Submission to the Senate Rural and Regional Affairs & Transport Legislation Committee Inquiry into Australia's General Aviation Industry

Legislative and regulatory frameworks underpinning CASA's aviation safety management functions

Safety and economic impacts, and relative risks, of CASA's aviation safety frameworks

Engagement of CASA with other relevant Australian Government agencies

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Executive Summary

Flight Path Forum (FPF) is an incorporated community association formed in 2019 in response to a failed consultation process by Airservices Australia in relation to changes to airspace and flight paths to support operations forum runway 13/31 at Sunshine Coast Airport.

Since April 2019, FPF has focussed on researching many aspects of the Civil Aviation Safety Authority (CASA) and Airservices Australia's (ASA) 's environmental and risk assessment processes for changes to airspace and flight paths., including regulatory frameworks and national operating standards and most importantly engagement between the two agencies on these issues. Concerns over the assessment process for environmental risks to aviation safety have arisen and FPF believes it necessary to set before the Senate Inquiry the full context of the particular circumstances surrounding new airspace and flight path designs for runway 13/31 at Sunshine Coast regional airport and to call for an immediate review of the Civil Aviation Safety Authority's (CASA) aviation safety management functions and aviation safety frameworks.

Whilst FPF appreciates the current inquiry is mainly focussed on Australia's general aviation industry, decisions made by CASA in conjunction with other relevant Australian Government agencies, in this case ASA, in relation to airspace changes and new flight paths have had a ripple effect on the safety of general aviation operations occurring in the vicinity of Sunshine Coast Airport (SCA).

As the safety regulator for Australian airspace, every decision CASA makes in relation to airspace changes, to accommodate flight paths for Regular Passenger Jet (RPT) aircraft, has the potential to create a knock-on effect for all airspace users including general aviation (GA) operators and it is for this reason FPF now presents this submission as a 'related matter'.

CASA's engagement with ASA, on the issue of aviation safety, is of particular concern in the case set out below. FPF is of that view that any Inquiry related to aviation safety frameworks and relative risks must consider the circumstances that have recently unfolded on the Sunshine Coast.

Introduction

The environmental risk assessment process for changes to airspace at SCA to facilitate operations on a new 2400m runway, which was the subject of an Environmental Impact Statement (EIS) in 2014 by Sunshine Coast Council (SCC) has been inadequately conducted, and falls substantively short of meeting International Civil Aviation Organisation (ICAO) Safety Management principles. As a result, the airspace change, including new flight paths, for SCA have been developed without any adequate aviation safety risk assessment by CASA, as the aviation safety regulator.

It has become clear through our research that CASA and ASA have effectively been operating in an isolated 'silo' environment. There appears to be no clarity about the aviation safety risk assessment process and responsibilities of other agencies and as a result, 'grey areas' have emerged, which no-one has assessed.

Risk assessment procedures, protocols and frameworks, exist within ASA and CASA review processes. In addition, the Environmental Impact Statement (EIS) Terms of Reference (TOR), should have assured public safety through the identification and evaluation of environmental risks to aviation, with a subsequent comprehensive review of those risks and consequences by the Office of Coordinator General (OCG), the Office of Airspace Regulation (OAR), the Department of Environment and Energy (DoEE) and the Department of Infrastructure, Transport and Regional Development.

It is clear that these failures are either systemic or process related and, in some cases, a dangerous combination of both. Processes, systems and safeguards, have failed in this instance to identify and therefore ensure adequate assessment of environmental hazards resulting in risks to aviation safety.

Those charged with oversight of the airspace change and risk assessment processes have been left devoid of critical information on which to base approvals.

The deficiencies in the assessment of the recently implemented airspace changes and flight paths for RPT impact all SCA airspace users and are of a magnitude that cannot continue to be ignored by all levels of government.

Inconceivably, there also appears to be a resistance by CASA and ASA to acknowledge these failures in the risk identification and assessment process. This is totally unacceptable and a poor reflection of government agencies which have a mandated responsibility to prioritise and protect public safety.

FPF have documented and raised the aviation safety risks, posed by future blasting operations at Yandina Creek Quarry (KRA 54) and proposed overflight of significant bird habitat which pose an increased risk of bird strike, with CASA and ASA. Responses from CASA, ASA, the Minister for Infrastructure, Transport and Regional Development have been woefully inadequate to date.

As a major infrastructure 'expansion' project, there is significant history to be considered prior to the approval of the airspace change by CASA, which occurred in October 2019. The history is complex but necessary to describe in order that the resulting failure of CASA's aviation safety frameworks and problems associated with CASA's engagement with ASA, can be understood.

It should be noted that this information was sent to the Hon Michael McCormack MP on 6 December 2019, yet the response from his office, received on 14 January 2020, did not indicate an intention to undertake further investigation or action.

Of further concern is the perpetual presentation of erroneous information by both agencies, in their responses to recently submitted Questions on Notice to Senate Estimates, submitted by FPF.

ASA have now begun a Post Implementation Review process for SCA. Of concern is that ASA is now attempting to constrain the review scope to consideration of a limited number of RPT operations occurring during Air Traffic Control (ATC) tower operating hours. GA operations are to be considered, but only in the context of 'management', it appears no consideration will be given to post-implementation impacts on the safety of GA operations operating within the SCA control zone.

1.0 Risk Assessment Pathway

Failures of risk assessments to identify and assess the aforementioned risks to aviation safety can be primarily identified as one of the following types of failure:

- Failure of Process – where frameworks were in place and should have identified the hazard or risk and subsequently assessed those risks but were not applied by the appropriate agency in this instance.

- Systemic Failure – where there are gaps or 'grey areas' in the risk assessment framework which has allowed for a failure to either not identify and evaluate risks, and/or a conscious decision to not examine known deficits and to pass the risk to other agencies

1.1 Failure at the point of origin

Prior to 2009, MJG aviation undertook preliminary work to identify flight paths and airspace which would support the new expanded runway 13/31 at SCA.

These initial concepts were included in Sunshine Coast Council's (SCC) Initial Advice Statement (IAS) published in 2011.

No environmental screening was undertaken during this early identification phase which would have alerted planners to the extensive wetland areas to the north of Sunshine Coast Airport, nor was cross referencing done with the State Planning Policy which would have identified KRA54 at Yandina Creek as a potential conflict for proposed changes to SCA airspace and flight path trajectories.

This is despite the Obstacle Limitation Surface (OLS) mapping which was undertaken and included in SCC's strategic planning documents as a component of Airport Environs Overlay maps.

This early failure of process, to conduct thorough research, risk screening and identification of potential environmental risks to aviation safety by consultants has unfathomably allowed risks to go unrecognised by State and Federal Governments and their agencies for 8 years. The compounding effect of this failure is extensive.

1.2 Pathways of Assumption

This points to a very serious and systemic failure of risk assessment frameworks within the complex EIS process, evaluation and approval of the EIS by the OCG, airspace design and development by ASA and further assessment and approval by CASA/OAR.

FPF's scrutiny of local, State and Federal government and Commonwealth agency processes, assessment documents, evaluation reports and environmental and risk management frameworks has enabled a unique overview of the failures of these systems which should

have been robust enough to ensure that aviation design outcomes were compliant with risk management frameworks were achieved by project proponents and government agencies, and that public safety could be seen to be the highest priority,.

The compounding effects of these systemic failures during the project development process have resulted in a situation where the agencies are not looking across the system, and despite substantive information provided by FPF, have failed to identify that false assumptions have been made and that someone else in another agency 'has it covered.'

This is a flawed and dangerous assumption to make in relation to public safety, and a circular argument about responsibility has begun to emerge.

1.3 Review of Options & Alternatives

In the case of runway 13/31 at SCA, only one option for *airspace* design has ever been considered based on a runway alignment which was predetermined and selected by SCC as far back as 2007.

Several concept designs for *flight paths* were considered and documented in *the Airspace Design Concepts Report* produced by Leading Edge Aviation Planning Professionals (LEAPP) in 2012.

Evaluation of alternative flight path options by LEAPP was undertaken on a technical level, i.e. were the proposed flight paths 'flyable' and 'operable'. Consideration of constraints was limited only to potential noise issues for various communities and possible interaction with the Brisbane basin airspace due to the planned construction of a new parallel runway at Brisbane Airport.

Potential environmental aviation safety risks and hazards were not investigated for the purposes of the LEAPP report, indicating a **failure of process** by the aviation consultant. Yet an *agreement in principle* for the flight paths was provided by CASA and ASA in 2012. Alarmingly, without any evidenced attempt to identify or investigate potential **environmental aviation safety risks**, to RPT or GA, despite risk assessment frameworks being in place. This is a clear **failure of process** by ASA to undertake due diligence at a critical point in the airspace and flight path development process.

The EIS included only these same airspace and flight path designs. There was no evaluation of alternatives based on aviation safety risk assessment outcomes. The EIS failed to identify and assess the risks and constraints posed by quarry or the wetland areas over which the proposed flight paths had been mapped. The EIS process failed in this significant purpose to identify risks and hazards. This is despite, in 2013, SCC (the proponent of the EIS) arguing in the Planning and Environment Court that the development of a hard rock quarry by Parklands Blue Metal Pty Ltd which lies directly under the approach and departure flight paths presented a serious aviation safety risk.

In July 2019 ASA were presented with various alternative, inexpertly drawn flight path possibilities as imagined by members of the public, during a feedback window in March and April.

By way of an example, Figure 1 shows one such alternative flight path proposal, hand drawn by a member of the public. ASA included various proposals such as these in their 'consideration of alternatives'.

Cursory consideration of these child-like drawings constitutes the sum total of alternative flight path options that ASA have considered to date. It should be noted that this occurred long after the EIS and after the publication of ASA's Targeted Environmental Impact Assessment (TEIA) which was another missed opportunity for risks to be identified and assessed. There appears to be no framework whereby environmental assessments are cross referenced with environmental risks. This is a systemic failure.

It is truly inconceivable that this hasty last-minute process by ASA to 'tick the box', would meet with any proper standard of regulatory evaluation and risk assessment.

Demands were made of FPF by Federal MP for Fairfax, Mr Ted O'Brien, SCC and ASA in July 2019 to present an alternative flight path solution for consideration by ASA. FPF held the view that providing alternative flight path solutions was the job of ASA, not a community group. FPF was publicly derided for not 'solving the problem'.

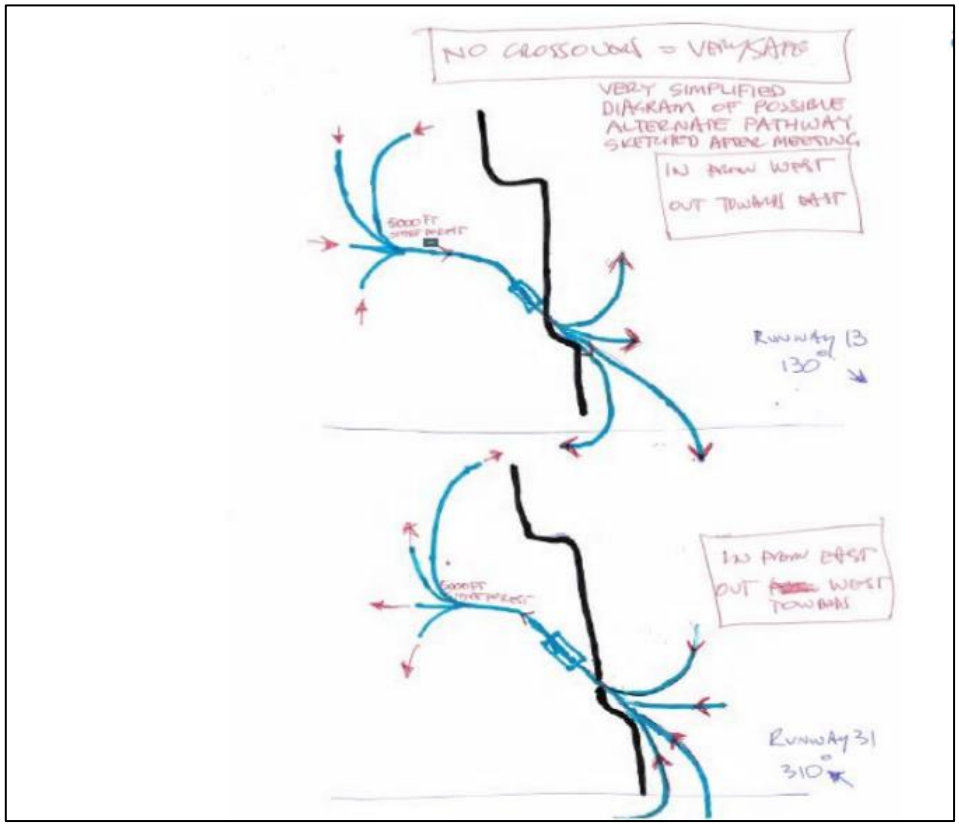

Figure 1: Flight path design proposal by a member of the public submitted to ASA during feedback in April 2019. Source: Airservices Australia. http://www.airservicesaustralia.com

Bizarre conduct indeed from government, but this is the surreal nature of the assessment process which has been undertaken by ASA for the new SCA flight paths.

Clearly, serious environmental aviation safety risk assessments were never high on ASA's agenda.

Designs like those in Figure 1 were dismissed for reasons other than aviation safety risks from KRA 54, bird strike or any other safety issue, indicating either a lack of knowledge of these risks or an abdication of responsibility to acknowledge them. Full and proper consideration of alternative flight paths based on risk assessment appears not to be a criterion applied to options during flight path selection and procedure development. This is a systemic failure of ASA's framework, which has compromised CASA's approval of changes to airspace for SCA.

1.4 ICAO Risk Assessment

Both CASA and ASA's published risk management protocols appear, in the main to follow ICAO's high order principles for risk assessment.

ICAO defines risk management as follows:

> *The identification, analysis and elimination (and/or mitigation to an acceptable or tolerable level) of those hazards, as well as the subsequent risks, that threaten the viability of an organisation.*

And that:

> *Risk management serves to focus safety efforts on those hazards posing the greatest risks.*

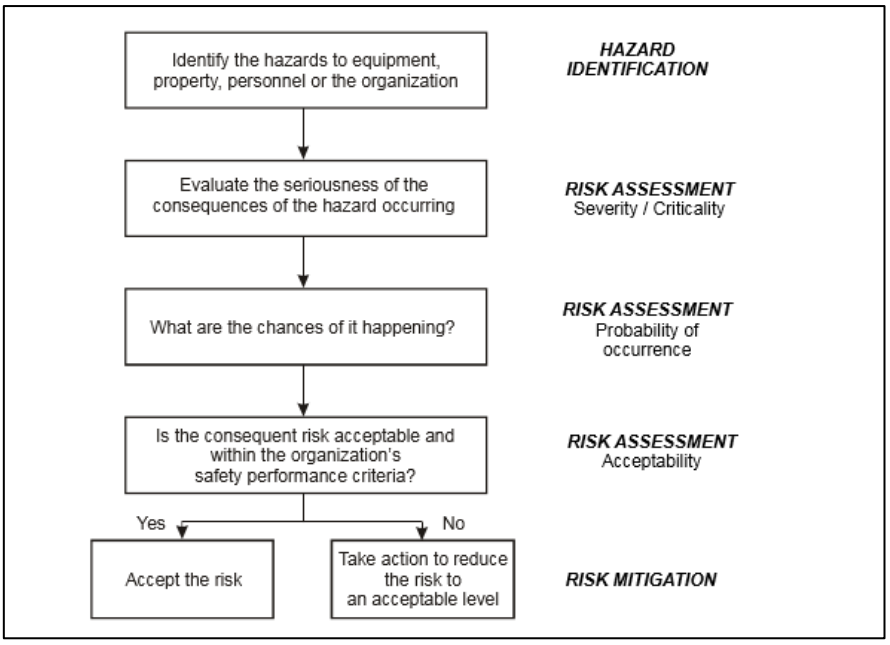

Figure 2: Risk Assessment. Source: International Civil Aviation Organisation Safety Management Manual, Figure 6.1 p6-2

ICAO's Risk Management framework articulates the following process for risk assessment:

- Identify the risk
- Evaluate the consequence of the risk eventuating
- Determine the likelihood of the risk occurring
- Determine acceptability of risk
- Either accept the risk or act to mitigate the risk

It appears that neither CASA/OAR or ASA have undertaken any of the above in relation to safety conflicts between bird strike, blasting operations at KRA 54 and the proposed new approach and departure routes for 13/31 other than the final point, to accept the risk. This is a failure of process.

ICAO also articulates the following risk mitigation strategies:

a) *Exposure Avoidance. The risky task, practice or operation or activity is avoided because the risk exceeds the benefits.*
b) *Loss reduction. Activities are taken to reduce the frequency of unsafe events or the magnitude of the consequences.*
c) *Segregation of exposure (separation or duplication). Action is taken to isolate the effects to the risk or build in redundancy to protect against the risks, i.e. reduce the severity of the risk (for example, protecting against collateral damage in the event of a material failure, or providing backup systems to reduce the likelihood of total system failure).* [1]

To maintain compliance with ICAO principles, risk assessment of both bird strike and blasting operations at KRA 54 should be subject to an approved and documented process in order to inform the Safety Management System (SMS). The potential loss of an airliner, passengers, crew and other consequences, as outlined in Section 2.2, would in any rational circumstance, present as an intolerable risk. Whereupon ICAO asks the primary question:

Can the hazards and related safety risk(s) be eliminated? [2]

Cleary the answer in the case of new flight paths for runway 13/31 at SCA, is *yes*.
So why have these risks not been eliminated through the development of alternative flight paths? Perhaps for one of the following reasons?

- The risks were not identified by anyone
- The risks were assumed to have been identified and assessed by another entity.

ICAO states that the optimal solution should be found. [3]

ASA's proposed flight paths cannot be regarded as the optimal solution, not just for safety reasons alone but also due to constraints which will necessarily be imposed on RPT airlines and GA businesses operating from SCA in order to accommodate the risk from KRA 54 in particular.

Failure to follow ICAO's SMS risk management process [4] which would have resulted in the identification of the optimal solution should be regarded as a systemic failure.

CASA/OAR and ASA have made no attempt, through the evaluation of alternative routes, to avoid the risks, instead electing to accept them unnecessarily and thus ignoring the existing opportunity to mitigate through exposure avoidance as espoused by ICAO. This appears to be a conscious decision by CASA/OAR and ASA and as such should be regarded as a **systemic failure**.

ASA have elected to **increase air traffic movements directly over the quarry site.** Use of a curved approach and departure procedure, which is widely agreed to be a critical, high work flow phase of flight means this design adds a layer of complexity for pilots. According to aviation experts this contrary to preferred operating procedures for both pilots and Air Traffic Control (ATC), that is, complexity should be reduced wherever possible, **not increased unnecessarily**.

1.5 Risk Management Frameworks

CASA states the following:

> *The administration of the airspace includes managing the establishment, amendment or disestablishment of:*
>
> - *Various classes of airspace (A to G)*
> - *Air routes*
> - *Prohibited, restricted or danger (PRD) areas*
>
> *All of which have their own associated conditions of rules of use.*
>
> *The various classes of airspace have defined volumes and boundaries that can be changed. Air routes are not volumes of airspace and their locations are defined by coordinates.* [5]

The establishment of *air routes* or flight paths is clearly within CASA's remit and should have been risk assessed according to CASA's Airspace Risk and Safety Management Manual (ARSMM). However, CASA published a statement on their website in September 2019 in response to public submissions on the ACP for SCA that:

> *CASA does not assess flight paths as part of an Airspace Change Proposal. The design of flight paths, environmental considerations and the conduct of public consultation are the responsibility of Airservices and the Sunshine Coast Airport. CASA understands that the proposed airspace and flight path designs for the Sunshine Coast Airport are consistent with the Environmental Impact Statement that was approved by the Queensland State Coordinator General on 19 May 2016.* [6]

The interdependence between airspace and flight paths is undeniable yet in this instance it appears CASA have not undertaken any risk assessment of the proposed SCA air routes and proceeded with approving a volume of airspace to accommodate them. This is a **failure of process**.

Have CASA/OAR made an assumption that ASA conducted a risk assessment?

Have CASA/OAR made an assumption that due to the OCG approval of the EIS in 2016 that adequate risk identification and assessment had occurred?

Of major concern is that both CASA and ASA risk management frameworks employ language regarding risk assessment commensurate with 'enterprise risk' as opposed to assessment of specific identified risks to public safety.

CASA's Airspace Risk and Safety Management Manual (ARSMM) indicates that safety is considered on the basis of potential airborne collisions between aircraft and adherence to vertical and lateral separation limits within designated airspace.

The ARSMM does not define criteria for assessing safety risks in relation to surface to air projectiles or describe the process by which risks of this nature should be assessed and by whom.

The ASRMM does not define criteria for assessing safety risks in relation to bird strike for flight paths or aircraft using those routes.

There are no criteria for assessing environmental risks as opposed to operational risks. This is a systemic failure.

FPF has been unable to ascertain where the *due diligence utilising a precautionary approach* [7] has been applied in this instance by CASA. This should be regarded as a failure of process.

CASA has stated that it does not assess risks from bird strike [8], however a *Form 1598- Risk Assessment* needed to be completed and submitted for the Airspace Change Proposal (ACP) by ASA. Columns B, C and D are provided for 'identified hazard' information.

FPF applied for a copy of the ACP package under FOI but were refused by ASA. It is not known if ASA noted these identified hazards on *Form 1598*, which would then duly have been considered by CASA as part of the ACP review process.

ASA's Risk Management Framework is similarly inclined to devote time to risk assessments about the potential risk of an activity to their business model.

Any consideration of operational risks should have included a review of aviation safety risks prior to ACP lodgement. There is no evidence to suggest that this was done, indicating a failure of process.

It should be noted that the TEIA returned a risk classification of *medium.* However, the TEIA v2 failed to include the following footnote to the risk classification table:

> **Note: Where primary consequence type is determined to be Safety, Work Health & Safety or Environment, apply the 'high' risk rating under catastrophic.*

ASA failed to apply the correct consequence type in this instance, indicating another failure of process.

ASA's Consequence Criteria includes the following potential outcomes in the *Catastrophic* section:

- An inability to achieve business objectives
- Inability to deliver services
- Impacts on the efficiency of customer operations

- Loss of organisational capability
- Loss of stakeholder confidence
- Demise of ASA as a viable business entity.

Whilst potential injury to people and the loss of an aircraft or human lives is noted as a potential consequence of a risk, what is clearly lacking from these frameworks are criteria to inform assessment or a decision on whether or not to accept that risk in the first instance.

The current risk management systems are embedded with a linear approach to decision-making.

There appears to be no scope or criteria for making a value judgement in this unique situation. This should be regarded as a **systemic failure.**

It is of major concern that assessment of risk consequences to commercial enterprise are intertwined with the criteria for assessing and determining acceptable public safety outcomes.

1.6 Acceptance of Risk

In the absence of any value judgement and evaluation of alternative flight path options, and without undertaking proper aviation safety risk assessments from blasting operations or bird strike, it appears CASA and ASA have elected, seemingly arbitrarily, to accept these risks and to opt for mitigation of the risk in the former, and to ignore the risk in the latter.

With both CASA and ASA yet to provide a rationale for embedding these risks into airspace and flight path designs, it appears that avoidance of risk has never been considered, which is again surreal and utterly questionable, given the opportunity exists to do so. These are risks which, once identified, should have been avoided given the inherent potential for catastrophic consequences.

Commercial pressures and third-party deadlines have to be considered as a reason for pursuing flight paths which are less safe than potential alternatives.

2.0 Blasting Operations at KRA 54

2.1 Unique circumstances

Matters surrounding the proposals for airspace and flight paths for runway 13/31 are unlike any other. Here we have a situation where a quarry, with regular planned blasting occurring, is located approximately 5nm from a busy and expanding airport of a growing urban city and **directly** beneath **new permanent flight paths. Furthermore,** those flight path plans also including an intersection or joining point between straight-in and curved approach and departure routes to the north and north-west of SCA, directly over the site.

Various locations in Australia, including the Oaklands quarry near Tullamarine Airport in Victoria, present scenarios where aviation activity occurs in proximity to operational quarries or mine sites.

However, none of these quarries are located directly underneath the final approach or departure flight paths or create an Obstacle Limitation Surface (OLS) penetration issue for RPT. [9] Impacts on GA operations remain unconsidered, as in many cases GA will maintain an altitude below the CTA threshold of 1500ft in order to retain flexibility of flight routes and avoid RPT operating within the controlled airspace. This creates a magnified risk to GA traffic traversing the quarry site, as extent of flyrock could reach 1607ft, according to expert testimony from the court case.

Mr Hughes SC in *Parklands Blue Metal Pty Ltd v Sunshine Coast Regional Council & Ors [2014]* noted that:

> *No expert was able to point to a hard rock quarry in the - within the flight pattern or the final approach of any airport.*
>
> *There's very good reason why, as we've said, the planning documents might not necessarily say part 6, line 4, chapter (iii), "Do not part a hard rock quarry under the flight path or the final approach path". It's axiomatic that blasting, unless one is in a war zone, is contraindicated as far as flight paths.* [10]

The term 'uniqueness' was used to describe the circumstances surrounding the development application of the hard rock quarry at Yandina Creek and the proposal to map flight paths directly overhead during the case by Judge Robertson. [11] Mr Hughes SC presented the view that the court should not deem it acceptable to manage the two uses, saying:

> *We're back a step from that. We're saying that they are incompatible land uses …..one should endeavour to avoid…..*

Judge Robertson was in agreement with the proposition about having to avoid management of the two uses, saying:

> *I agree fundamentally with that proposition. Aviation and quarries don't mix.* [12]

Blasting at sites in more remote locations across Australia would not typically see RPT commercial jet aircraft at 1000-2000ft directly overflying the site on an hourly basis following Continuous Descent Approach procedures (CDA), including curved approach and departure procedures, nor have high volumes of GA traffic, including helicopters, operating in the vicinity.

Yet with the SCA situation, this is precisely the occurrence that has, unfathomably, been approved by CASA, evidenced by ASA's implementation of approach and departure procedures over the quarry without any risk assessment.

The ARSMM does describe high level criteria for the establishment of a *Prohibited, Restricted or Danger area* (PRD), which would appear to be applicable to the aviation safety risk from the overflight of a blasting quarry, but as we know, an application for a *Danger Area* over KRA 54 was refused in August 2014, the details of which, and the reasons for the refusal currently the subject of further enquiry via FOI request by FPF.

2.1 Likelihood of Risk

Mitigation has been proposed to reduce the likelihood of flyrock hitting an aircraft, though it is not clear to whom the responsibility for mitigation will ultimately fall.

Unfortunately, any mitigation measures are only useful in a 'perfect blast' scenario, which has been appropriately timed to avoid scheduled overflight by RPT jet aircraft and notified in advance to GA traffic. The unscheduled and inconsistent nature of GA operations remains unconsidered. However, it is essential, and more important, to consider flyrock in the context of a blast that has not gone according to plan and/or when aircraft schedules may undergo last minute adjustments for various reasons or an aviation emergency situation occurs.

> *Analysis conducted by Verakis and Lobb (2007) shows that in surface mining 39 accidents were directly attributed to lack of blast area security,* ***32 to flyrock, 15 to premature blast, nine to misfires, one to disposing and seven to miscellaneous blasting-related accidents****.* [13]
>
> *The major causes of blasting-related injuries in surface mines are lack of blast area security,* ***flyrock, premature blast, misfire, and disposal****.* [14]

Flyrock is a lethal product of unforeseen circumstances which can never be mitigated. The likelihood of flyrock occurring from a delayed or accidental premature planned blast, or post blast inspection,[15] a misfire or explosives accident, can never be predicted. No amount of planning will mitigate this risk. A safety alert from the Department of Mines and Natural resources (DNRME) further highlights the difficulty in predicting likelihood of risk citing:

> *A high potential explosive incident where an excavator digging into an area containing unidentified misfired explosives accidentally initiated the explosives. The force of the blast was strong enough to blow teeth of the excavator bucket with flyrock being propelled into the cabin of the excavator. Debris was found up to 230m from the initiation point.*
>
> *Pieces of rock, bucket teeth or other debris displaced during initiation of the misfired explosive can travel through the air at high velocity, sufficient to cause fatal injuries to persons and extensive damage to plant and equipment.*
>
> *It is still possible for misfires to go undetected until excavation activities are conducted.* [16]

The interface between blasting operations, geological structure of the blast face, explosive use, RPT jet and general aviation aircraft overflight of a quarry site is a dynamic, complex management system environment and when human error factors are taken into account, the potential for a serious incident is magnified and exists with absolute certainty for each and every blasting operation.

ICAO notes that:

> *A determination of any unintended consequences, particularly the introduction of new hazards, should be made prior to the implementation of any risk mitigation measures.* [17]

These 'unplanned' flyrock incidents that should be of major concern to all entities with legislated responsibilities for public safety.

This problem is already of concern to commercial airlines, passengers and communities in flight path affected areas, evidenced by Air New Zealand's objection to the development of a hard rock quarry near Christchurch airport. [18]

Perhaps unsurprisingly, Christchurch Airport itself is also an objector to the quarry development proposal, signalling what would normally be expected. However, in this case, the previous airport owner, SCC, was in a conflicted position and has consequentially allowed this risk to be embedded in these flight paths.

2.2 Consequences of taking that risk

The potential consequences of exposing an aircraft to flyrock impact, howsoever caused, could only be described as catastrophic in the event that flyrock results in the loss of control of an aircraft. The loss of a commercial aircraft with a payload of passengers, and the inevitable loss of human life on the ground as a result of a jetliner crash, is a scenario from which no stakeholder in this project approval process would easily recover.

Damage to the business reputation of the unfortunate airline, to the safety record of CASA/ OAR and ASA, to the economy of the Sunshine Coast, and the business prospects and livelihoods of the myriad of small business owners on the coast who rely on tourism, must all be taken into consideration when reviewing the consequences of taking this risk.

The loss of faith in our aviation safety regulatory authority would be absolute and would likely have far reaching impacts both within and outside of Australia, impacting not only commercial prospects but business reputations, which would take many years to recover.

Loss of public confidence in State and Government agencies to protect the community's interest and safeguard the public would be absolute.

2.3 Flyrock

As previously stated, flyrock is a lethal product of unforeseen circumstances. Any blast that causes flyrock, means that rock has been propelled unexpectedly beyond the designated blast area, the perimeter of which has been set out to ensure the safety of personnel.

When the term *flyrock* is used, it means that projectile rock has travelled beyond the safe zone of the blast area. The velocity with which flyrock can travel is extraordinary.

> *The flyrock is defined as the rock propelled beyond the blast area by the force of an explosion (IME, 2007). When these rock fragments are thrown beyond the allowable limits they result in human injuries, fatalities and structure damages. These rocks can travel distances of more than 600 m (19568.5ft) at speeds of almost 650 km h−1 (Verakis and Lobb 2007).* [19]

Flyrock can occur during a planned blast, but more importantly it can occur during premature blasts, post blast inspections, misfires and the accidental detonation of explosives.

The Queensland Department of Natural Resources, Mines and Energy states the following in relation to flyrock throw:

> *Incidents have been recorded where flyrock has travelled in excess of 1 kilometre and resulted in significant damage and injury. It is not uncommon for undesirable flyrock to travel considerable distances, with the potential to cause injury or damage.* [20]

It is FPF's understanding that typically, explosives are loaded into blast holes on the same day of the planned firing. In some cases, shots are loaded into blast holes but for various reasons may not be detonated until the following day, in which case the site is shut down and guarded until such time as firing occurs. The high consequence environment is amplified in this scenario.

Security measures to protect explosives storage and/or loaded blast holes would necessitate provision to protect against infiltration by terrorist organisations who would likely view the presence of explosives beneath a flight path as a 'soft target'.

ICAO Document 8973 and Annex 17 sets out minimum aviation security standards for the aviation sector, based on security risk assessment. However, this unique scenario falls into another 'grey area'. How have security risk assessments for the mining industry been intertwined with those for civil aviation? How has the risk analysis of this potential security threat been undertaken and assessed?

ASA has yet to justify or provide a rationale for the development of the new SCA flight paths or why a decision has been made to embed this aviation safety risk into proposals. CASA has yet to provide a rationale for approving changes to airspace to facilitate ASA's flight paths. Indeed, it would appear both CASA and ASA are attempting to divest themselves from any risk assessment responsibilities. This points to, at the very least a failure of process, but more likely a systemic failure by CASA and ASA in the way they conduct due diligence and assessment of risks for flight paths.

In a phone call between FPF and Martin Holberton, (Acting Manager, Office of Airspace Regulation, Air Navigation, Airspace and Aerodromes Branch) at CASA, it was clearly stated that factors affecting ASA's flight paths, including quarry operations are the responsibility of ASA to assess for risk.

Statements by both CASA and SCC indicate contrary views about the entity responsible for risk assessment, perhaps because the liability issue needs to be further considered.

CASA/OAR's assessment outcome, as articulated by ASA, that *flyrock does not pose a hazard to aviation* [21] is problematic, and any evidence on which this conclusion is based has yet to be presented for scrutiny by either ASA or CASA/OAR, and furthermore, that based on evidence supplied by blasting experts to the court of appeal in 2013, that this conclusion by CASA/OAR in relation to KRA 54 at Yandina Creek is incorrect. Blasting experts agreed that the height of flyrock could reach up to 1607ft, penetrating the OLS.

Flyrock throw is wholly unpredictable, CASA/OAR's statement, indicating *implosions* rather than *explosions*, we believe, should not be proffered with such an air of categoric certainty or regarded as an adequate assessment of the risk, as it is in direct contradiction with expert evidence.

This unpredictability creates particular problems in relation to GA traffic which, according to information provided by ASA the 19 September PIR community meeting, do not receive an air traffic control service and they:

- 'can go wherever they want as long as they are outside controlled airspace'.
- 'just go and do whatever they want to do'.

Additionally, in most cases, ASA does not even know the GA traffic is there, as ASA's radar surveillance system may not even detect GA aircraft if they do not have a transponder turned on. [22]

Flyrock incidents are an intrinsic hazard at mine and quarry sites throughout Australia, despite the extraction industry constantly reviewing and updating its blast management safety systems and protocols and training regimes for operators.

As previously stated, no amount of planned mitigation can eliminate risks associated with misfires and flyrock occurrences or improperly executed safety measures, which appear to be a common human error factor in most flyrock incidents.

There are current concerns within the extraction industry about the lack of adherence to safe operating practices.

> *Many of the recent incidents may have reflected the disconnects that may exist between the boardroom and the pit. In parallel, there also appears a disconnect between the pit bottom and the boardroom…what is really happening is sometimes not getting through…. maybe because some sites wouldn't want to ruin their perfect record by acknowledging that we actually have some things that we do daily, that we haven't really risk assessed for many years*.
>
> *When you read the detail, many of these incidents are truly enough to make you cry. Some 'so-called' safety practices have defied the normal and the outcomes of incidents are truly saddening for many families and individuals involved.*
>
> *All of these incidents create excessive waste across the Australian mining industry.*
>
> *Waste of miner's lives, waste of company resources in dealing with legal defences or investigating incidents and, a waste of Government revenue in attempting to ensure the thin veil of decency and accountability is maintained in the middle of a public outcry.*
>
> *Economically, it's ludicrous and emotionally, for many, its soul destroying.* [23]

The uniqueness of the current SCA situation should dictate that any previous risk assessment parameters must be supported by documented analysis and a value judgement on the risk and consequences of proceeding with the proposed permanent flight paths and airspace arrangements to the north and north-west of SCA.

Liability for making the decision to proceed with these airspace changes, in view of the known serious risks, must be established.

2.4 Human error

Generalised views of CASA, ASA and SCC state that the risk can be managed and mitigated through the timing of blasting events and quarry overflight.

This ideal scenario is simplistic and problematic and takes no account of the following:

- unplanned blasts or misfires due to human error in identifying potential issues with rock strata and technical problems
- incorrect timing of blasts by the shot firer
- inadequate notification of blasting activities to pilots or missed notification by pilots
- communication breakdown in risk management chain through human error
- pilots in training who may be less aware of blasting notifications
- inadequate staff training leading to mistakes in the loading, firing or technical process
- pilot error
- human failure to follow a blast management plan
- alterations to flight schedules due to prevailing weather conditions or emergencies

Mitigation for a blast, however well planned, can never eliminate the human error factor which, as previously stated, is a common denominator in flyrock incidents. A mitigation plan and blast management protocol are complex processes involving numerous individuals all undertaking effective, adequate and timely communication according to protocol, particularly where pilots are concerned.

> *Communication is a complex system consisting of verbal, non-verbal, written, spoken and electronic communication. It is a crucial factor in managing critical situations.*
>
> *It is imperative to certify that all the actions required by the Safety Management System's philosophy have been implemented to develop safety behaviour.*
>
> *Considering that in aviation a high-risk situation can easily become a tragedy, communication skill is a key competency for those who work in this sector.*
>
> *Lack of a satisfactory communication skill can easily decay intellectual and technical knowledge and may negatively affect the decision-making process in such a dynamic environment.*
>
> *Risk management in aviation is based on the assessment of danger and possible consequences of the threats and errors caused by miscommunication.* [24]

How have these communication skills been certified for those working in blast management operations? Any deficiency in this skill set among those working at the quarry will raise the level of risk to aviation safety.

> *According to ICAO, between 1976 and 2000, more than 1100 passengers and crew lost their lives in air crashes and accidents in which the issues of language had a contributive role (MATHEWS, 2004).*

> *Incorrect or incomplete communication between controllers and crew is a direct or circumstantial factor in 80% of incidents or accidents, according to a survey carried out by NASA using ASRS database (FLIGHT SAFETY FOUNDATION, 2000, p. 1).* [25]

The scenario created overflight by KRA 54 complicates and amplifies the potential for communication errors as the communication skills of those in another industry will have to be relied upon, irrespective of how effective ASA perceives the communication skills of its employees to be.

Whilst being under positive ATC, a level of protection from a planned blast could be assumed for RPT passenger jets, however, GA and helicopter pilots under Visual Flight Rules (VFR) will still be relying on Notice to Airmen (NOTAM's), radio communications and 'keeping a visual look out'. Pilots in training may be particularly susceptible to a lack of situational awareness. Helicopter training flights are a daily occurrence at SCA.

Underpinning all of the above, is the assumption that the plan will be executed perfectly and all safety protocols are followed to the letter by every person involved, or potentially affected by a blast procedure.

Human error in various capacities is the most common cause of flyrock incidents. CASA/OAR and ASA's ability to maintain a good aviation safety record will now become reliant not only on internal processes and actions, but on those of individual personnel in another industry, over whom they have no control, oversight or jurisdiction.

> *Failure emerges opportunistically, non-randomly, from the very webs of relationships that breed success and that are supposed to protect organizations from disaster.* [26]
>
> *Usually the human is considered a hazard - a system component whose unsafe acts are implicated in the majority of catastrophic breakdowns.*
>
> *An infinitesimal change in starting conditions that might have enormous consequences later on.*
>
> *Drifting into failure is a gradual, incremental decline into disaster driven by environmental pressure, unruly technology and social processes that normalize growing risk. No organization is exempt from drifting into failure.* [27]

3.0 Bird Strike

The flight paths to the north of SCA overfly extensive wetland areas, home to thousands of birds including migratory species and high-risk strike species including kites, kestrels and eagles. [28]

As previously stated, bird strike risk in flight path affected areas was not assessed in the EIS.

CASA/OAR has stated that it is not responsible for assessing bird strike risk at all.

CASA and ASA have provided no evidence that they have assessed bird strike risk for aircraft operating on the new flight paths or the impact of changes to airspace CTA steps on GA

traffic. The responsibility for assessing risk from bird strike in flight path affected areas is a 'grey area', highlighting a systemic failure of the risk assessment process by all agencies.

FPF has submitted extensive information to CASA/OAR on bird species, known flight altitudes of these species and local knowledge of areas in which species are commonly seen or known to inhabit.

FPF also reviewed the EIS assessment of bird strike risk and found that only bird strike on-airport or in the immediate environs had been considered in the EIS and predominantly from the viewpoint of aircraft having a negative impact on Matters of National Environmental Significance (MNES). [29]

The Hudson river incident which occurred on 15 January 2009 is a clear indication that the bird strike risk is real and the consequences major. Only the exceptional skills and ability of the pilot, Mr Chesley B. "Sully" Sullenberger prevented the loss of human life in this catastrophic event:

> *US Airways flight 1549 experienced an almost complete loss of thrust in both engines after encountering a flock of birds and was subsequently ditched on the Hudson River about 8.5 miles from LaGuardia Airport (LGA), New York City, New York.*
>
> *According to FDR data, the bird encounter occurred when the airplane was at an altitude of 2,818 feet above ground level (agl) and a distance of about 4.5 miles north-northwest of the approach end of runway 22 at LGA.* [30]

Aircraft approaching and departing SCA from runway 13/31 will be operating at altitudes below 2818ft over wetland areas where large birds often fly in flocks and bird strike risk is inherent.

To ignore the potential risk from bird strike to both RPT aircraft using the new flight flights and GA aircraft operating with the vicinity of SCA, or abdicate responsibility to other unrelated entities, i.e. SCA which was suggested by CASA, is what might best be described as negligence.

Consequences as outlined above, in paragraph 2.2, apply in this instance should the loss of an aircraft occur due to bird strike.

4.0 Airport Privatisation

In 2018 SCC elected to proceed with runway construction on an alignment which they knew would aim the currently proposed primary approach and departure route directly at the KRA 54 quarry.

Indeed, shifts in the runway alignment have occurred since the EIS, which have resulted in the primary approach and the quarry intersecting perfectly.

Annual commercial aircraft movements at SCA predicted to be 8,900 with 99,760 GA and helicopter movements in 2020 and growing to 24,410 commercial aircraft movements plus 120,750 GA and helicopter movements in 2050 (using the EIS baseline forecasts). [31] Busy day

aircraft movement forecasts for 2050 show 89 commercial aircraft movements per day in 2050 (14 per hour).[32]

It is clear that economics is the driver for increasing aircraft movements and passenger numbers at SCA, with all stakeholders in the SCAEP holding a level of commercial interest in achieving the forecast growth of the airport, including local, State and Federal Governments and Commonwealth agencies. Thus, it is easy to see why minimising the appearance or relevance of any aviation safety risk is desirable.

Unfortunately, the magnitude of vested commercial interest can lead to a divergence from the moral compass in rationalising safety outcomes.

> *We can expect people involved in a safety-critical activity to know its risks, to know possible outcomes, or to at least do their best to achieve as great a level of knowledge about it as possible.* ***What it takes on their part is an effort to understand those risks and possible outcomes, to plot them out. And it takes a moral commitment to avoid the worst of them.***
>
> *If people knew in advance what the benefits and costs of particular decision alternatives were, but went ahead anyway, then we can call them amoral.* [33]

As previously stated, any perceived effective management protocol for the KRA 54 aviation safety risk involves decision making in a highly complex and dynamic environment, with many moving parts and connections and reliance on good communications.

The recently approved SCA Master Plan will now see the existing runway 18/36 closed.

This was not an outcome assessed in the 2014 EIS, or prior. There was evidently no plan to close 18/36 in 2014. 90% of RPT jet traffic was to operate from 13/31 and 90% of general aviation traffic was to continue to operate from 18/36. GA operators, without a dedicated runway now have to operate from 13/31 and as RPT traffic increases into the future, runway access will be constrained for GA operators at SCA.

Conclusion

Complacency in risk management, i.e. ongoing 'management' of risks which seem to rarely eventuate, stems from a belief that when systems are well managed, nothing can go wrong.

This complacency should be guarded against at all costs.

Even the most complex and well managed systems fail, particularly when linear thinking is applied to isolated components of that complex management system.

CASA/OAR and ASA's safety record may be intact to date, but how has this record been tested against permanent, dynamic, burgeoning and unpredictable circumstances such as those posed by changes to airspace and flight paths at SCA either in combination or individually, by blasting operations at KRA 54 and bird strike?

> *The growth of complexity in society has got ahead of our understanding of how complex systems work and fail. Our technologies have gone ahead of our theories. We are able to build things – from deep-sea oil rigs to jackscrews to collaterized debt obligations – whose properties we can model and understand in isolation. But, when released into competitive,*

> *nominally regulated societies, their connections proliferate, their interactions and interdependencies multiply, their complexities mushroom.*
>
> *And we are caught short.*
>
> *We have no well-developed theories for understanding how such complexity develops. And when such complexity fails, we still apply simple, linear, componential ideas as if those will help us understand what went wrong.*
>
> *Complexity is a defining characteristic of society and many of its technologies today. Yet simplicity and linearity remain the defining characteristics of the theories we use to explain bad events that emerge from this complexity. Our language and logic remain imprisoned in the space of linear interactions and component failures that was once defined by Newton and Descartes.* [34]

Accidents can and will happen, irrespective of any proposed planning and mitigation for the perfect blast scenario or wildlife management plan in the vicinity of the airport.

Alternative options for runway 13/31 flight paths exist, as evidenced in the *Airspace Concepts Design Report for SCA,* to the south of the currently proposed tracks and to the west which would eliminate both these risks. The current PIR process could recommend changes to airspace to reduce aviation safety risks, but the risks must be acknowledged in the first instance.

The airspace design and proposed flight paths for runway 13/31 at SCA should now be regarded as an *active failure* with *latent conditions*.

> *Active failures are actions or inactions, including errors and violations, which have an immediate adverse effect. They are generally viewed, with the benefit of hindsight, as unsafe acts.*
>
> *Latent conditions are those that exist in the aviation system well before a damaging outcome is experienced. The consequences of latent conditions may remain dormant for a long time. Initially these latent conditions are not perceived as harmful, but will become evident once the system's defences have been breached. These conditions are generally created by people removed in time and space from the event. Latent conditions in the system may include those created by a lack of safety culture; poor equipment or procedural design; conflicting organisational goals; defective organisational systems or management decisions.* [35]

Through inadequate risk identification and assessment and failure to reference ICAO risk management principles, CASA OAR and ASA in conjunction with SCC's decision to privatise the airport have created the perfect scenario for these aviation safety risks to proliferate in a 'grey area' with a catastrophic incident now a foregone conclusion at some point in the future.

Serious risks to aviation and public safety remain unassessed. An inadequate framework exists for the assessment of risk in this totally unique situation, and even the most basic risk assessment has not been undertaken by any agency, because the risks were not identified at critical points in the airspace design and flight path design development process.

When all the above is considered against the fact that there was absolutely no justifiable reason to embed either of these risks into the new flight paths and airspace design for runway 13/31 at SCA, the

community is right to demand why any government agency would elect to accept this risk on behalf of the aviation industry and the general public without their consent or knowledge.

All stakeholders in the SCAEP should feel vulnerable to the impacts of an aviation disaster and the attendant public outcry which will ensue as a result, given the numerous identified failures in the systems and process which should have seen these risks completely avoided.

After lengthy and unproductive correspondence with CASA and ASA in attempt to ascertain accountability for these risk assessments, FPF lodged a submission with the Commonwealth Ombudsman in March this year. [36] In September, the Ombudsman's findings showed that CASA had responsibility for assessing these risks. [37] Of persistent concern however, is CASA's provision of erroneous information to the Ombudsman in relation to flyrock heights and flyrock not reaching above ground level and the resulting conclusion that blasting at KRA 54 did not pose a threat to aviation safety.

Two enquiries were made of CASA OAR in relation to an application for a Danger Area (DA) for KRA 54. The first by Avlaw, [38] acting for Parklands Blue Metal Pty Ltd, in the Planning and Environment Court case in 2013 and the second by Aviation Solutions [39], appointed by Sunshine Coast Airport in 2015. On both occasions CASA OAR told the enquirer that a DA application was not required. [40]

FPF notes that in response to recent question submitted by FPF to Senator Waters for CASA in June, CASA appears to now be stating that the responsibility for raising potential aviation safety risk issues lies with a proponent related to the quarry.

> *CASA has previously advised the public that a quarry site at Yandina Creek had been subject to a Danger Area application in 2014, but found to pose no threat to aviation safety at the Sunshine Coast airport. However, documents released under FOI indicate that no application was ever made or assessed. Following an investigation, the Queensland Coordinator General asserted in a report that CASA "thinks that the [Sunshine Coast] airport operations should close during blasting sessions" at the quarry.*
>
> *1. Does CASA concede that no Danger Area application was received?*
>
> *2. Does CASA intend to take any action to correct the public advice that the quarry had been assessed and determined not to be a Danger Area?*
>
> *3. Is it CASA's view that the Sunshine Coast airport should close during blasting operations at the Yandina Creek quarry? If not, what was the basis for the Coordinator-General's assertion?*
>
> *Answer:*
>
> *CASA has not received an application for an Airspace Change Proposal from a proponent related to the quarry that would be expected to cover these considerations. Submission of an Airspace Change Proposal provides CASA with an opportunity to comprehensively review impacts on aviation safety and recommend actions for the proponent to address risk mitigations where possible.* [41]

FPF expects CASA and ASA to use the current PIR process to undertake a comprehensive review of the airspace and flight paths for runway 13/31 at SCA, acknowledge the aviation safety risks presented by the current arrangements and work collaboratively to achieve the intent of the Aircraft Noise Ombudsman's recommendation to:

…design and effective post-implementation review process for the Sunshine Coast flight path designs, that does not perpetuate design constraints requiring alignment with EIS concepts and which encompasses:

(a) consideration of community suggested alternatives;
(b) a community engagement process that provides for genuine opportunities for community contributions to influence decisions;
(c) application of the latest version of Airservices' National Operating standard f(NOS) for Environmental Management of changes to aircraft operations. [42]

ASA and CASA must make clear its environmental risk assessment processes and take this opportunity to provide the Sunshine Coast community with safe flight tracks and an airspace design that is free of totally unnecessary, potentially catastrophic aviation safety risks to both RPT and GA operating from SCA, and eliminate the fear of the inevitable which our community will have to coexist with on a permanent basis.

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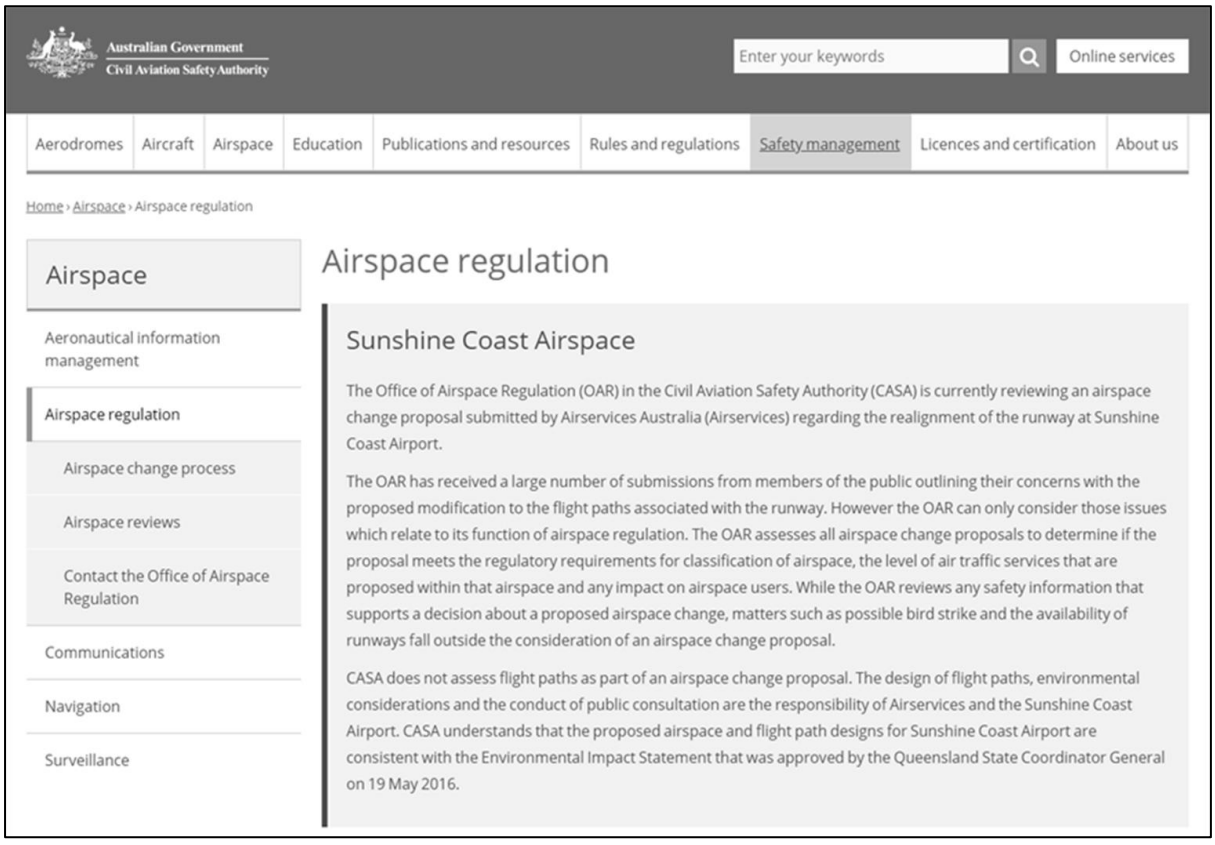

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