higher lines will restrict this further. They also impose maneuvering requirements (low level, engine out) for those sites that do remain, in order to obtain the length required.

For this combined qualitative/quantitative consideration then, the new-lines, engine failure in-circuit exposure 400 to 900ft climb-out has only been reduced to a half, rather than a third, based on significance of wind energy on a given day.

Putting the fraction of total operations for which circuit traffic contributes to new line exposure then gives  $0.39 \times (1 \text{ minute}/7 \text{ minutes}) \times \frac{1}{2} = 0.0278$  ( use 2.78 % ). To this must be added AirBiz (p46) 0.55% exposure of total for out-and-back to give total exposure to new lines only of 3.33% of total flighttime.

An engine failure during this portion of flight-time either has the aircraft in potential conflict with the new lines, if conducted into wind; or has its potential safe forced landing sites choice constrained and dominated by the new lines (requiring low-level power-off maneuvering – and all the associated risks).

This is  $(3.33/0.55) = 6.05$  times the exposure figure AirBiz thought was conservative (p46) for new lines only.

HOWEVER, while Sections "(r) (iii)" and "(r) (iv)" are hereby acknowledged to be roughly presented in the originally filed brief of my evidence (and the word "just" has been omitted before "out and back" in (iii)), the MAIN ERROR is that a construction seems left open that the circuit traffic exposure to the new lines was a "KNOWN" to AirBiz and Sullivan that they somehow deliberately left out. This was never intended.

I accept that they do not have the knowledge and experience required, which would then make any such implications/allegations/accusations grossly unfair and offensive on my part.

I therefore unconditionally withdraw any such implications relating to this matter and apologise for any offense or inconvenience caused to AirBiz and Sullivan. I take full responsibility for these errors, and the other members of the Ardmore Airfield Tenants and Users Committee are in no way implicated.

My only legitimate contention relating to this particular issue is that AirBiz/Sullivan should have been aware of this situation; been able to deduce it; or obtained it from the Ardmore peer review that did not happen. This I poorly articulated.

I must also apologise to any other interested parties for any confusion created by the version of this information that appeared in my original Brief.

The Clauses concerned have been substantially reworked in the Amended Brief following.

Allan McCreadie  
Acting Chairman  
AATUC

**AMMENDMENTS** from 26/02/08 Brief

With the welcomed time extension, I have been able to tidy up some issues and completion:-

- Tower heights 2-3 times existing, not twice
- Accumulation ("last straw") effects of new lines added to existing obstacles
- CAA involvement
- Ardmore future planning
- Aperture Effect in Clevedon Gully

## **Introduction**

### Ardmore Airfield

Ardmore was constructed in the War year of 1943 as a joint venture between NZ and US military interests initially as a base hospital airfield, but developed into a fighter training base. At that time, one power line (that to be replaced) had existed since 1933. The existence of that line is why the Airfield is closer than ideal to the township of Papakura.

Ardmore is still, in terms of flights and flight hours, predominantly a training base but civil rather than military.

It is however a National, Regional and Local transport Infrastructure Asset, and is recognised as such in District and Regional Plans, because of its strategic placement and service to General Aviation throughout NZ

In terms of workshop based activities it is home to Local, Regional, National, Australasian and Pacific service centres; while in the specialised warbird and vintage aircraft restoration and rebuild field we have at least two players on the world stage.

On any workday we have around 350 on-site staff at the airfield, plus around 60-80 trainees and customers.

In 2004 Ardmore had had 243, 000 Aircraft Movements, making it by far the busiest in New Zealand on this metric.

A survey we did in 2004 for Environment Court action against Papakura District Council and others revealed a \$120M p.a. turnover for on-field businesses excluding on site business-to-business transactions. With our businesses predominantly locally owned and putting both wages and profits into the Auckland / South Auckland community, the direct and induced contribution was factored at \$80M p.a.

Next to schools, the airfield is one of the largest employers by specialisation in Papakura. The Ardmore business model of clustered high value knowledge-based industries is being actively copied at Tauranga and Hamilton Airports.

## **Involvement and Position**

1. My name is Allan Robert McCreadie. I operate a business of Professional Consulting and Research and Development, from a facility at Ardmore Airfield (Armadillo Engineering Ltd and Green Zephyr Co Ltd).
2. Since 1993 I have been Acting Chairman of AATUC, a non democratically appointed group (on basis of airfield business sector representation). I currently represent the sport and recreational pilots; and engineering organisations.
3. My project development and control work in the course of our businesses has brought me into the planning and RMA arena; and I have been carrying out this

aspect of work for AATUC with the Papakura District Council, Auckland Regional Council, Manukau City Council, Local Lobby Groups and Parliament's Transport Select Committee since 1993. Useful results have been obtained.

4. Since the Ardmore operators becoming alarmed at the Transpower proposed approx 60 metre high towers and lines adding to obstacles at Ardmore, I have communicated these concerns to Transpower on numerous occasions, and copied these widely (CAA, MCC, Electricity Commission, and others).
5. On 8 May 2007 I attended an introductory meeting at Ardmore (morning only) with the AirBiz Team, MWH, AAL and Ardmore business people, plus other pilots.
6. I addressed that meeting briefly on the basis that
  - a) The "Avoid" option (of the "Avoid; mitigate; compensate; hierarchy) needed to be given priority (undergrounding lines 500m minimum either side of runway centerline 03/21, and
  - b) That (under the "Reason Model" for accident analysis / avoidance - promoted by CAA) one of the "templates" at Ardmore (environment) already has a sizable "hole" in it with the existing lines and this will become even larger with the new proposed ones. ("Reason Model" discussed in body of evidence also).
7. The AirBiz representative assured the meeting that he was fully aware of the "Avoid" option. In their report, however, there is no "Avoid" option (developed further in body of evidence).
8. Despite an extended involvement in this particular issue, and demonstrated understanding of systems and methodology, no communication was subsequently received from AirBiz prior to report. We consider their report seriously deficient and any evidence or conclusions based on it, potentially unsound (developed further).

### **Qualifications and Experience**

9. I am qualified BE (Chemicals and Materials Engineering) - Auckland University, School of Engineering 1973).
10. I have 853 hours private pilot time logged (706 as pilot in command). I was trained at Ardmore from 1984. My flying time was accumulated in training, recreational flying and precision competition (non aerobatic) work. Two time Royal New Zealand Aeroclub National Champion (forced landing without power) 1996 and 2000.
11. My University work led to specialisation in Industrial Utilities and Chemical Engineering then developed into project management, then project planning. I have also had to do a lot of technical and contractual trouble-shooting along the way, and this has led to Court professional witness (technical and contractual), mediation, and court sanctioned arbitration work. My first post-graduate employment was with Dr Jim Sprrott during the period he was giving evidence in the Crewe case.

12. Currently my job title (predominant) is Senior Industrial Utilities Strategist and some clients are Fonterra Brands, Tip Top, DB Breweries, Sanfords Fisheries, Oceanis Group (Melbourne, Australia), Wallace Corporation and Villa Maria Wines. Our Ardmore facility also handles client pilot-plant work, and experimental aircraft development.
13. My project planning and control work involves comprehensive project and OSH risk analysis and management work. This involves consideration of client and public risks, plus work-plan work with contractors to ensure the safety of this; and monitoring of their OSH performance. We become involved in full "HAZOP" studies undertaken on new and problem plants.
14. We work closely with insurance company safety and loss prevention specialists where we are responsible for specifying and purchasing Contract All Risk policies for clients. The largest such was a \$30m (2008 dollars) greenfields chemical plant. The exposed nature of our work keeps us in contact with our own Professional Indemnity Insurers, and this risk is re-evaluated and renegotiated on an annual basis.
15. Like many in New Zealand aviation, I have closely watched the evolution of risk and accident analysis from the automatic "pilot error" stamp through the difficult days of Erebus, with the ground-breaking work on organisational contributions and culture problems by Justice Mahon and Gordon Vette. I also monitor accident, incident and defect reports in NZ aviation.

## **16. AATUC Case Definition**

### **Summary**

The AirBiz risk analysis must be set aside and redone to the AS/NZS Standard on a full scope. We believe the Airbiz report and Sullivan's evidence derived from the same source to be deficient and distorted to the point that in themselves they represent a risk to all parties.

Risk to lines themselves and power outage effects must be included.

The onus (and best opportunity) of risk avoidance, mitigation or compensation lies with the party creating the hazard, not the potential victims.

AATUC would accept that a decision to underground at least 500m of line either side of the Runway 03/21 extended centerline would meet our hazard avoidance requirements, without further ado.

If the third row of pylons out from the end of runway 03 are replaced with new ones 2-3 times the height, there is a significant increase in risk from present. If however the existing pylon line were replaced with (even 1km) of underground line, this would represent a useful increase in safety compared with present.

- (a) It is our concern that the AirBiz Risk Analysis Report appears severely deficient in scope and understanding - and that in turn negates any conclusions drawn from it; or evidence at these hearings grown from it.
- (b) We request that this report be set aside and a complete and independent study authorised by the Board of Inquiry, with AATUC and their industry advisors as involved and consulted stakeholders.
- (c) Alternatively, we request that our own modifications and additions to the AirBiz analysis and conclusions be accepted by the Board, resulting in the undergrounding of line at least 500m either side of the extended centre-line of runway 03/21.
- (d) Running (and keeping) the proposed line voltage at 220kV (in keeping with the dissenting Electrical Commissioners view that it will never be run at 400kV anyway) makes both this undergrounding and the line much more cost effective.
- (e) To simplify and focus the issues we have limited our detailed risk concerns to the "Emergency" engine failure or serious partial power loss on take-off; on final approach to land; or while in transit through the Clevedon Gully.
- (f) While the other situations ("bona fide low level operations" and "abnormal operations") will be exposed to greater risk with the higher towers and lines - or the usual risks for longer - there is an element of "choice" totally missing in (e). While "BFLLO" and "AO" can only add to total risk increase with the higher towers / lines (especially if they become Emergency Operations) it is our

contention that the (e) issues carry the bulk of significant and unavoidable risk - and our case can be made on those issues alone if needs be.

- (g) Despite considerable representation on the matter by Ardmore operators, the fact that Ardmore is predominantly (runway ops and airtime) a training aerodrome with probably 50% of operations involving pilots in command with only 10 (first solo) to 80 hours (PPL issue), is given only passing reference ("nursery airport") in the Air Biz risk report. We cannot find reference to this in Sullivan's evidence. This "vulnerability" factor increases the chance of "inappropriate actions in emergency" manifold and needs a statistical multiplier. There is also a tendency to slower response times, which requires an additional multiplier. These are an "any activity" effect, not confined to flight.
- (h) While simulated engine failure / partial power downs must be taught - and taught with particular reference to avoiding inappropriate responses around power lines - these are an instructor-directed controlled-environment exercise which must not be given equal (or higher) priority reference to REAL emergencies (as occurs in the AirBiz report and Sullivan's evidence). There is no significance of simulation risk in comparison to REAL EMERGENCY risk. The blurring of these issues and off-hand dismissal of the "real thing" is disturbing (Sullivan 136 to 140).
- (i) Sending a new pilot solo at any time in the 10 to 40 hour (or more) experience level is a high stress situation for the instructor. Transpower's taller towers and lines increase the concerns of all of us in regard to appropriate emergency responses. Any accident also makes the instructor and the training organization victims. OSH requirements now cover elimination of unreasonable, unnecessary and avoidable stress.
- (j) There is an unbelievable and huge hole in the risk report in that the lines are being deliberately exposed to single point massive failure due to aircraft impact. The reason for the new lines is supposedly "security of supply" and this sits incongruously with the AirBiz non-consideration of this aspect in their seemingly casual dismissal of the risks.
- (k) Both the AirBiz report and Sullivan's evidence (36) reference "AS/NZS 4360:2004 Risk Management" in that they have "utilised comparable likelihood/consequence tables and a risk ranking matrix derived from" this source.

They should have applied the "Standard" to their scoping / consulting / and development of the report itself. It is a generic and straight forward guide to scope and process that highlights the omissions and deficiencies in the AirBiz report and process (bona fide purchased copy provided as Appendix A). It is also relevant to the NZ legislative environment in that it fits with the stakeholder involvements/consultation process and the "Avoid-Mitigate-Compensate" hierarchy for risk management adopted for hazard treatment in occupational safety and health (our prime consideration for pilots, passengers, and instructors).

- (l) By comparison, the ICAO template used by Sullivan (his appendix 1) is a simplistic and archaic system providing for omnipotent bureaucracies to impose

risk judgements on stakeholders who have not agreed to the analysis given or to accept or share those risks in this manner with no compensation. Not this century folks.

- (m) Aircraft taking off from and landing at Ardmore are "part 91" operations and not subject to part 137. If property is placed (anew) beneath the ascent and descent of a designated aerodrome, this is at the person's or owner's own risk. Operators using Ardmore will not assume or accept any liability for property Transpower have placed at risk in this way. While the operators will do their utmost to avoid collision (for self preservation) this is a duty of care to themselves only - it is not a duty of care due to Transpower or their customers.
- (n) Similarly, aircraft insurers can be expected to exclude coverage for third party damage and damages claims from Transpower or their customers in respect of new Transpower assets deliberately placed at risk by Transpower below the ascent and descent fans of designated aerodromes.
- (o) However, insurers of aircraft hull and occupant lives can also be expected to subrogate Transpower for recovery of settlements made where the placements of their assets constitute identified new or increased hazards in unacceptable positions and Transpower have been advised of the unacceptable disposition of these assets.
- (p) We are concerned about the attempt by AirBiz and Sullivan (90 and 91 and Appendices 12/13) to doctor a spin on the new tower height to make the new towers seem lower than those they will replace. (They are actually around 2-3 times the height). The result they have achieved (using an existing single tower placed on the side of a hill on the extreme edge of the "arrival/departure fan", compared with a new tower on the lower flat ground that makes up approx 90% of the "fan" width) is only to confuse, not edify.

Sullivan's own evidence (radar tracks, his Appendix 9) demonstrates the distortion in this: - the aircraft track out on runway centerline and do not benefit whatever from this cute "left of track" nonsense.

The increased height of the new towers affects the whole width of Clevedon Gully, not just approach and departure fan, all of which is used by Ardmore and transit operations.

- (q) It is the "human factors" and "organizational cultures" of Transpower/MWH/AirBiz that allow this sort of malarkey that needs addressing - not those of their potential victims (AirBiz report, 9.2).
- (r) We are concerned regarding the arithmetic and exclusions in the "semi quantitative analysis" (AirBiz)
  - (i) No vulnerability factors applied for low hour pilots
  - (ii) No factors for "perceived" rather than real emergencies - resulting in inappropriate actions (old classic - the thrashing seat belt end out the door perceived to be massive engine or structural failure).

- (iii) Ardmore is a training airfield. Our predominant activity is "circuit" training (not just "out and back" per AirBiz 8.3 p46). Aircraft in the Runway 03 circuit are exposed to the new lines in the case of engine failure crosswind (and other causes of circuit extension: heavy/fast aircraft; very busy; night circuits (which are higher and therefore extend)). Of my own 853 hrs approx 35% has been circuit work. Sullivan admits circuit training (49) but neither he nor Airbiz realize that engine failure crosswind is exposed. Factored exposure AATUC estimates are at six times the Airbiz figure.
- (iv) No consideration of the ACCUMULATION factor of THREE SETS of lines. The new lines (which are up to almost 3 times higher) are the LAST STRAW, not the first or second. Sullivan (13) acknowledges that they have deliberately analysed only the increase in hazard between the new and existing line it replaces (as the "second straw" then). We are amazed that senior risk analyst professionals would accept instruction to work with such restricted scope.

To achieve that risk scenario, you would have to bury the other two existing power pylon lines. AirBiz/Sullivan do make reference to the other lines, but that is only where the other lines can be shown to pose a higher risk. This is comparing the weights of the straws, and is unhelpful in terms of accumulated risk.

The accumulated 3 line risk factor can be difficult to accept now under some conditions (especially night operations). All that is needed is a relatively small increment then to tip this: the new lines must be analysed in this cumulative "last straw" manner.

- (v) Although identified by HazID group and Sullivan 118, the combination of "hitting the ground" while maneuvering to avoid power lines after an engine failure is awarded an "n.a" (not applicable) in AirBiz Table 8.3 pg 45; and table 10.3 p60. Inappropriate actions resulting in aircraft wing stall/spin (loss of control) following an engine failure (or perceived engine failure) by a low time pilot (50% of movements) trying to deal with the multiple emergency and avoid the power lines is one of our GREATEST concerns. (Developed in Body of Evidence).
- (vi) AirBiz 11.2 p62 requires "mitigation strategies" to divide the residual risks by a factor of 10 to get them into "the generally acceptable" region. Sullivan (123) seems to fudge around this and claims results OK without mitigation. "Avoidance" is avoided.
- (vii) AirBiz 11.4 p64 recommends "further analysis" because of concerns generated by the "semi quantitative analysis". Meteorological work was carried out apparently, but no results are produced. The report version currently tabled is the same as that originally produced, and the recommendations still refer to future work. Apart from the Sullivan Appendix 9 data for radar tracking of aircraft, the remainder is not done or reported.

(s) There are "mitigation recommendations" in AirBiz 11.3 p63, but no "avoid" recommendations. The AirBiz mitigations ALL refer to actions required by pilots and their trainers to avoid the wires:-

- Transpower may paint up the towers and "ball" the lines BUT this then transfers the onus on the pilots to see and avoid them.

- The pilots must be "trained and educated" to avoid the lines (T and E). The nonsense that this condescension represents is given away though - such "T and E" is only to take place after line construction (recommendations 3 and 4). One of the most hazardous times will be DURING construction - and all following. Be assured Training and Education will begin BEFORE any construction.

The AirBiz approach cutely raises the "pilot error" rubber stamp in preparation for any issues. The potential victims of hazards deliberately created (and seemingly whitewashed) by Transpower, are presented as tainted with poor training and irresponsibility. This is insulting and non-factual. (AirBiz 11.3 recommendations 3 & 4 p64). All these precautions have already existed for at least my 20+yrs of active involvement, so any suggestion that instigating them now would improve safety is bunkum.

Sullivan adds as a mitigation sweetener (126/7/8/9) automatic cloud ceiling sensing information on ATIS paid for by Transpower. If actually available this would be very new technology.

(t) If any Aviation Organisation presented an Exposition for a "part (anything)" work approval that placed all safety issues on the shoulders of the pilots we would expect CAA to summarily reject it.

The role that the organisation's own safety culture and managerial level risk/hazards understanding, analysis and treatment plays is by far the most important - and focus is on "avoid" so minimum remains for pilots to mitigate and compensate.

(u) Transpower, MWH, AirBiz, and the terms of engagement/scope restriction between the latter need to come under such scrutiny.

(v) Sullivan does not present any qualifications as a pilot; AirBiz personel may have this training, but those preparing this report do not appear to. They do not appear to already KNOW what is required to review the "Emergency" situation - but they also seem lacking the ability to UNDERSTAND in detail what the pilots were telling them. This shows up in such areas as:-

- No provision for circuit traffic in AirBiz 8.3 p46 (a predominant activity with engine failure/forced landing exposure)

- Minimal recognition of predominance of low hour pilots and how to account for this

- Not understanding potential control loss as a major hazard with engine failure, especially in obstacle avoidance maneuvering.

- Equating negligible risks (engine failure simulations to ensure safe responses) with major risks (a real engine failure). See Sullivan 136/7/8.

To complete this work, while relying on Ardmore pilots to provide this input/feedback would have required AirBiz to continue to work on an interactive process of peer review with our people before report publish.

This did not take place.

The AirBiz report turned up all potted, polished and packaged complete, straight into the public arena.

While the Organisations "consulted" at Ardmore have been identified in the AirBiz report, the fact that they are apparently the actual experts in this exercise is not acknowledged; nor are their names, qualifications or experience levels.

Without any stakeholder/expert review sign-off by the Ardmore pilots and operations manager consultees of the AirBiz report, or Sullivan evidence; the ability of Sullivan to use this information and claim expert witness status (where his opinion carries the weight of fact) is THEREFORE DISPUTED by AATUC.

- (w) There is a legal disclaimer (3rd sheet, before p1) of AirBiz report that says "the material in this document is of the nature of general comment only, and neither purports nor intends to be professional advice" etc.

While this is one of the few parts of the report or Sullivan's evidence that AATUC would whole-heartedly concur with; we request the following be considered:

- Surely Transpower/MWH were entitled to "professional advice" for their fee?
- As non-professional advice, what standing or value does the report actually have?
- Given the already confused/deficient analysis we perceive in Sullivan's evidence, how does the non-professional advice status of his main reference document aid his claim to professional witness status?
- If AirBiz WERE to produce a "Professional Advice" quality document, how would it differ from this one?

As a consulting professional who does stand behind the work he does, in advice, design, analysis and evaluation (without weasel-word disclaimers); and a professional witness that does limit himself to subject of intimate personal knowledge and experience; I object strongly to any acceptance of the AirBiz report (in its current form) and Sullivan's evidence derived from it.

- (x) While deficiencies can be related to lack of knowledge and expertise; our perceived distortions such as the tower height confusion, submerging of engine failure reality, and fudging the mitigation contribution to reduced risk

apparently required by the Airbiz report; can only have been done with a reason. It would appear the only logical reason for such would be ACTUAL REALISATION OF RISK THAT MUST BE DENIED.

- (y) The outcome of such would then be that the AirBiz report and Sullivan's evidence not only spells danger for Ardmore operators, but also Transpower, MWH, AirBiz and Sullivan. In the event of a lines-related accident, the existence of a suspect risk report and evidence could bury them.
- (z) We therefore contend it will be safer for all parties that the AirBiz report and Sullivan evidence be withdrawn.
- (aa) Despite bulking up the AirBiz report and Sullivan's evidence with reproductions of CAA literature, approval by CAA of the remainder of the material does not yet exist.

CAA apparently have a final say as to how the new majorly increased height lines across the runway extended centerline at Ardmore and Clevedon Gully may affect airport operations. This is by way of a "Part 77 Determination" which has yet to be made. (Dennis Hoskin CAA Wgtn).

Transpower could be liable for heavy and continuing compensation claims by AAL and Ardmore Operations if additional operational restrictions are imposed by CAA because of the new lines not being undergrounded.

This is then the importance of having a full-scope independent risk study of impeccable integrity; it is imperative to neither under nor over estimate the risk.

- (bb) In AATUC vs everybody before Judge Whiting Environmental Court, the court has in an interim decision requested continued consideration of maintaining Ardmore capability up to 350,000 movements per year (240,000 in 2004).

Last month ARC got off the fence as well and have submitted in favour of the 350,000 movements.

This is a significant increase (viewed to 2050 AD) over the Airbiz 200,000 figure analysed. We expect a significant increase in light jet air taxi operations (faster; reduced slope climb and descent; extended hour (dark time); extended circuit operations).

The AATUC have put 14 years hard work into maintaining the viability of the Airfield.

- (cc) We do not consider the "obstacle limitation surfaces" (ostensibly used for individual point obstacles) are relevant to continuous fence-type obstacles directly across track.
- (dd) With the new lines on the edge of the MBZ, where the airspace for uncontrolled operations drops to 1500ft Above Mean Sea Level (AMSL), there is a normal operations "aperture reduction" effect between obstacle clearance height over these new lines  $[500 + (58 \times 3.28) + 80\text{ft local} = 770\text{ft AMSL}]$  that only results in 730ft usable height aperture on a no-cloud effect day.

If cloud base restricts operations to Ardmore circuit height (day) of 1100ft AMSL, there is only a 330ft aperture height left. With the existing lines now, this is still only a 455ft gap and already makes it difficult to maintain separation between VFR North-South transit (non-Ardmore) traffic and our traffic up and down the gully (i.e. on crossed paths).

17. **Body of Evidence - Contents**

In support of our defined case issues 16 above, we have assembled the following:-

- a) A new scope and procedure for the Risk Assessment and Management Report based on "AS/NZS 4360:2004 Risk Management". This must include "security of electrical supply and down stream risks".
- b) Vulnerability perspective
- c) A detailed look at the risks associated with engine failure or power loss (real or perceived) in the Ardmore environment - take off and landing.
- d) Other risks not previously considered by AirBiz in the take off and landing phases.
- e) Simulated engine failure exercises put in correct perspective.
- f) The Avoid option.
- g) A peer review of the above items by Warren Salter, CFI Ardmore Flying School.
- h) Human Factors and application of the "Reason" model to Ardmore situation - current position, and how to improve it.

17 (a) A New Scope and Procedure for the Ardmore Risk Analysis

(i) Scope

The risk analysis and management must be expanded in time, depth and breadth.

As a concept and detail designer, I can verify that the biggest contributions to safety (and all positive outcomes) are possible at the concept stage then reduce through the detailing, implementation, and placement in service phases.

Opportunities not taken at concept stage cannot be recovered at detail stage - and so on, down the chain.

At the moment, the ability to select a safer concept (undergrounding) still exists, so the scope cannot be reduced on the basis that the lines are a fait-acompli (the scope of MWH / AirBiz report). The concept and design are still on the table, and our requests have also been known for around two years.

The risk and hazards of line outage due to aircraft impact are an extremely important facet and must be considered in terms of downstream effects. A tower strike could cause an extended outage. How this could have been left out of the present Risk Report Scope is quite amazing.

(ii) Procedure

The current Transpower Procedure appears to be one of arrogant imposition.

The Risk Report approach starkly exposes this: - the onus of lines security and aircraft safety are to be dumped on the party least able to make major contribution to outcome; they will have their lives and livelihood put at increased risk; and for no compensation. This is absolute nonsense.

The onus of (and liability for) avoiding, mitigating and/or compensating a hazardous situation always falls on the party creating the hazard. If another party has better opportunity to create the "avoid" (etc), the action may be (by agreement) delegated or shared; but compensation is then required. Here, only Transpower have the liability and opportunity to make the major risk reduction (undergrounding). Refer AS/NZS Risk Management Standard, Appendix A.

We strongly submit that the ICAO model Sullivan and AirBiz have used is not appropriate in this instance of multiple uncontracted parties, since it involves a unilateral declaration by one Authoritarian party that presumes Government (Ruling) Agency Status.

The RMA does not recognise this dictatorial regime, and Transpower do not have "Government" status, despite their ownership.

I do not propose to re-write AS/NZS 4360:2004 (Appendix A) here: - it is generic, but simple and concise. Further elaboration is included in a companion Hand Book 436:2004 (not attached or appendix here). This Standard does address the

situation of multiple uncontracted parties working to a joint solution, and highlights the avoid/mitigate/compensate hierarchy.

The AS/NZS copy (Appendix A ) is an original as is required by the copyright conditions of Standards NZ. We could have highlighted or annotated it, but this would seem to be superfluous.

Only 5 copies of the Standard have been provided, and any other party needing further copies will have to purchase these from SNZ direct. Do not photocopy or otherwise reproduce this document without SNZ approval.

17 (b) Vulnerability Perspective

The business of Ardmore flying is at least 50% training operations involving “ab-initio” (previously untrained) pilots, and any risk analysis must address this.

AirBiz p48 Table 8-4 introduces a table (reproduced here) to demonstrate human fallibility in different situations taken from work by Wilson & Corlett.

	<b>Task Type</b>	<b>Probability of Failure</b>
(i)	Simple, frequently performed task, minimal stress	0.0010
(ii)	More complex task, less time variable, some care necessary	0.0100
(iii)	Complex, unfamiliar task, with little feedback and some distractions	0.1000
(iv)	Highly complex task, considerable stress, little performance time	0.3000
(v)	Extreme stress, rarely performed task	1.0000

It is our contention that in the case of low time pilots flying first and early solo (10 to 40 hours) that (i) simply doesn’t exist, and all hazard levels move up.

- (vi) Age effects exist that shift these effects. People come into aviation at various ages, and while younger people may learn more quickly and react more quickly, they may be more prone to misplaced early over-confidence.
- (vii) The training “rate” also has a bearing. Too fast and saturation / non-retention occurs; but at the other end of the scale, training less than once per week in these early stages can delay progress due to non retention also.

While the training organisations can control the “fast end” to the individual’s capabilities, the infrequent trainees can make slow progress - thus hours alone are not an absolute guide of vulnerability to inappropriate actions.

- (viii) Not only ab-initio training is vulnerable; any step that involves a major increase in complexity (e.g. from single engined to twin engined, retractable under carriage with variable pitch propellers and cowl flaps and workload

effectively sets the vulnerability clock back - and introduces a host of new inappropriate action possibilities ("securing" the wrong engine, or sudden turn towards the dead engine in an engine failure).

- (ix) Vulnerability effects can extend back upstream from an emergency itself. The "emergency" may be perceived only, like the flapping safety belt / buckle in the airstream that sounds like a massive engine or structural failure.

The emergency itself can be the result of inappropriate action - for example failure to detect and eliminate carburetor icing; or fuel mis-management.

- (x) Up to the "cross-country" stage at least 80% of all dual training flights include a "new" training aspect / component. The student is then required to practice these new skills when flying solo. Therefore this period of training can be very stressful. (see table previous page)

- (xi) Longer reaction times are typical of lack of experience. Learning the pre-planning and speeding up responses is one of the most challenging aspects of the flight training process. Typical of a proficient and current pilot is accepted as 4 seconds, but a low time pilot in a multiple failure/ stressor situation could be up to 30 seconds to make a decision regarding (for instance) a forced landing site. For an engine failure at below 500ft such a decision and the ground will arrive at the same time, even without losing control.

Any airport environment design decision that reduces obstacles also reduces the number of what may prove mind-numbing stressors to novice pilots, so the positive effects compound.

#### 17 (c) Real and Perceived Engine Failure

- (i) Simulated engine failures are not "part" of this risk: they are conducted to reduce the likelihood of inappropriate actions being taken in the event of the real thing. This instructor controlled exercise is discussed in (e) below.
- (ii) We object strongly that AirBiz and Sullivan have lumped "real" and "simulated" together as a group of risks. The real and perceived occurrences are pro-risk; while the training exercises are the only anti-risk device we have.
- (iii) Appropriate emergency responses exist and can be taught - along with better judgement, better decision making, and enhanced trouble-shooting capabilities - but not instantaneously.
- (iv) Experience confirms that appropriate responses are not necessarily intuitive; and in some cases are counter-intuitive. Loss of control while maneuvering an aircraft at low level without power is a proven likely negative outcome of engine failure. This control loss is generally associated with wing "stall" (one

or both) in which the wing concerned contributes little or no load bearing capability, but extreme drag.

- (v) The stall occurs when the angle of the wing incident to the air (angle of attack) is more than around 15 degrees, and is generally related to insufficient airspeed ("stalling speed").
- (vi) If only one wing stalls, the aircraft spins. At the altitudes we are considering, all stalls are most likely fatal accidents.
- (vii) From the pilot's perspective stall and spin accidents are created by (common factors):-
  - Inattention to the aircraft's airspeed due to workload and fixation on objects, obstacles, or scenarios outside the aircraft. A particular concern is fixation outside the cockpit due to knowing the lines are there, but NOT being able to see them.
  - Trying to extend a glide to clear an obstacle (or trying to climb over an obstacle with insufficient power) by raising the nose of the aircraft with elevator. This decays airspeed, increasing angle of wing attack.
  - Maneuvering the aircraft sharply in turning with no power to avoid an obstacle observed too late (or not reacted to soon enough)
  - Miss-handling an "engine-out" twin (more below)
- (viii) Obstacles to be avoided by maneuvering or attempting to "climb" over them contribute majorly to the "unsafety" of the situation then - and this is our issue with the lines in respect of contribution to "loss of control at low level" (generally fatal) accidents. The aircraft may not hit the lines in these events, but being out of control, they may.
- (ix) Even appropriate actions cannot always save the day - obstacles that block access to the limited number of safe emergency landing sites (as Transpower's pylons and lines do now - and do much more effectively in future under the present proposal) will contribute to aircraft damage and injury.

Again, the lines have contributed to unsafety - in this instance without being hit (this has happened to a warbirds syndicate CT4 aircraft suffering power loss relatively recently).

- (x) An engine failure / serious power loss below 500ft above ground (AGL) - not constrained by power lines, hilly terrain, or shelterbelt trees, while taking off or landing is generally taught as a "straight ahead" exercise with only minimal adjustments to go between the "big bits", i.e. buildings, individual trees, rock outcrops etc while securing the engine, configuring the aircraft for landing (flaps and wheels) and (above all) maintaining airspeed safely above the stall value. Since take off and landing (including forced landings)

are made into wind, "straight ahead" is the correct option, as the speed with respect to ground is at minimum. Any impact speed is reduced.

- (xi) Introducing 25m and 60m high electric fences into the equation adds considerably to the complexity of the situation; cuts down the number of safe options; and increases the number of potential inappropriate actions (and opportunities for failure of trainee judgement or decision making)
- (xii) The first question that the pilot must now ask themselves is "over or under" (in reality "over" or turn away and land on "this" side of the lines). The first issue is actually to make a decision after exercising judgement (which may only be "work in progress"). Obvious inappropriate response opportunities are:-

- Freeze and do nothing at all - hit or lose control.
- Attempt to glide over but:-
  - Fail and hit
  - Stall the wings trying to climb above the wires without power - lose control
- Realise too late that this is not working and lose air speed / control in an abrupt turn away maneuver.
- Turn away too abruptly, stall and lose control (the "impossible turn-back maneuver")
- Fixate on the lines looming up and pay insufficient attention to airspeed, then stall and lose control

All probably fatal, and attributed to lines existence, even if the lines are not actually hit.

- Turning away 90° and fail to pull off a safe cross-wind landing is also attributable (but possibly survivable with damage depending on ground speed). Aircraft handling cross-wind is more difficult, and there is no headwind to slow the aircraft with respect to ground.
- (xiii) The opportunities for inappropriate responses are less on landing than take off.
- The aircraft is already trimmed and in landing configuration
  - The aircraft is already in reduced power condition, so no abrupt trim changes are necessary if power is reduced completely

In landing, however, the temptation to try and "stretch" the glide is strong - the runway is out there and visible: - beckoning. The danger is hoping too long, and deciding too late that you can't make it.

Loss of airspeed and control on landing is just as potentially fatal as any other control loss.

- (xiv) In take-off the workload involved in response to an engine failure is greater:
- The trim setting on many aircraft for climb-out is inappropriate for best glide and must be adjusted to maintain a safe glide-speed above stall (hands off or with minimal stick load).
  - Set flaps and wheels to landing configuration (re-trim if necessary).
  - "Secure" the engine which will have failed at a high power setting, and this must be reduced, in case it restarts unexpectedly and crumples up your landing attempt.
  - In a twin-engined aircraft, securing the failed engine also means "feathering" the propeller on that engine so the blades are aligned to flight direction and create minimum drag. Mechanical inability to do so is a seriously compounding emergency; and failure to carry out this step a seriously inappropriate lack of action.
  - And at Ardmore on '03" somewhere in all this, depending on proximity, you have to miss 3 sets of powerlines - one proposed to be approximately doubled in height from present, without losing control of the aircraft due to inappropriate maneuvering. You are then required to make a safe forced landing maybe cross-wind, in a severely reduced choice of fields. This is hard work for low time trainees.

#### 17 (d) Other Risks and Hazards not Identified

The simplistic AirBiz / Sullivan treatment has not adequately developed the hazards identified by the Ardmore consulted group, and AirBiz / Sullivan have obviously arrived at the table with empty plates for our people to fill.

We have (above) developed Sullivan's 118(c) ("collision with the ground as a direct result of trying to avoid the proposed line") recorded but awarded "n.a." (not applicable) status by AirBiz in Table 8-3 p45 and Table 10-3 p60.

This is to us, the most hazardous situation arising from an engine power loss during or after take-off from Ardmore; or during landing; that can be directly attributed to the lines existence. Other factors can increase this.

Other risks to lines / aircraft that should have been identified because of the lines existence either direct or as a hazard multiplier are:

- Engine failure at night on runway 03 takeoff. While lighting the towers and line balls may make the lines easier to see, the effect on night vision is to bury the intended forced landing sites in darkness. Without lights you will

probably hit the lines. The present situation is already marginal with the short towers.

- Combination engine failure and sunstrike. The sunstrike conditions are reasonably prevalent at times making the combination emergency not a low probability event. This is a problem even without the lines, only the line-strike element is an increased (but significant) risk.
- Bird strike, windscreen direct, or propeller; either majorly reducing visibility forwards or creating a possibly paralysing temporary shock reaction in particularly low time pilots. Ability to react appropriately is reduced by vision problems and likelihood of other inappropriate actions increased by shock / stress. Line impact possible.
- A really catastrophic engine failure (pot or head blown off) can put copious oil on the windscreen of the aircraft. There is no method of removing it quickly to restore forward vision. All the previous hazard levels are multiplied by this and loss of control / wire strike are more likely for an aircraft taking off (this is more likely in a high power setting such as take-off).
- Banner towing aircraft, particularly the helicopters with long drop banners, if suffering power loss and forced to jettison the banners (they have huge drag) to retain control, could create a hazard for the lines. A situation where the banner was not dropped in a power loss could escalate to ugly quickly as well, if tangled in the lines. Higher lines force the long-drop banner aircraft higher to clear.
- Take-offs with any degree of tail wind substantially degrade climb slope and an engine-out twin machine would be very vulnerable to this. Wind-shear works against such take-offs, and the aircraft has to accelerate with respect to ground just to maintain airspeed as it climbs. An engine out twin has maybe power to climb some, or power to accelerate some, but not enough for significant quantities of both. An aircraft could clear the close-in lines; suffer an engine-out then fly into the new triple-height lines (it is engine failure AFTER take-off we are concerned about).
- Tail wind operations can occur because the winds are light and variable; the circuit (full of aircraft) takes a bit of time to re-arrange after wind shift; and the down-wind take-off itself may be an inappropriate response to time demands - without considering engine-out performance in this situation.
- Because the unexpected restart of a failed engine can itself be an embarrassment to controlled flight or a safe forced landing in a tight space, it is normal to set the power to idle and mixture to cut-off to prevent this, once attempts to restart or restore power have been abandoned. With a twin; add propeller feathering. If this isn't, or can't be done; no residual ability to climb on one engine can be relied upon.

- With trainee twin-engined aircraft pilots it is not that unusual for the novice to “secure” the wrong engine in an engine-out simulation exercise - and that’s only in the stress of a known-to-be practice situation.
- While the recovery response may be obvious, the time to achieve this, and the speed / height lost meantime, can be significant. Again, a twin having cleared the close-in lines under full power may struggle to clear the new higher lines after such inappropriate response to an engine-out.
- A twin-engined aircraft with wing mounted engines in an engine-out situation must be handled well to achieve the residual climb rate claimed in the manual. The asymmetric nature of the thrust means considerable drag is created by the dead engine and the rudder surface deflection to maintain direction, and a higher air speed is now critical to maintain this directional control. Things are substantially worse with an unfeathered prop.
- An aircraft in this condition is in no way capable of power-line evasion maneuvers, as it can only turn safely towards the running engine - and this is painfully slow. A turn towards the dead engine is a last resort and very risky, as the wing that side will quickly slow to below stall speed if not managed skillfully, and a normally fatal spin results. Even safely executed the turn radius would be large, with no real ability to climb and turn simultaneously.
- For an engine-out twin, unable to out-climb the high power lines and unable to turn away quickly/safely, the only “safe” option is to attempt to fly / land straight ahead UNDER the power lines. At the relatively high minimum air speed for directional control, this is going to be an interesting maneuver or arrival.

#### 17 (e) Simulated Engine Failure Practice

Preventing pilots hitting the lines (or preventing them from losing control while avoiding the lines) in an engine failure scenario is totally dependent on the successful outcome of this practical training. The appropriate responses are not intuitive. We are not born with the ability to make the judgements, decisions and maneuvers uninstructed.

To have AirBiz / Sullivan submerge the REAL engine failure risk into a simulation situation that they then painted up as discretionary, risky, abnormal operation, is spin-doctoring in its own tailspin. The (absurd) subliminal implications are then that real engine failures are part of an unnecessarily risky discretionary activity; and/or we need to learn to have REAL engine failures away from the lines (Sullivan 136 to 138). We cannot object strongly enough to such nonsense.

17 (f) The Avoid Option

From the introduction of my involvement in these matters it will have been noted that I put both the "Avoid" option (undergrounding the lines 500m (minimum) either side of the extended centerline of runway 03/21) to the senior AirBiz representative at the initial meeting (morning of 8 May 2007).

He replied to the meeting that he was "well aware of the 'Avoid' option".

In the AirBiz report however, and in Sullivan's evidence, there is no treatment of any "Avoid" option(s). Instead, there is a spin doctoring version in AirBiz "9.3 Alternative Risk Mitigation Measures, p57" which references our "Avoid" option as a "mitigation" measure - but because it was NOT raised by the "HazID workshop participants" as such a "mitigation measure" - they did not consider it in their "Event Tree and Likelihood Analysis".

Considering that AirBiz had accepted it as an "Avoid" option in open meeting, why would our people put it forward as a "mitigation measure"? (and who's job was it to explore the "Avoid, mitigate, compensate" hierarchy - did AirBiz contribute nothing to that either?)

Who would pay an "Aviation Expert" organisation to come to the HazID table with no contributions to offer? Especially those they had previously acknowledged having to hand?

17 (g) Verification of items 17 (b) to (f) above:-

The Chief Flying Instructor of Ardmore Flying School, Warren Sattler, has reviewed and verified these training and emergency related items. His countersignature appears on the last page.

17 (h) Application of the Reason Model and Human Factors

AirBiz Annex p64 refers to "Human Factors" but only (like the Risk Analysis scoping itself) confined to the actions / inactions of those relatively powerless to do more than adapt to a risky environment thrust upon them (the pilots).

Similarly, their reference to the "Reason" model p65 is restricted to the "local factors" template.

A CAA "Vector" September / October 2002 article promoted the use of the "Reason" model in analysing the ability (or otherwise) of preventing errors from becoming accidents. This particular example is an in-house (single company) one, so there are only the four basic templates.

In a more complex situation, with multiple organisations involved, there are potentially more error capture / screen templates, and supposedly more opportunity

to prevent the simultaneous aligned “holes” that let an error slip right through to become an accident.

In this instance we have the “organisations” each represented by their own screen template and ranked in order of opportunity to prevent or divert the error-to-accident link at design stage (the “Avoid” opportunity). The ranking has nothing to do with willingness demonstrated presently:-

	}	The Board of Inquiry - unknown
Can	}	Transpower - unwilling
influence	}	CAA – presently reticent - unknown
direct	}	MWH - unwilling
	}	AirBiz - unwilling
Can only submit	}	Ardmore Airport - reticent
and lobby	}	AATUC – lobbying strongly for “avoid” option

If the error is allowed through the design stage, so that the Avoid option is not taken, then the error capture / divert must be by mitigation or compensation. These are less effective and we believe (on the basis of our own deliberations above) inadequate.

Can only	}	Flying Schools	}	Will have no option
React in	}	Pilots	}	but to shoulder burden
Self preservation	}		}	of risk to themselves

The “unwilling” parties represent screen templates which are frames only with no screening or interception ability.

They believe (incorrectly in our view) that they are in a position to down-delegate all risk management to the last screen template. Worse, the Transpower / MWH / AirBiz group appear to be trying to bypass or negate the AATUC screening effort with a weighty (but apparently seriously flawed and distorted) risk report / evidence presentation.

We could split out the various aspects of the Flying Schools / Pilots organisations and operations into sub-screens, but this would be to miss the point entirely. The real ability to prevent errors from becoming accidents in this situation exists only at the upper organisational levels, and in the design phase.

#### Human Factors (other)

It is informative to review the positions of the parties most able to make the largest contributions to safety regarding this issue (but least willing) in human factor terms.

It may suit AirBiz / Sullivan to dwell on only the pilot safety attitudes, but how much more significant risk is represented by a group of parties apparently willing to spin-doctor a risk report itself?

Transpower - the risky behaviour here we feel is bloody-minded corporate arrogance.

MWH - have been tasked by Transpower to eradicate obstacles to their proposal and are thus fixated on one goal (tunnel vision) on the basis that the "end" justifies the "means".

This includes apparently selecting a manipulable "aviation expert".

You don't have to stand back very far to see that there are better ends and better means.

AirBiz / Sullivan - their apparent willingness to spin-doctor the evidence (e.g. trying to pass off the new 60m (approx) towers as creating less of an obstacle than the existing that are around on third the height); then slide out of responsibility for the conclusions then drawn on the basis of a legal disclaimer, actually appears to pass under the radar of any very earnest industry "Human factor" tomes which start with a presumption of "good intentions not necessarily well executed". You would have to dig deeper on this one possibly.

How risky is the attitude that such actions are clever?

"Clever" they may have been, but certainly not wise in our view. With the exposure of what we regard as distortions, you have to ask "Why?" To us the most obvious answer is REAL RISKS REALISED THAT MUST BE DENIED. Then the denial becomes the risk.

The other risk is the one those parties create for themselves. In the event of a lines related aircraft accident, the existence of a risk report and evidence distorted to downplay risk would be very dangerous documents.

**For Ardmore Airfield Tenants and Users Committee**

Allan McCreadie, Acting Chairman \_\_\_\_\_ Date \_\_\_\_\_

**Countersigned technical verification items 17 (b) to (f)**

Warren Louis Sattler \_\_\_\_\_ Date \_\_\_\_\_

CFI Ardmore Flying School; 25,000+ flight hrs; many Type Ratings; Syllabus Innovator.  
Ardmore Flight Operation Group; Consults to CAA (Rules) and Airways Corp (Procedures)  
Vice President NZ Aviation Industry Association, 9yrs as Chairman – Flight Training Divn