r2a
DUE DILIGENCE ENGINEERS

CASE STUDY.

Airspace Collision Risk Model.

A FRESH APPROACH FOR THE AVIATION INDUSTRY.

DUE DILIGENCE ENGINEERS

PREAMBLE

> R2A assisted in the production of a generative and collaborative aeronautical study.

Following on-going safety concerns, the International Federation of Airline Pilots' Association labelled Taupo airport in New Zealand a 'black star' or critically deficient airport. At the time it was the only black star airport with 11 special operating procedures in the world.

With the failure of numerous aeronautical studies to resolve the safety concerns at the airport, an alternative approach was required.

R2A were engaged as part of the Civil Aviation Authority (CAA) study team to complete a generative and collaborative aeronautical study using the Aerodrome Aerospace Risk Modelling tool previously developed by R2A for the CAA.

Resolving the matter required a line to be drawn in the sand. This involved the stakeholders:

- Leaving behind past studies and biases and only referring to them for information purposes; and
- Asking the question, "What precautions are needed to safely and effectively sustain all of the desired airspace activities for all airport users?"

BACKGROUND

> Generative interviews uncovered a Memorandum of Understanding between operators.

Based on the information collected during the generative interviews, the local airspace users seemed to be comfortable with the current operations at Taupo. This appeared to be largely as a result of the Memorandum of Understanding (MoU) in place between:

- The Taupo Airport Authority;
- The airlines (Eagle Airways Ltd, Vincent Aviation Ltd and Air National Corporate Ltd); and
- The combined parachuting operators at Taupo (Tandom Skydiving (2002) Ltd, Freefall (2006) Ltd and Skydive Taupo Ltd).

Although not formally part of the MoU, all other local operators were aware of it. Many had copies of the MoU and had adopted the principles included in the document as part of their own standard operating procedures.

All local operators were familiar with the activities of the other local operators at Taupo. This provided good situational awareness.

Based on this information, the key issues therefore appeared to be associated with non-regular users of the Taupo airport airspace. These included students, itinerants and charter pilots and applied to the following generic classes of airspace users:

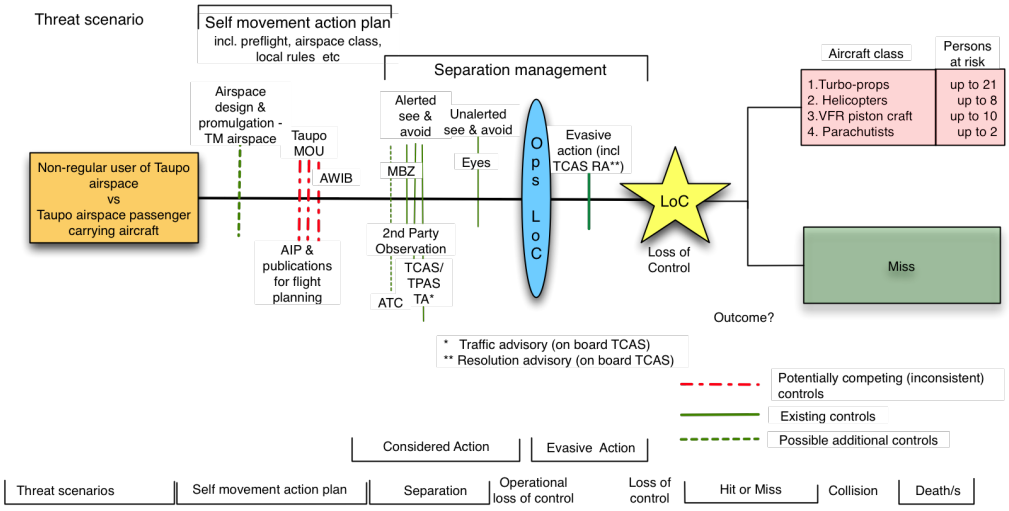
- Scheduled turbo prop craft (airline passenger services);
- VFR turbo prop craft (predominantly parachute jump craft);
- Helicopters;
- VFR piston craft (local charter organisations); and
- Parachutists.

> Key issues arose for non-regular users of Taupo airport airspace.

R2A COLLISION RISK MODEL

R2A Aerodrome Airspace Collision Risk Model

The simplified threat barrier diagram below represents the credible critical threat scenario of a Taupo airspace passenger-carrying aircraft encountering a non-regular user of the Taupo airspace. This was tested at the stakeholder meeting on Thursday 3 July 2008.



DUE DILIGENCE ENGINEERS

EXISTING BARRIERS

> A number of independent precautions were identified by R2A.

Two generic barriers consisting of a number of independent precautions were identified:

Self Movement Action Planning
(density management and exposure control)

Taupo is designated as Class G airspace (uncontrolled) below 6,500 ft with a transponder mandatory overlay between 3,000 and 6,500ft. It is noted that all of the local users interviewed had transponders fitted to all of their aircraft and they remain on when operating.

Separation Management

A number of independent, low reliability barriers make up the generic self separation barrier. This consists of:

- The Taupo Mandatory Broadcast Zone (MBZ);
- Alerted see and avoid provided by second party observation;
- Provision of Traffic Collision Avoidance System (TCAS);
- Traffic Proximity Alert System (TPAS);
- Traffic advisory (some aircraft classes only); and
- Unalerted see and avoid.

The second party observation was also identified for Taupo in particular. This appeared to be as a result of the parachuting activities. The local users of the airspace take a proactive approach by observing traffic in the area and questioning any unclear information. Under the MoU, the pilots of the parachute jump craft are required to maintain a current awareness of the airspace.

> A proactive approach is taken by local users of the airspace.

Evasive action is a precaution that acts after the operational loss of control. It includes a resolution advisory by TCAS. This barrier is only applicable to some aircraft class types

ADDITIONAL BARRIERS

> To enhance the safety of Taupo airspace, a number of precautions were put forward.

To enhance the safety of non-regular users of the Taupo airspace, a number of precautions were suggested for consideration. These have been listed in hierarchal control order in line with the New Zealand Health, Safety & Employment Act (1992). Where section 8 requires employers to eliminate where practicable, section 9 requires isolation if elimination is impracticable and section 10 requires minimisation and protection if elimination and isolation is not practicable.

A. Lower Mandatory Transponder (TM) overlay preferably to the surface and promulgate the principles and practices of the local users to the wider aviation community. This could include including procedures in the AIP which articulate the principles of the local users and photographs of Parachute Landing Zones, producing standard arrivals and departures, publishing charts with Parachute Drop Zones. This would require an appropriate education campaign which could include briefings, videos and other printed material etc.

B. Provision of ATC.

CONCLUSION

On a relative risk basis, it would appear that transponder mandatory airspace to the surface and promulgation of consistent 'good practices' across the aviation industry provides an order of magnitude improvement on a per trial basis over the existing situation for the critical scenario described.

Any form of controlled airspace moves away from relying on the airspace users' practices and procedures (MoU, AWIB etc) and subsumes MBZ radio calls and second party observations into ATC. This suggests that providing ATC at Taupo only provides a further half order of magnitude improvement over the formalisation of current policies and procedures implemented by the local Taupo airspace users.

For further information please contact R2A or visit
http://www.caa.govt.nz/aerodromes/Taupo_files/Taupo_App1.pdf

DUE DILIGENCE ENGINEERS

WHERE TO NEXT

Talk to R2A about your next project.

If you would like to know more about how to manage due diligence in your business you can:

- Contact R2A to organise a briefing for your executive management team.
- Book an In-House Course or Private Briefing.
- Buy a copy of the 9th edition R2A text: Risk & Reliability: Engineering Due Diligence. Order online.
- Receive R2A's email newsletter.
- Attend the two day Engineering Due Dilligence Workshop presented by Richard Robinson.
- Attend the one day Defensible Risk Management Techniques course presented by Richard Robinson on behalf of Engineering Education Australia.
- Enrol in the postgraduate unit 'Introduction to Risk and Due Diligence' Postgraduate Unit at Swinburne University, also presented by R2A.

r2a
DUE DILIGENCE ENGINEERS

Level 1, 55 Hardware Lane
Melbourne, VIC, 3000
Australia

P +1300 772 333
F +61 3 9670 6360
E reception@r2a.com.au
W www.r2a.com.au