

D5

AIRSPACE AND AIRCRAFT RELATED NOISE

SOCIAL AND VISUAL IMPACTS



Sunshine Coast
COUNCIL



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5.1 INTRODUCTION

The Environmental Impact Statement (EIS) Terms of Reference (TOR) for the Sunshine Coast Airport Expansion Project (the Project) require Sunshine Coast Airport (SCA) to take into consideration potential impacts from changes to aircraft operations within a 20 nautical mile (approximately 40 km) radius of the airport.

This chapter addresses the airspace related effects of the airport on the social and visual environment within this area which takes in the Sunshine Coast Local Government Area (LGA) and the new the Noosa Shire LGA.

The objectives for the social impact assessment (SIA) include:

- Identifying potential positive and negative social impacts that may come about as a result of airspace issues associated with the construction and operation of the Project
- Identifying potential measures to enhance positive social impacts and avoid, mitigate or offset potential negative social or economic impacts
- To provide an assessment of the level of residual social impact (positive or negative) associated with airspace issues associated with the Project.

5.2 METHODOLOGY

The International Principles for social impact assessment are used widely by SIA practitioners when undertaking impact assessment. The principles state that SIA:

“...includes the processes of analysing, monitoring and managing the intended and unintended social consequences, both positive and negative, or planned interventions (policies, programs, plans, and projects) and any social change processes invoked by those interventions. Its primary purpose is to bring about a more sustainable and equitable biophysical and human environment” (Vanclay P. F., 2003).

The Queensland Government’s Department of State Development, Infrastructure and Planning’s Social Impact Assessment Guideline (2013) includes the following principles in relation to SIA:

- SIA will assess impacts (both beneficial and detrimental) arising from the project and cumulatively with other developments in the region
- Proponents are expected to mitigate impacts that are directly related to their project
- Social impact mitigation incorporates the principles of adaptive management
- SIA covers the full lifecycle of the project to the extent possible
- SIA is based on the best data available

- SIA will identify strategies to capitalise on social opportunities and to avoid, manage, mitigate or offset the predicted impacts arising from the Project
- Communities of interest will be engaged in a meaningful way during the development of the SIA, recognising local knowledge, experience, customs and values
- Community participation should continue across the project lifecycle.

These two guidelines have been used in conjunction with the EIS TOR to develop the methodology for this SIA.

5.2.1 SIA scope

This chapter of the EIS assesses potential social impacts associated with the operation of a new main runway and associated changes to aircraft operations. It uses three project scenarios as described in Chapter A3 – Options and Alternatives. These are:

- 2020 Do Minimum (the base case)
- 2020 New Runway (opening year)
- 2040 New Runway.

Social impacts are defined as changes to one of more of the following (Vanclay P. F., 2003):

- **People’s way of life** – how they live, work, play and interact with one another on a day-to-day basis
- **Their culture** – that is, their shared beliefs, customs, values and language or dialect
- **Their community** – its cohesion, stability, character, services and facilities
- **Their political systems** – the extent to which people are able to participate in decisions that affect their lives, the level of democratisation that is taking place, and the resources provided for this purpose
- **Their environment** – the quality of the air and water people use; the availability and quality of the food they eat; the level of hazard or risk, dust and noise they are exposed to; the adequacy of sanitation, their physical safety, and their access to and control over resources
- **Their health and wellbeing** – health is a state of complete physical, mental, social and spiritual wellbeing and not merely the absence of disease or infirmity
- **Their personal and property rights** – particularly whether people are economically affected, or experience personal disadvantage which may include a violation of their civil liberties
- **Their fears and aspirations** – their perceptions about their safety, their fears about the future of their community, and their aspirations for their future and the future of their children.

Combining these factors with the requirements of the EIS TOR, this airspace SIA focuses on identifying potential impacts of the proposal associated with people’s way of life, their environment, their community, their health and wellbeing and their personal and property rights.

Social impacts associated with the Project are discussed in this chapter, Chapter B13 – Social Impact and Chapter C6 – Other Considerations. Aspects of culture and heritage are addressed in greater detail in Chapter B11 – Indigenous Cultural Heritage and Native Title and Chapter B12 – Non-Indigenous Cultural Heritage.

5.2.2 Information sources

The SIA has been informed by a wide range of existing reports and studies. Where available, input from stakeholders and the community has been used to better understand the baseline social environment and people's perception of the Project and its potential social and economic impacts and benefits.

The SIA also relies on inputs from a variety of other EIS disciplines including landscape and visual, cultural heritage, economics, property, noise, traffic, airspace design and project design.

The SIA has been carried out using information gathered from the following sources:

- **Australian Bureau of Statistics (ABS) Census data** - 2011 Census data has been used to provide information about relevant populations
- **Existing reports and data** – a number of existing reports have been used to gather information for the SIA.

This includes government plans and policies, information from other planning projects conducted in the vicinity of the Project area, media reports and community based websites

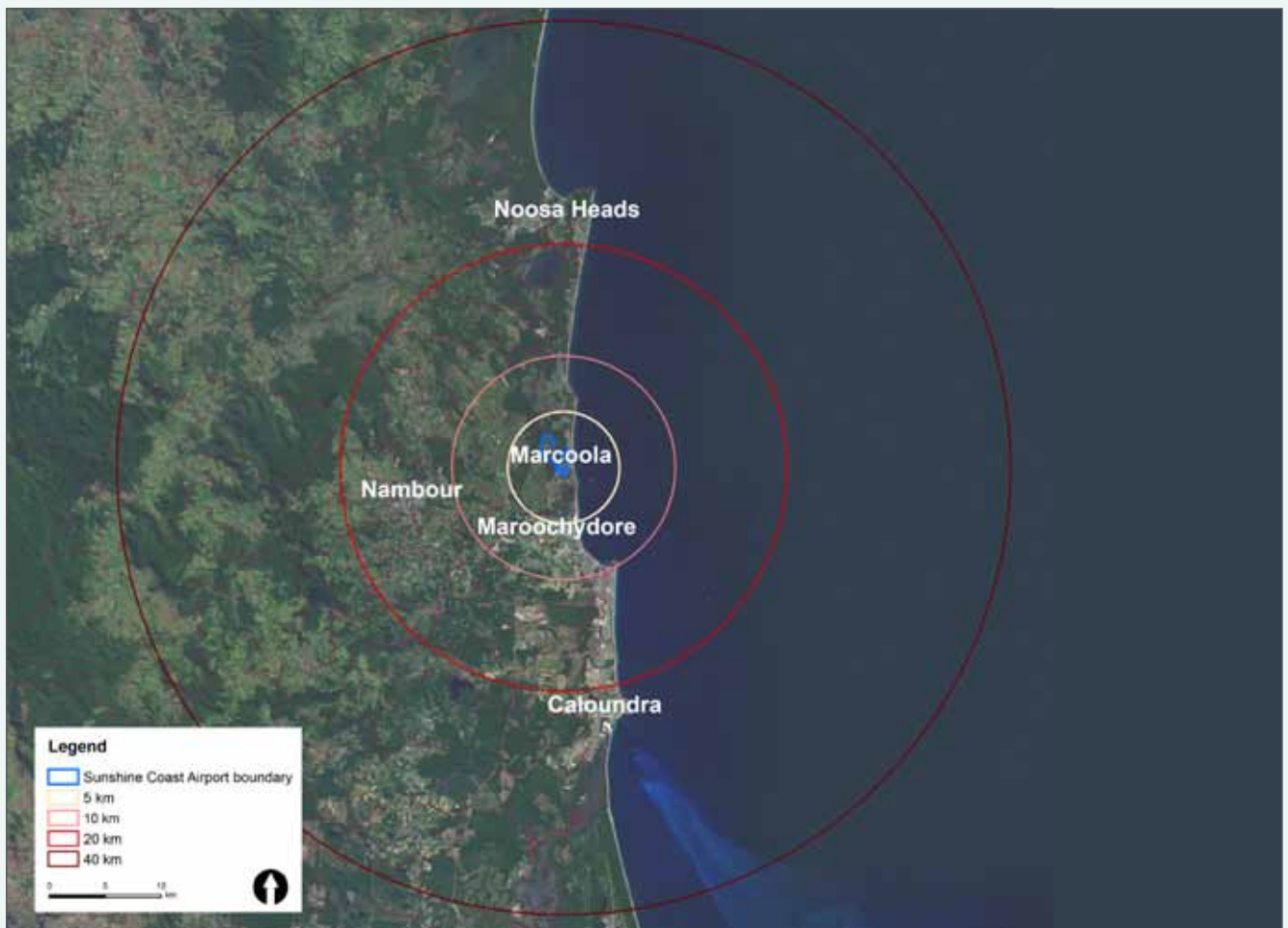
- **Other EIS chapters** – information used in this SIA has been drawn from other chapters of this EIS
- **Scientific literature on aircraft noise and health** – references and reviews have been used to inform the discussion on social impacts on health, wellbeing and quality of life.

5.2.3 Study area

Three areas of interest have been defined for the Project. These include the airport site, the area within a 40 km radius of the airport known as the Project study area and the site of dredging activities and associated marine activities. This chapter of the EIS focuses on potential social impacts related to the operation of aircraft in the air within 40 km from SCA. The impact on the social environment is shown in **Figure 5.2a** and described within the following areas:

- Locations within 5 km of the airport
- Locations within 5 km to 10 km of the airport
- Locations within 10 km to 20 km of the airport
- Locations within 20 km to 40 km of the airport.

Figure 5.2a: Study areas



Potential social impacts associated with the airport site are described in Chapter B13 – Social Impact. Potential social impacts associated with the dredging activities are discussed in Chapter C6 – Other Considerations.

5.2.4 Assumptions and technical limitations

Social assessment is subjective in nature – objectivity has been brought into the assessment where possible through the use of standards, scientific references, policies and guidelines.

5.2.4.1 Demographic and statistical data

The demographic data used for this SIA was drawn from the 2011 ABS Census. Data from other reliable sources, such as the Queensland Government’s Office of Economic and Statistical Research (OESR) have been used to supplement this data.

Demographic profiles in this SIA are based on usual place of residence data which counts where people live no matter where they were on Census night. Data which shows where people actually were on Census night (known as enumerated data) has been used to represent the ‘transient population’ (i.e. tourists) within the SIA study areas.

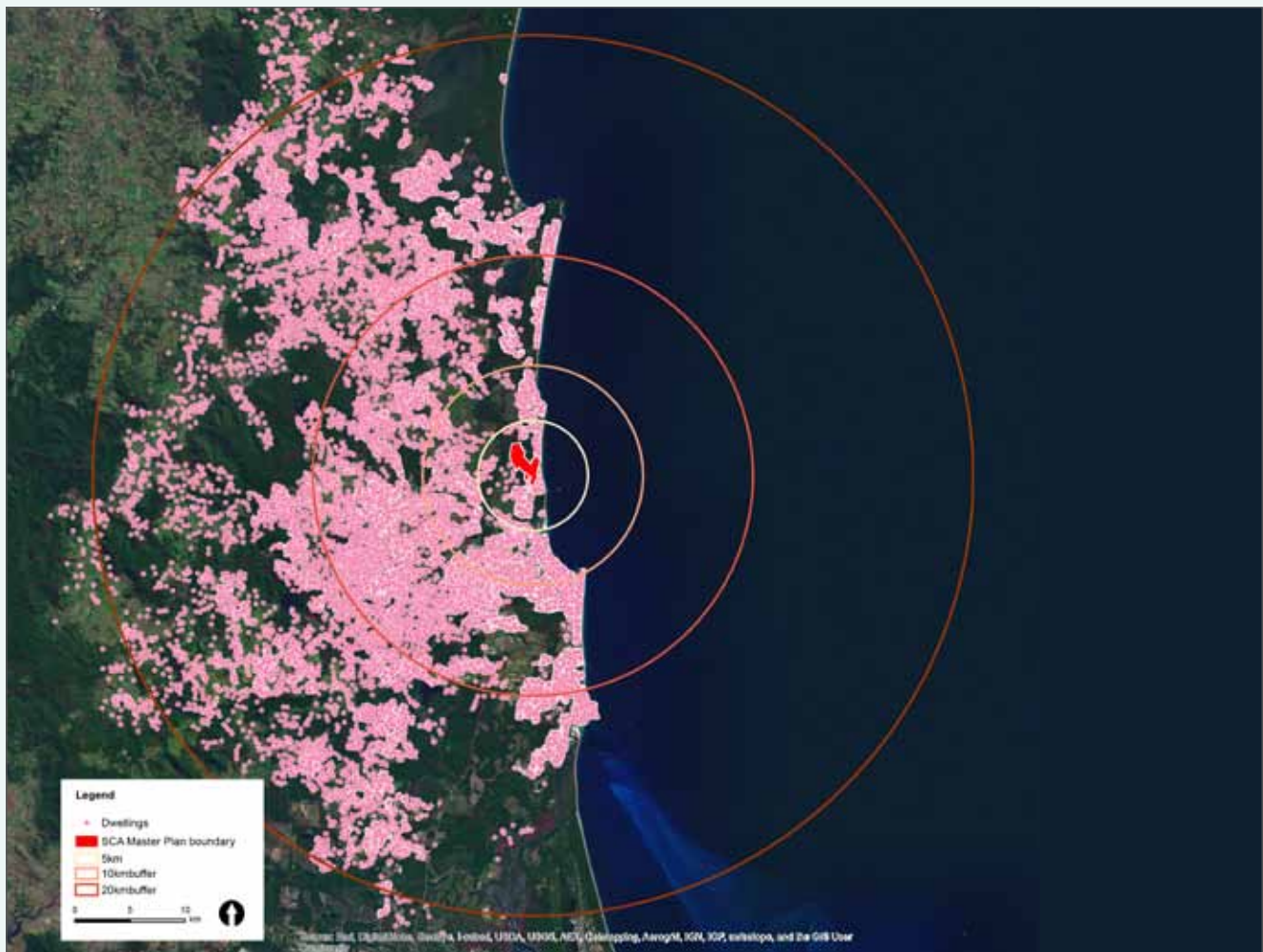
The 2011 Census was undertaken in August which is not a peak tourism season; therefore this data is used as a guide only and has been supplemented by other visitor data where available.

Major classification changes have occurred between the ABS 2006 and 2011 Census. The 2011 Census collection areas were based upon the Australian Statistical Geography Standard (ASGS) which replaces the Australian Standards Geographic Classification used in the 2006 Census. This means that small discrepancies between comparative data may exist, but these are not deemed to be significant.

5.2.4.2 Dwelling counts

Dwelling counts have been undertaken as part of this SIA to quantify the number of dwellings potentially impacted by the Project. Dwelling datasets were provided to Arup by noise consultants Wilkinson Murray (see **Figure 5.2b**). The methodology used to develop this dataset is described in Chapter D3 – Aircraft Noise. Analysis of this dwelling count dataset was undertaken in GIS to determine the number of dwellings within specific areas and noise contours. This dataset contains existing dwelling numbers (at 2014) and does not project any growth in dwelling numbers.

Figure 5.2b: Dwellings density across the Project study area



5.3 POLICY CONTEXT AND LEGISLATIVE FRAMEWORK

Aviation policy and legislation is described in detail in Chapter A6 – Planning and Legislation. The following legislation and policies are of particular relevance to this chapter of the EIS.

5.3.1 Sunshine Coast Airport Master Plan

Prepared in 2007 the SCA Master Plan is the basis of the proposal to develop the new east-west runway 13/31 and other aviation facilities. The Master Plan was publicly exhibited and had broad community support at that time. A key feature of the Master Plan is the re-alignment of the runway to reduce the noise, health and safety impacts of airport operations upon the surrounding community.

5.3.2 Sunshine Coast Planning Scheme 2014

The Sunshine Coast Planning Scheme 2014 (Planning Scheme) commenced on 21 May 2014, replacing the Maroochy Plan 2000. The Planning Scheme recognises the expansion of the SCA as a significant asset for tourism and the economy, and supports the development of major infrastructure associated with the SCA.

The Planning Scheme notes that the SCA provides regional, national and international aviation and related services. In terms of economic development, the SCA is identified as providing an expanded range of aviation, aerospace, business, tourism and employment opportunities which promote the region, attract investment and support tourism on the Sunshine Coast.

5.3.3 National Airports Safeguarding Framework

The purpose of the National Airports Safeguarding Framework (NASF) is to enhance the current and future safety, viability and growth of aviation operations at Australian airports, by supporting and enabling:

- The implementation of best practice in relation to land use assessment and decision making in the vicinity of airports
- Assurance of community safety and amenity near airports
- Better understanding and recognition of aviation safety requirements and aircraft noise impacts in land use and related planning decisions
- The provision of greater certainty and clarity for developers and land owners
- Improvements to regulatory certainty and efficiency
- The publication and dissemination of information on best practice in land use and related planning that supports the safe and efficient operation of airports.

The NASF provides the opportunity to drive improvements in planning outcomes consistently across all jurisdictions, and to improve the safety and viability of operations at all Australian airports. It also supports the integration and coordination of on-site and off-site planning relating to airport operations.

The NASF is built around the following seven principles:

1. The safety, efficiency and operational integrity of airports should be protected by all governments, recognising their economic, defence and social significance.
2. Airports, governments and local communities should share responsibility to ensure that airport planning is integrated with local and regional planning.
3. Governments at all levels should align land use planning and building requirements in the vicinity of airports.
4. Land use planning processes should balance and protect both airport/aviation operations and community safety and amenity expectations.
5. Governments will protect operational airspace around airports in the interests of both aviation and community safety.
6. Strategic and statutory planning frameworks should address aircraft noise by applying a comprehensive suite of noise measures.
7. Airports should work with governments to provide comprehensive and understandable information to local communities on their operations concerning noise impacts and airspace requirements.

5.3.4 Environmental Principles and Procedures for Minimising the Impact of Aircraft Noise 2002

Produced by Airservices Australia in 2002, the Environmental Principles and Procedures for Minimising the Impact of Aircraft Noise provides a set of fundamental principles to minimise noise impact on communities. While non-statutory in nature, the principles and procedures have been used to guide the assessment of whether noise impacts are significant or not.

5.3.5 Economic Directions Statement Queensland Airports 2013-2023

The Economic Directions Statement sets down the Queensland Government's view of the critical role of airports in supporting economic growth. It facilitates informed planning and investment decisions and assist in strengthening collaboration between the private sector and governments.

The Statement notes that SCA is an airport of economic significance for the State of Queensland. This economic activity is generated through airport operations, construction activity, aviation related business and training and skills development.

The Statement also notes:

SCA is a major source of tourist traffic and has now entered the FIFO market. The state government has been assisting with the expansion phase of the Sunshine Coast Airport (Maroochydore) by facilitating planning and approval processes to accelerate the development of maintenance and passenger infrastructure. It is assisting in overcoming vegetation management issues and freeing up state-owned land for flexible use on the airport's footprint. The positive outcome at Sunshine Coast Airport in relation to vegetation management was achieved by changing state planning regulations relating to public transport infrastructure.

The state government has also been working with major stakeholders as part of a whole-of-government process to identify solutions to current issues constraining the future growth of the helicopter sector on the Sunshine Coast. It will continue working with Sunshine Coast Airport business development staff to attract anchor tenant companies from interstate and internationally.

5.4 METHODS OF DESCRIBING NOISE EFFECTS

This SIA uses a number of metrics for describing noise. These are described in the following section.

5.4.1 Australian Noise Exposure Forecast

As described in Chapter D3, *AS2021 Acoustics (Aircraft noise intrusion) Building siting and construction*, the Australian Noise Exposure Forecast (ANEF) is used for land use planning and to assess the average community response to noise exposure around aerodromes. The ANEF measure was adapted to Australian conditions from the United States of America's Noise Exposure Forecast (NEF) measure in the 1980s. For Australian airports, the ANEF is the forecast approved by the relevant authority, in this case Airservices Australia.

The Australian Noise Exposure Concept (ANEC) is a version of the ANEF that has not yet been endorsed by the relevant authority. ANECs have been produced for each scenario assessed in this SIA (2020 Do Minimum, 2020 New Runway and 2040 New Runway).

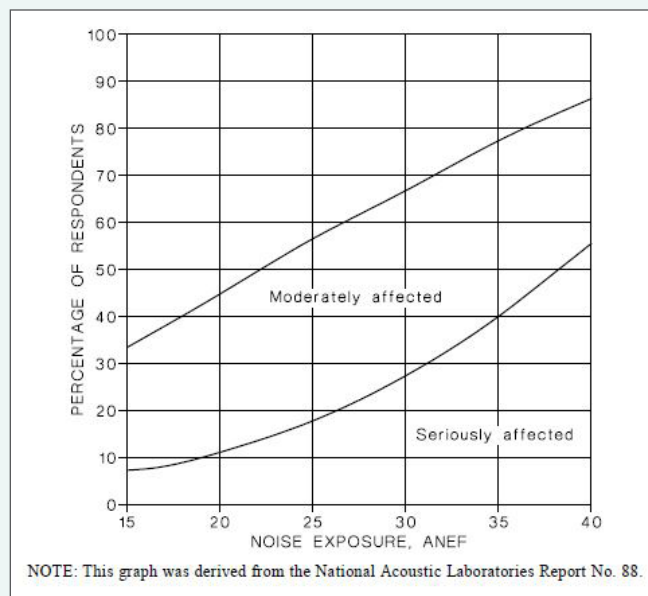
The ANEF/ANEC is a composite metric that takes into consideration:

- The intensity, duration, tonal content and spectrum of audible frequencies of the noise of aircraft take-offs, approaches to landing, and reverse thrust after landing. Ground based activities such as taxiing and ground running are excluded
- The forecast frequency of aircraft types and movements on the various flight paths, including flight paths used for circuit training

- The average daily distribution of aircraft arrivals and departures in both daytime and night time (daytime defined as 0700 hours to 1900 hours, and night time defined as 1900 hours to 0700 hours).

A socio-acoustic study was conducted in the late 1970s to determine people's response to aviation related noise in terms of dissatisfaction, annoyance and fear, as well as reports of activity disturbance and complaint disposition. This study was used to define whether people were 'seriously affected' by aircraft noise. **Figure 5.4a** shows the relationship that this study found between the ANEF and the proportion of people seriously affected by aircraft noise (from AS2021).

Figure 5.4a: Relationship between ANEF and proportion of people seriously affected by aircraft noise (from AS2021).



This shows that some people would still consider themselves seriously affected by aircraft noise in areas outside the 20 ANEF/ANEC contour. Also, it should be noted that people who are newly exposed to aircraft noise are more likely to consider themselves seriously affected.

The ANEF/ANEC is a useful measure to identify locations that would be moderately or seriously affected by aircraft noise and to plan appropriate land uses for these areas but it is not the only metric that should be used to identify potential social impacts. Chapter B2 – Land Use and Tenure describes land use restrictions within certain ANEF/ANEC contours. For this chapter, the ANEF/ANEC is used as one of the metrics used to describe social impacts associated with aircraft noise.

The Planning Scheme includes Airport Environs Overlay Maps for the SCA which show the ANEF for the existing main runway (18/36) and the proposed new runway (13/31).

5.4.2 N70s

As described in Chapter D3 – Aircraft Noise, a system of describing aircraft noise was developed in the early 2000s by the Australian Government's former Department of Transport Regional Services (DOTARS) to better describe aircraft related noise to the community. The N70 is the most common descriptor in this system providing details about the number of 70dB(A) noise events that a location is expected to experience within a certain time period. This 70dB(A) noise level has been chosen as the level at which aircraft noise would become intrusive within a residence. A 70dB(A) noise event outside would result in around a 60dB(A) noise within a dwelling with its windows open, which has the potential to disturb conversation with the speaker needed to raise their voice to be heard. Listening to television or radio may also be disrupted from a 70dB(A) external noise event. The noise attenuation of the dwelling would increase if windows were closed.

N70 contours can be calculated for different periods, indicating the average number of events experienced per day in that period. For this project, N70 contours are calculated for the following separate periods of time:

- Day (7:00am-6:00pm) or evening (6:00pm-10:00pm)
- Weekday or weekend
- Summer or winter.

N70 contours for fixed wing aircraft (jet and general aviation) are used in this chapter to describe existing and potential noise impacts associated with the airport expansion project.

N70 contours show areas that receive a certain number of 70dB(A) noise events within the specified time periods. This chapter uses the threshold of N70 (five or more events) for day time and evening operations. It is recognised that 70dB(A) noise events may still occur outside the N70 contours, but these will be at a lower frequency than five or more (day and evening).

As described in Chapter D3 – Aircraft Noise, the airport expansion project is expected to have minimal impact on helicopter operations at the airport; therefore the social impact of helicopter operations is not expected to change significantly and is not a focus of this chapter, where there are predicted changes to helicopter operations these are discussed in this chapter. N70 and N60 contours for helicopter operations are described in full in Chapter D3 – Aircraft Noise. Due to this, all N70 contours used in this chapter have been generated using fixed wing aircraft movements only.

As described in Chapter D3 – Aircraft Noise, there is little difference between summer and winter N70 contours for the SCA. This chapter uses a 2020 summer weekday day N70, both with and without the new runway, as the baseline case. This has been chosen as people are more likely to have open windows and use their outdoor living areas in the summer months. A full set of N70 contours for all time and seasonal variations can be found in Chapter D3 – Aircraft Noise.

5.4.3 Over flights

Over flights is the term used to describe areas where aircraft fly overhead. There are defined flight paths that aircraft use to manoeuvre within airspace, but aircraft can also fly outside of these designated paths with approval from air traffic control. Therefore any area can experience an over flight, but some areas along defined flight paths are more likely to be overflown by aircraft. Over flights may be associated with SCA or may be associated with aircraft en-route to other destinations.

5.5 BASELINE CONDITIONS

The proposed new main runway at SCA is currently forecast to be operational in 2020. This baseline conditions section uses the 2020 Do Minimum scenario as the 'base case' from which impacts will be assessed.

As described in Chapter D2 – Airspace Architecture and Modes of Operation, existing flight paths which aircraft follow to arrive at and depart from SCA are based on the north-south alignment of the existing main 18/36 runway. Operating procedures and flight paths currently used to arrive and depart SCA are designed to minimise the impact of aircraft noise on the community as much as possible.

The location of flight paths and the noise abatement procedures associated with these dictate that, where possible, the preferred direction of operation for jet aircraft is to land from the south, landing on Runway (RWY) 36, and depart to the south, taking off from RWY 18.

These procedures are designed to avoid, as much as possible, low-level over flight of the Marcoola area immediately to the north of the airport. In addition jet aircraft operating south of the airport approach from the east remaining over the ocean for as long as possible, and turn to the east on departure as soon as possible to minimise the amount of over flight of high population areas in Maroochydore and southern areas of the Sunshine Coast. The density of flights during 2012-2013 is shown in **Figure 5.5a**.

While operational procedures are in place to limit noise impacts on the surrounding community, the operation of aircraft still creates noise at levels that affect some members of the community. Chapter D3 – Aircraft Noise, provides an analysis of noise complaints received by SCA between January 2010 and March 2012. **Figure 5.5b** provides a visual representation of this data. It can be seen that more noise complaints were received from suburbs close to the airport, particularly those that sit directly to the south of the existing 18/36 runway. Analysis of complaints data shows that more than half of complaints were associated with helicopter operations.

Figure 5.5a: Existing runway system flight density (all fixed wing) 2012 – 2013

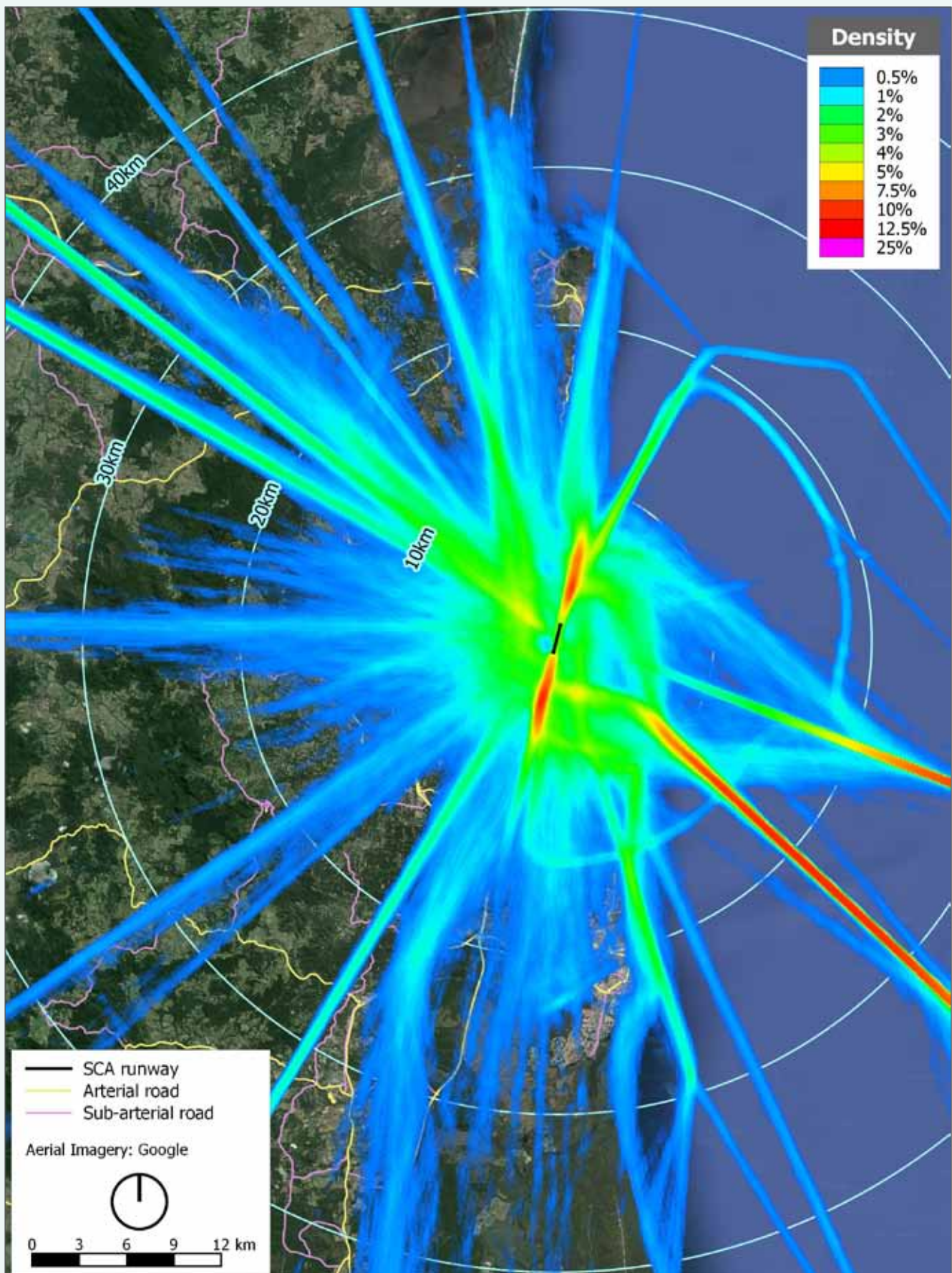
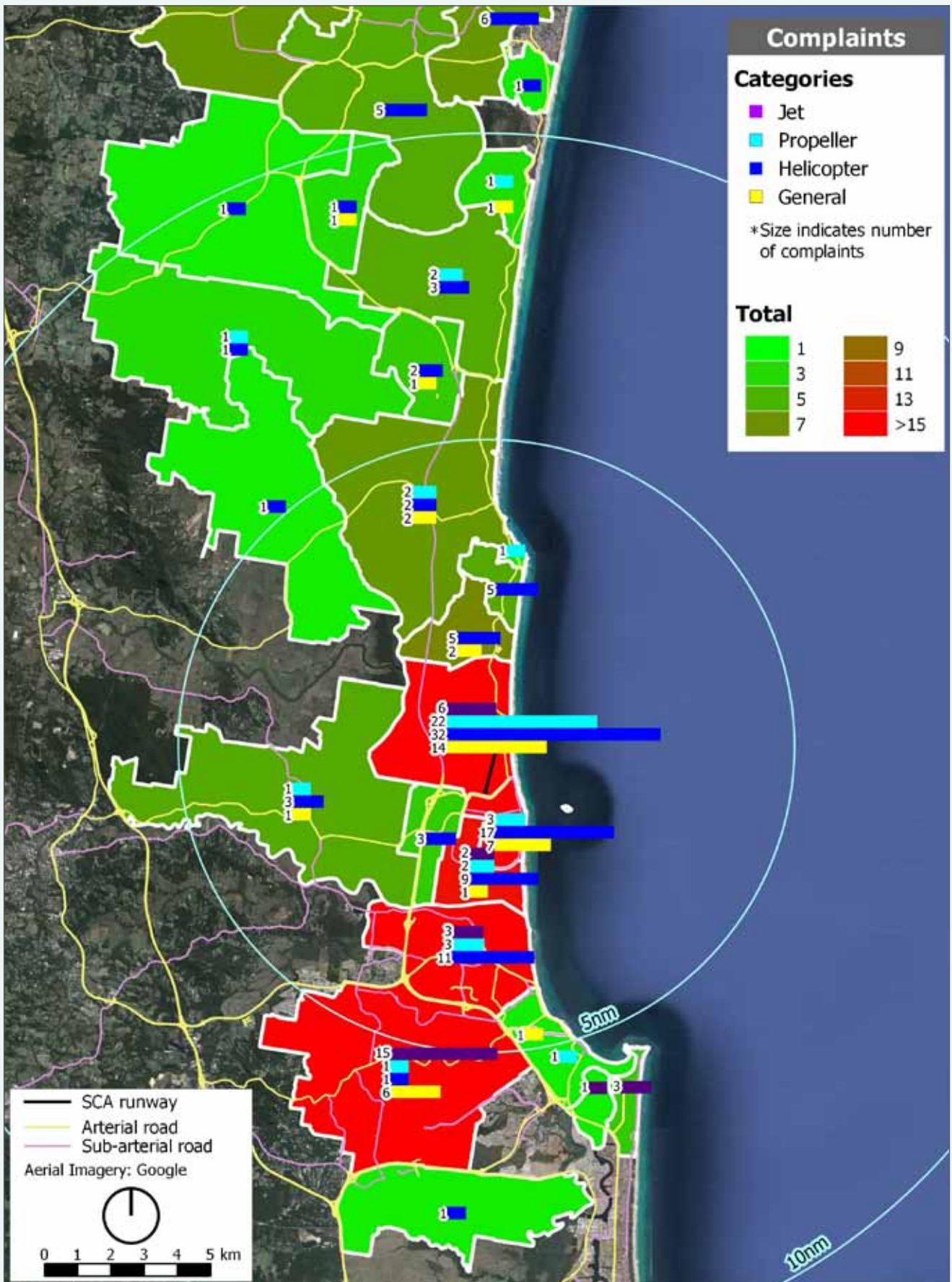


Figure 5.5b: Analysis of noise complaint data



5.5.1 Locations within 5 km of SCA

Suburbs located closest to the airport currently experience the greatest effects of aircraft operations at SCA. The suburbs of Mt Coolum, Marcoola, Mudjimba, Pacific Paradise, Twin Waters and Bli Bli (part) are all located within five kilometres of SCA. People living/working/recreating in areas located within five kilometres of the airport currently see and hear aircraft flying at low altitudes as they approach or depart SCA. Operations at these low altitudes (generally below 150 m, or 500 feet) generate noise on the ground in this area, especially at the southern and northern ends of the runway.

5.5.1.1 Over flights

The current main runway (18/36) is oriented on a north/south alignment; therefore suburbs that sit to the north and south of the runway are overflown at low altitudes as fixed wing aircraft approach and depart from the main runway. Within 5 km of the airport these include parts of:

- Marcoola
- Maroochydore
- Mt Coolum
- Mudjimba
- Pacific Paradise
- Twin Waters.

In 2012 there were 5,559 commercial jet aircraft movements at SCA. All of these movements occurred on the main runway. The main runway is also used by smaller general aviation aircraft when wind direction makes this smaller 12/30 runway unsuitable. The density of jet arrivals and departures onto the existing main runway is shown in **Figure 5.5d** and **Figure 5.5e**.

The airport's secondary runway, the smaller 12/30 runway (oriented on a south-east/north-west alignment), is used by general aviation aircraft only. Large commercial jets are unable to use this runway. In 2012 there were 25,168 fixed wing general aviation aircraft movements at SCA. The majority of these movements occurred on runway 18/36 with a small percentage using runway 12/30. When the 12/30 runway is used, parts of the suburbs of Mudjimba and Bli Bli are overflown by small aircraft.

By 2020 aircraft traffic is forecast to have grown to 38,270 movements per annum (comprising 8,900 jet and 29,370 general aviation movements), an increase of around 20 per cent from 2012 movement numbers. This growth is forecast to occur whether or not the new runway is implemented.

SCA has a high proportion of helicopter operations due to a number of training and other commercial helicopter organisations being based at SCA, including RACQ Careflight. In 2012 there were 60,302 helicopter movements at SCA representing 66 per cent of all airport traffic. By 2020 there are forecast to be 70,390 helicopter movements each year at SCA irrespective of the new runway proposal.

Currently helicopters operate from the southern general aviation area at the airport. Some training circuits are currently flown in the area north of runway 12/30 and north-west of runway 18/36. These areas are shown in **Figure 5.5c**.

As of 2013 most operations after 4:00pm were moved to the newly opened western GA area. Daytime helicopter operations prior to 4:00pm are expected to continue in the southern GA until at least 2027, when the last of the existing hangar leases expires. Beyond this date it is intended that helicopter operations will be progressively removed from the southern GA.

Areas closer to the airport experience a higher number of helicopter operations than other parts of the Sunshine Coast as shown in **Figure 5.5f**. All suburbs located within five kilometres of the airport experience a varied amount of helicopter over flights.

Figure 5.5d: Jet arrivals density (existing runway system)

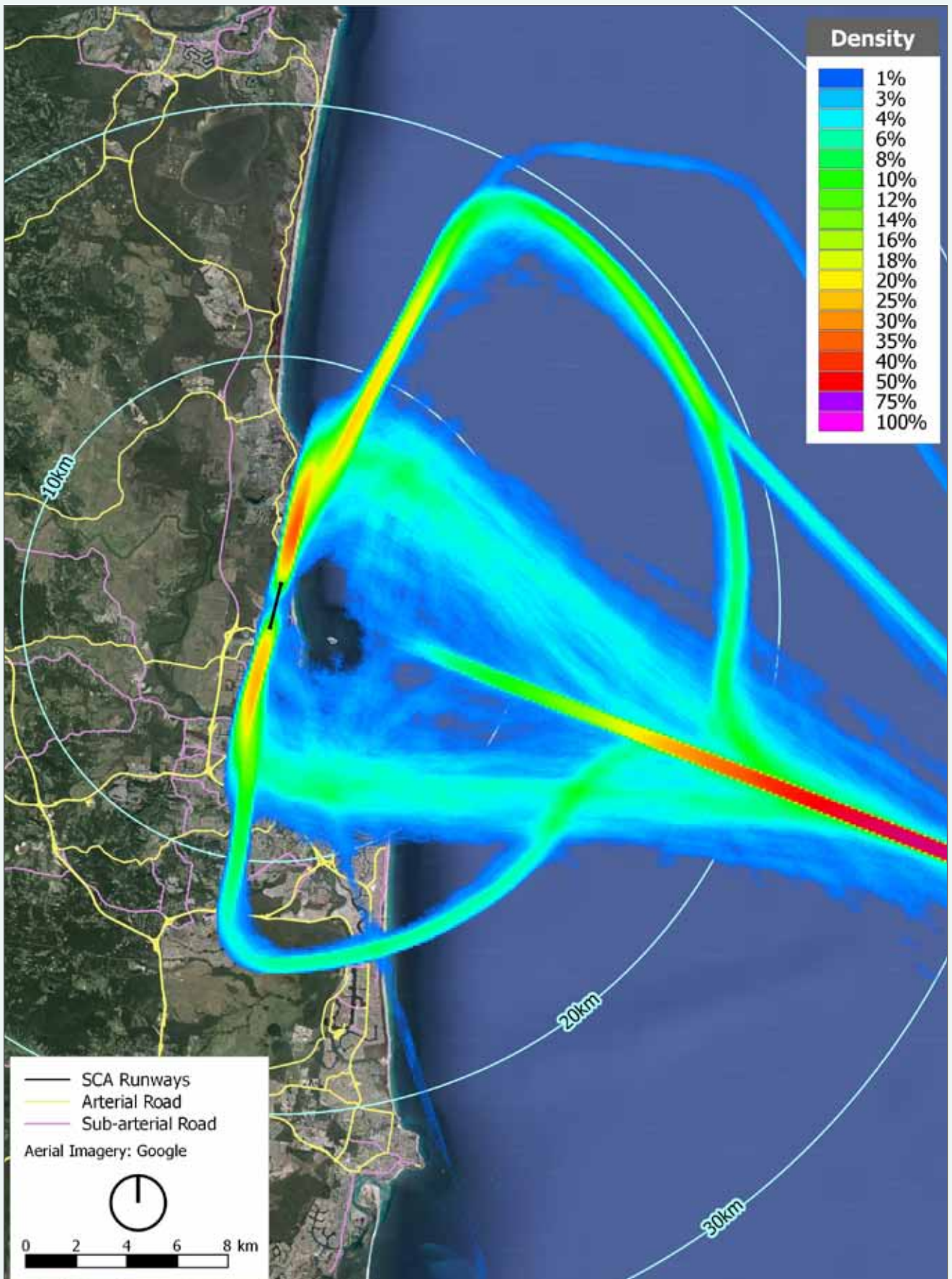


Figure 5.5e: Jet departures density (existing runway system)

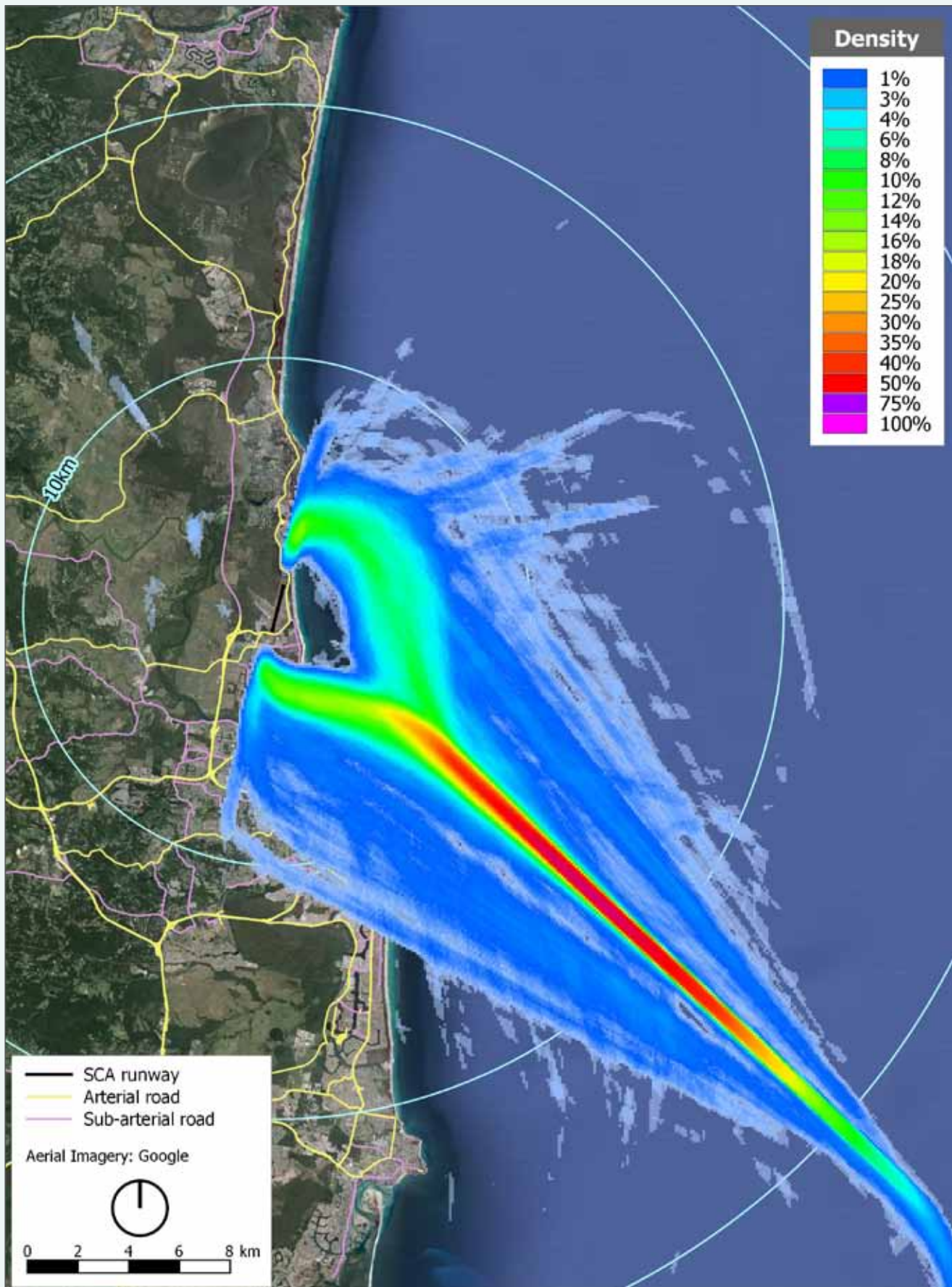
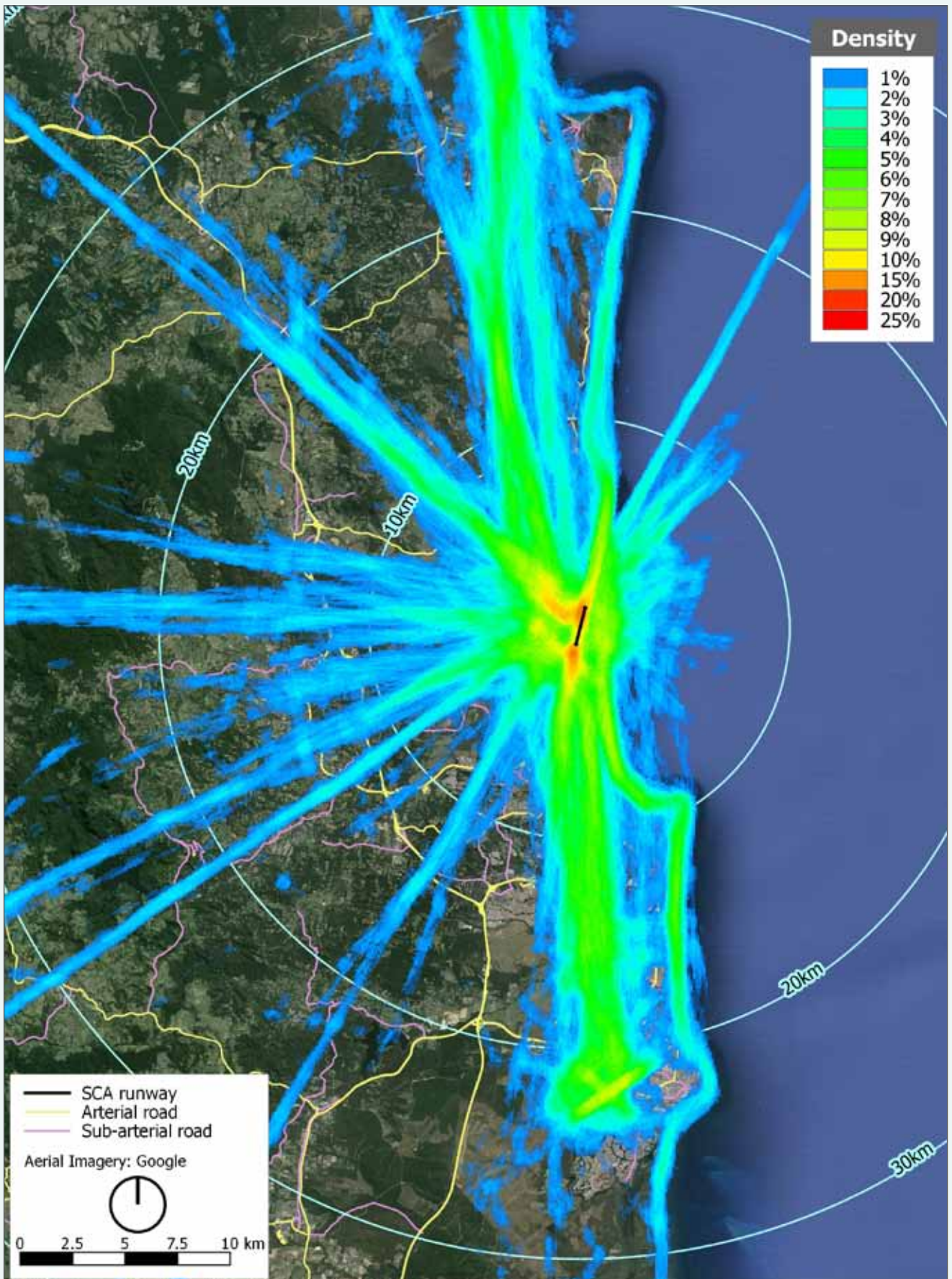


Figure 5.5f: Density of helicopter flights (existing runway system) 2012 – 2013



5.5.1.2 ANEC

As described in **Section 5.4.1**, there are certain restrictions applying to the development of land in areas that fall within ANEC/ANEC 20 or more contours. Parts of the suburbs of Bli Bli, Marcoola, Mudjimba and Twin Waters sit within the 20 or more ANEC contour (2020 base case) as shown in **Figure 5.5g**. See Chapter B2 – Land Use and Tenure for detail about these restrictions.

5.5.1.3 N70 contours

As described in **Section 5.4.2**, the N70 noise metric is used to show locations that will experience more than five noise events of 70dB(A) or more during a daytime, evening or night-time period. **Table 5.5a** provides details of N70 counts for the base case for the daytime period on a summer weekday day. **Figure 5.5h** shows the location of these N70 contours.

Table 5.5b provides details of N70 counts for the base case for the evening period. **Figure 5.5i** shows the location of these N70 contours. The base case does not include any night-time flights, therefore no N70 counts are available for this time period. There are also areas that fall outside these N70 contours that receive less frequent (less than five) 70dB(A) noise events during the relevant time period. Areas within the N70 contours may receive noise events of more than 70dB(A) and up to 95dB(A), see **Section 5.5.1.4** for details.

Figure 5.5g: SCA ANEC contour (2020 Do Minimum)

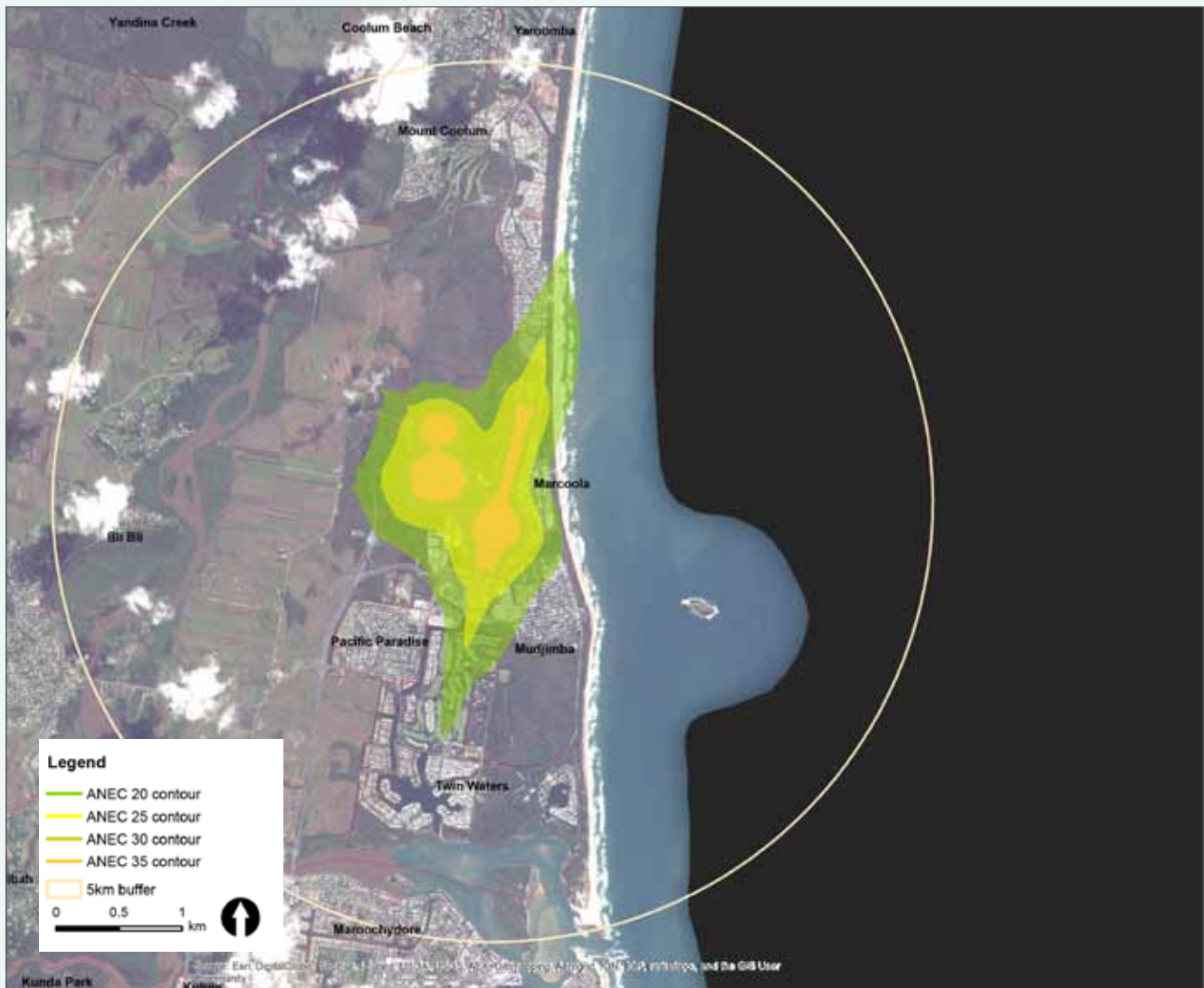


Table 5.5a: N70 counts for the dwellings located within 5 km of SCA – base case (day)

N70 2020 Do Minimum (summer weekday day)											
	No. of dwellings within 5km of SCA	N70 (5-9 events)	Percentage of dwellings affected	N70 (10-19 events)	Percentage of dwellings affected	N70 (20-49 events)	Percentage of dwellings affected	N70 (50+ events)	Percentage of dwellings affected	Suburb totals	Percentage of dwellings affected
Bli Bli	165	0	0%	0	0%	0	0%	0	0%	0	0%
Marcoola	1,722	96	6%	198	11%	1,250	73%	178	10%	1,722	100%
Maroochy River	0	0	n/a	0	n/a	0	n/a	0	n/a	0	n/a
Maroochydhore	1,526	633	41%	0	0%	0	0%	0	0%	633	41%
Mt Coolum	1,264	226	18%	20	2%	0	0%	0	0%	246	19%
Mudjimba	953	261	27%	317	33%	367	39%	8	1%	953	100%
Pacific Paradise	885	317	36%	158	18%	0	0%	0	0%	475	54%
Twin Waters	1,172	257	22%	482	41%	49	4%	0	0%	788	67%
Yandina Creek	8	0	0%	0	0%	0	0%	0	0%	0	0%
Yaroomba	43	5	12%	0	0%	0	0%	0	0%	5	12%
TOTALS	7,738	1,795	23%	1,175	15%	1,666	22%	186	2%	4,822	62%

Note: This data reports on dwellings that will receive five or more N70 noise events during the specified period. Dwellings outside these contours may still hear aircraft noise but it will be at lower decibel level than 70 dB(A) and will be less frequent than five events during a summer weekday day. Dwellings within these contours may also experience noise events of greater than 70dB(A).

Table 5.5b: N70 counts for the dwellings located within 5 km of SCA – base case (evening)

N70 2020 Do Minimum (summer weekday evening)											
	No. of dwellings within 5km of SCA	N70 (5-9)	Percentage of dwellings affected	N70 (10-19)	Percentage of dwellings affected	N70 (20-49)	Percentage of dwellings affected	N70 (50+)	Percentage of dwellings affected	Suburb totals	Percentage of dwellings affected
Bli Bli	165	0	0%	0	0%	0	0%	0	0%	0	0%
Marcoola	1,722	850	49%	328	19%	0	0%	0	0%	1,178	68%
Maroochy River	0	0	n/a	0	n/a	0	n/a	0	n/a	0	n/a
Maroochydhore	1,526	0	0%	0	0%	0	0%	0	0%	0	0%
Mt Coolum	1,264	0	0%	0	0%	0	0%	0	0%	0	0%
Mudjimba	953	235	25%	79	8%	0	0%	0	0%	314	33%
Pacific Paradise	885	0	0%	0	0%	0	0%	0	0%	0	0%
Twin Waters	1,172	308	26%	0	0%	0	0%	0	0%	308	26%
Yandina Creek	8	0	0%	0	0%	0	0%	0	0%	0	0%
Yaroomba	43	0	0%	0	0%	0	0%	0	0%	0	0%
TOTALS	7,738	1,393	18%	407	5%	0	0%	0	0%	1,800	23%

Note: This data reports on dwellings that will receive five or more N70 noise events during the specified period. Dwellings outside these contours may still hear aircraft noise but it will be at lower decibel level than 70 dB(A) and will be less frequent than five events during a summer weekday evening. Dwellings within these contours may also experience noise events of greater than 70dB(A).

Figure 5.5h: N70 contours – Base case (do minimum) summer weekday day (7:00am – 6:00pm)

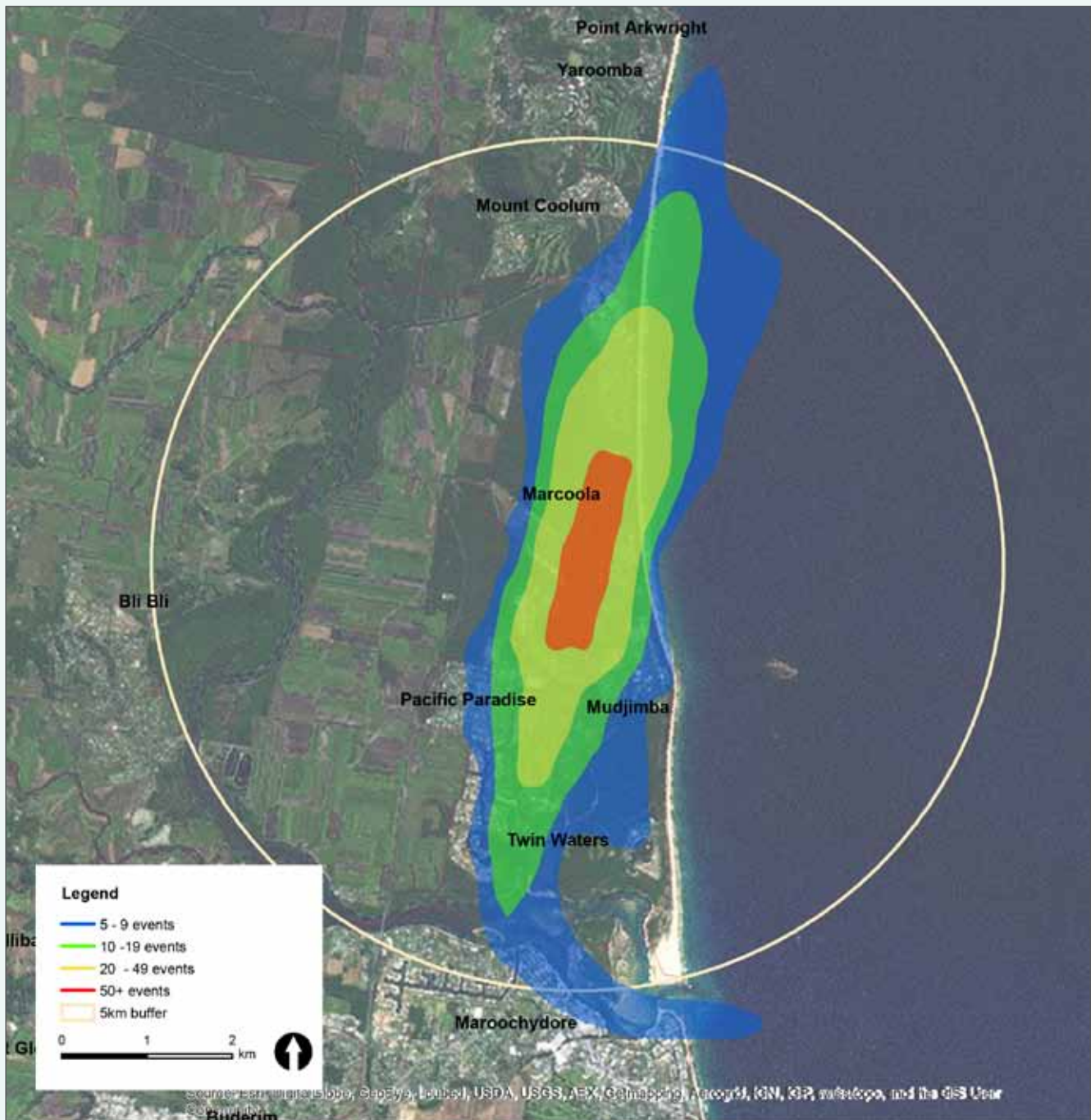
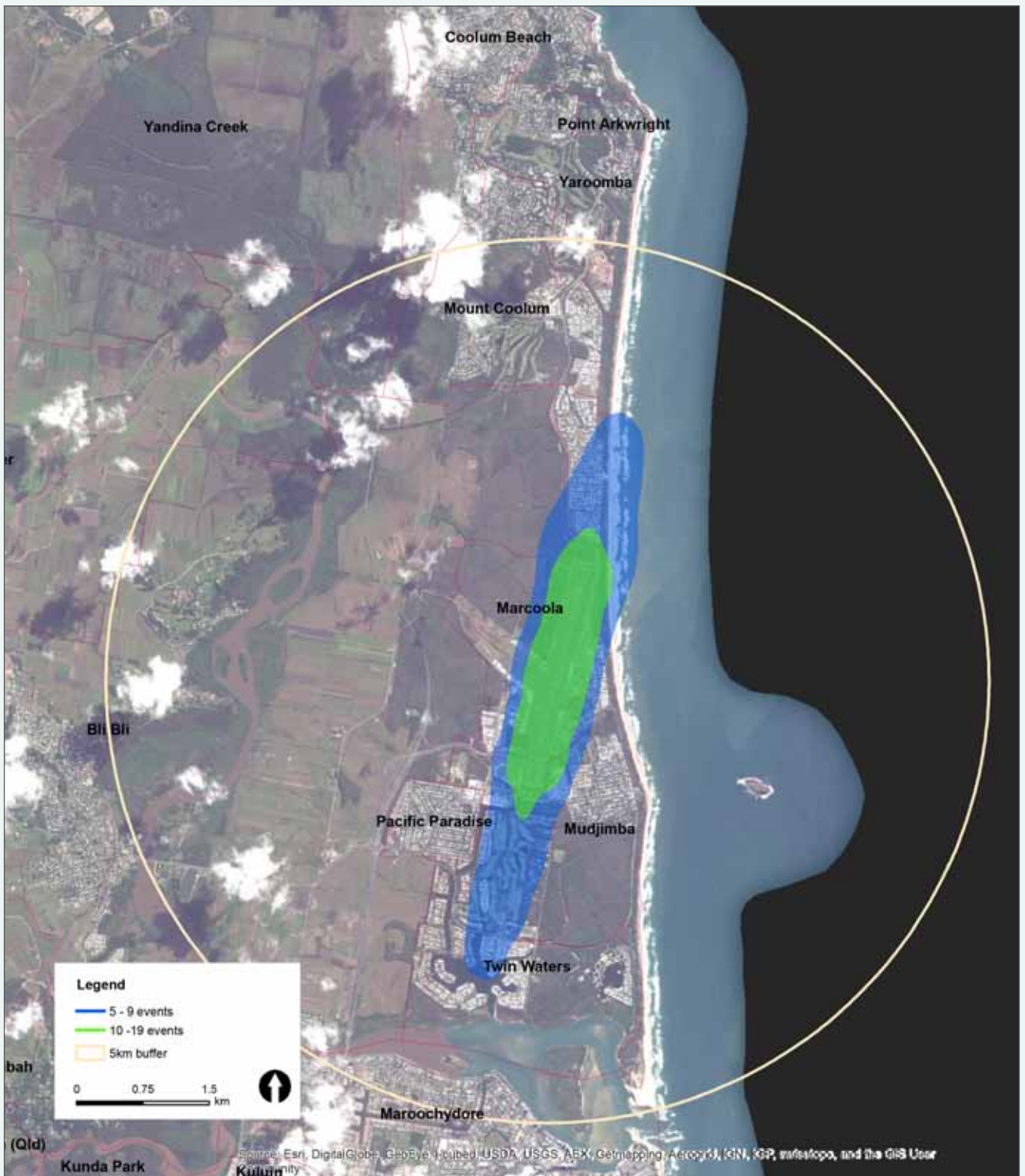


Figure 5.5i: N70 contours – base case (Do Minimum) summer weekday evening (6:00pm – 10:00pm)



5.5.1.4 Noise induced vibration

As discussed in Chapter D3 – Aircraft Noise, the low frequency components of aircraft noise can result in vibration of loose elements of buildings, notably windows. With typical light building structures, noise induced vibration may begin to occur where the maximum external noise level reaches approximately 90dB(A). The effect is more common on take-offs than for landings, since the noise spectrum for a take-off close to the airport has stronger low frequency components.

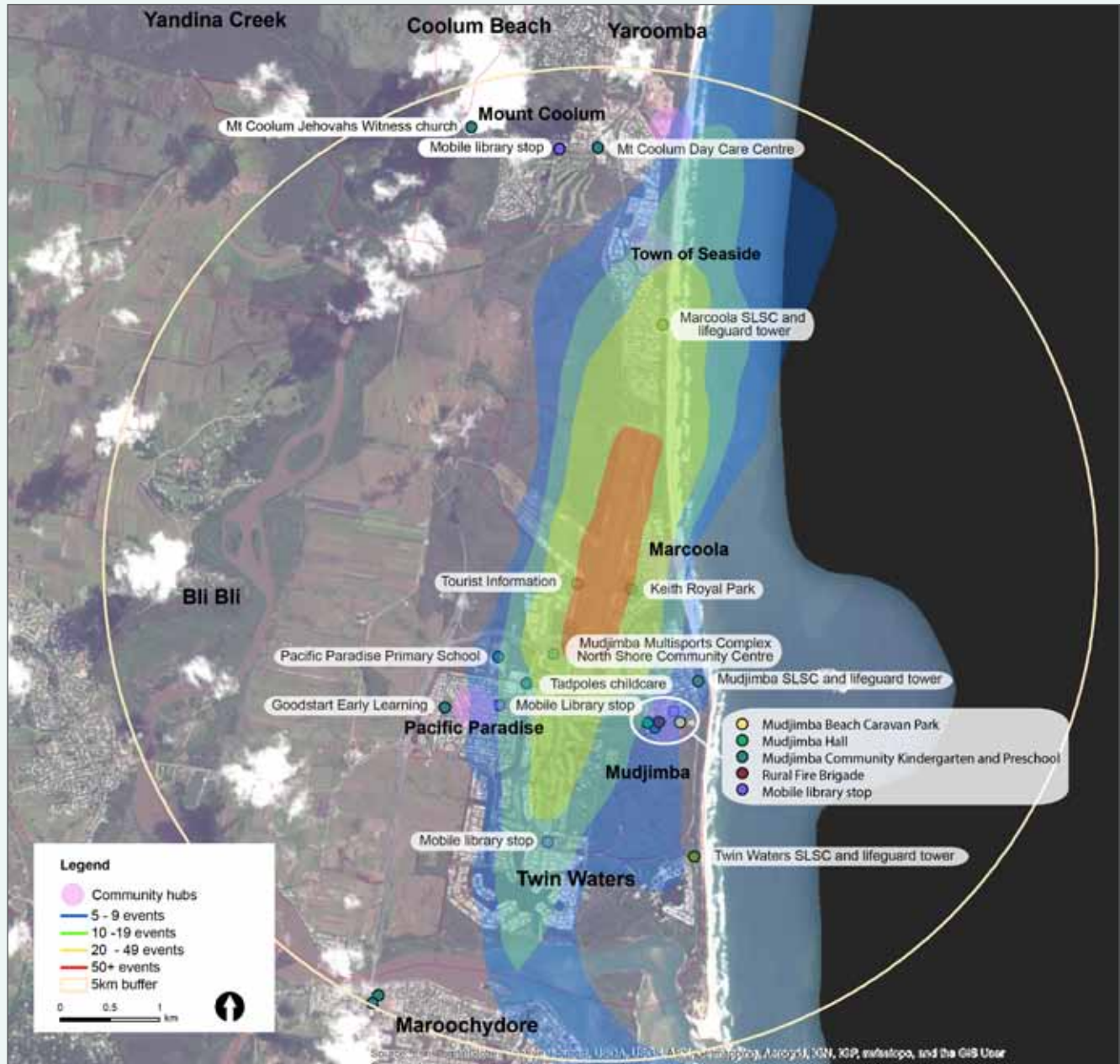
The 90dB(A) contour for B737-800 currently encroaches on parts of Marcoola, Mudjimba, Pacific Paradise and Twin Waters during a departure to the south. North of the airport, parts of Marcoola are predicted to experience LA_{max} noise levels exceeding 90dB(A) during departures on Runway 36.

5.5.1.5 Community facilities

As outlined in the Social Infrastructure Strategy (Sunshine Coast Regional Council, 2011d), the following community facilities are located within five kilometres of the airport as shown in **Figure 5.5j**:

- Goodstart Early Learning Pacific Paradise
- Keith Royal Park*
- Marcoola Lifeguard Tower and SLSC*
- Marcoola Local Community Hub* (see Chapter B13 – Social Impact for definition of Community hubs)
- Mobile library stops at Mt Coolum, Pacific Paradise*, Twin Waters* and Mudjimba
- Mt Coolum Day Care Centre

Figure 5.5j: Community facilities located within 5 km of SCA (from SCC Social Infrastructure Strategy 2011 and other sources)



- Mt Coolum Jehovah's Witness Church
- Mt Coolum Local Community Hub*
- Mudjimba Beach Caravan Park.
- Mudjimba Community Kindergarten and Preschool*
- Mudjimba Hall*
- Mudjimba Lifeguard Tower and SLSC
- Mudjimba Local Community Hub*
- Mudjimba Tourist Information Centre*
- Mudjimba Multisports Complex*
- North Shore Community Centre*
- Pacific Paradise Local Community Hub*
- Pacific Paradise Primary School*
- Rural Fire Brigade Mudjimba*
- Tadpoles Childcare Centre*
- Town of Seaside Local Community Hub*
- Twin Waters Lifeguard Tower.

Those facilities that currently experience five or more noise events of 70dB(A) or more on a summer, weekday, day are marked with an asterisk (*). It is acknowledged that facilities that are not impacted by 70dB(A) noise events (i.e. five or more) may experience some 70dB(A) noise events during this time period given their proximity to the airport.

It is also acknowledged that other facilities, such as Family Day Care homes, may also exist in this area and may also be impacted by N70 noise events.

5.5.2 Commercial accommodation providers

There are a number apartment style accommodation facilities located at Marcoola, including Ramada Marcoola Beach, Sanmarino by the Sea, Atlantis Marcoola, Marcoola Motel, Pacific Palms Motor Inn, Marcoola Beach Resort and Sand Dunes Resort. These apartments are located adjacent to the existing main runway with the closest located within 350 m of the runway centreline as shown in **Figure 5.5k**. Given their position adjacent to the 18/36 runway, they experience noise from both arrival and departure operations.

On a summer weekday day these facilities experience between 20 – 49 N70 noise events. Generally, the closer the building is located to the runway the more N70 noise events are experienced.

5.5.3 Visual impact of the airport

As described in **Section 5.5.1**, fixed wing aircraft operate at altitudes of up to 500 feet (150 m) or less in the final stages of approach to an airport. Departing aircraft gain altitude more quickly than arriving aircraft lose altitude. At this low altitude, aircraft form a very prominent feature of the view for a short period of time as they transition between the ground and air and vice-versa. Their visual prominence and the sound they generate at these low altitudes is consistent with the airport environ. Residents in dwellings that sit to the

south and north of the current main 18/36 runway under approach and departure paths are more likely to see aircraft operating in the vicinity of SCA.

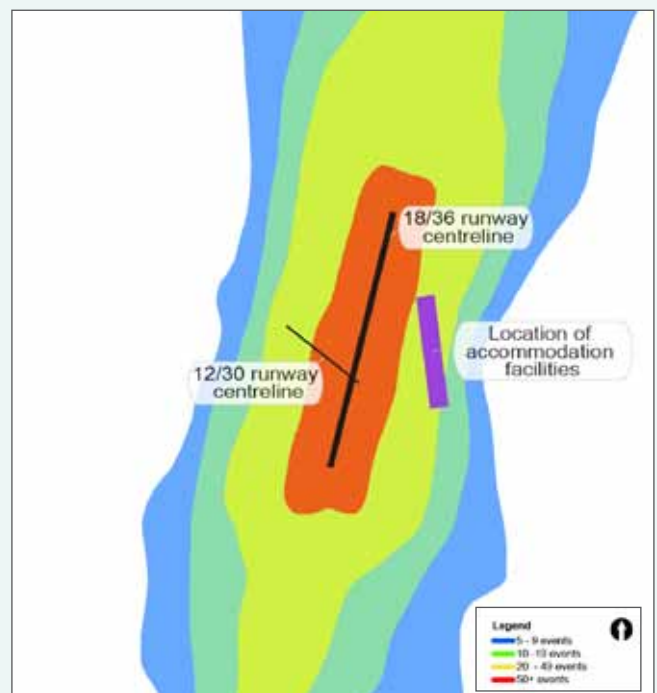
It can be generally assumed that the greater the distance from the airport, the higher aircraft will be and therefore the less visually prominent these aircraft are in views toward them.

5.5.2 Within 5 km to 10 km of SCA

The following suburbs are located 5 to 10 km from SCA:

- Alexandra Headland
- Bli Bli (part)
- Buderim (part)
- Coolum Beach
- Diddillibah (part)
- Kiels Mountain (part)
- Kuluin
- Kunda Park
- Maroochy River
- Maroochydore
- Mooloolabah.
- Point Arkwright
- Rosemount (part)
- Valdora (part)
- Yandina Creek
- Yaroomba.

Figure 5.5k: Accommodation facilities and N70 contours for the Do Minimum scenario



People living/working/recreating in areas located within five to 10 km of the airport currently see and hear aircraft flying at altitudes of around 500 feet (150 m) to 1,500 feet (500 m) as they approach or depart SCA. Operations at these low altitudes may generate noise on the ground in specific areas.

5.5.2.1 Over flights

Parts of the suburbs of Yaroomba, Maroochydore, Mooloolaba and Buderim are more frequently overflowed by fixed wing aircraft on arrival or departure from the airport. Some suburbs in this five to 10 km band will also experience helicopter over flights as shown in **Figure 5.5f**.

5.5.2.2 ANEF

The ANEF for SCA does not extend into the area 5 to 10 km from SCA; therefore no dwellings in this area are affected by an ANEF contour.

5.5.2.3 N70 contours

A small area of Maroochydore receives more than five 70dB(A) noise events on a summer weekday day. N70 counts for this area are shown in **Table 5.5c**. **Figure 5.5l** shows the location of these N70 contours. Other areas within this band are not impacted by frequent N70 noise events, though it is acknowledged that areas north and south of the existing 18/36 runway (especially Maroochydore and Point Arkwright) may receive a lower frequency of N70 noise events. Other areas within this band are not significantly impacted by N70 noise events, but likely still hear aircraft operating at less than 70dB(A). N70 contours do not extend into this area in the evening or night periods.

5.5.2.4 Community facilities

There are many community facilities located within five to 10 km of SCA. There are no community facilities in this area located within the N70 contour in this band, but it is acknowledged that facilities located south of the existing 18/36 runway in Maroochydore may experience a lower number of 70dB(A) noise events. These facilities include:

- Maroochy Uniting Church
- Maroochydore Assembly of God Church
- Maroochydore Primary School
- Maroochydore State High School
- Maroochydore Waters Child Care
- McKenzie Child Care Centre
- Millwell Road Community Centre
- Stella Maris Primary School.

5.5.2.5 Visual impact of the airport

Aircraft within airspace 5 to 10 km from SCA generally operate at altitudes of around 500 feet (150 m) to 1,500 feet (500 m). At this altitude aircraft form a prominent feature of the view for a short period of time as they approach or depart the airport. Departing aircraft will be a feature of the

view for a shorter period of time than an arriving aircraft as an aircraft gains altitude quickly on take-off.

As described in Section 5.5.2.1 the suburbs of Yaroomba, Maroochydore, Mooloolaba and Buderim are most likely to be overflown by aircraft, therefore these suburbs will have the clearest view of aircraft operating in this area.

It can be generally assumed that the greater the distance from the airport, the higher aircraft will be and therefore the less visually prominent these aircraft are in views toward them.

5.5.3 Within 10 km to 20 km of SCA

The following suburbs or localities are located 10 to 20 km from SCA:

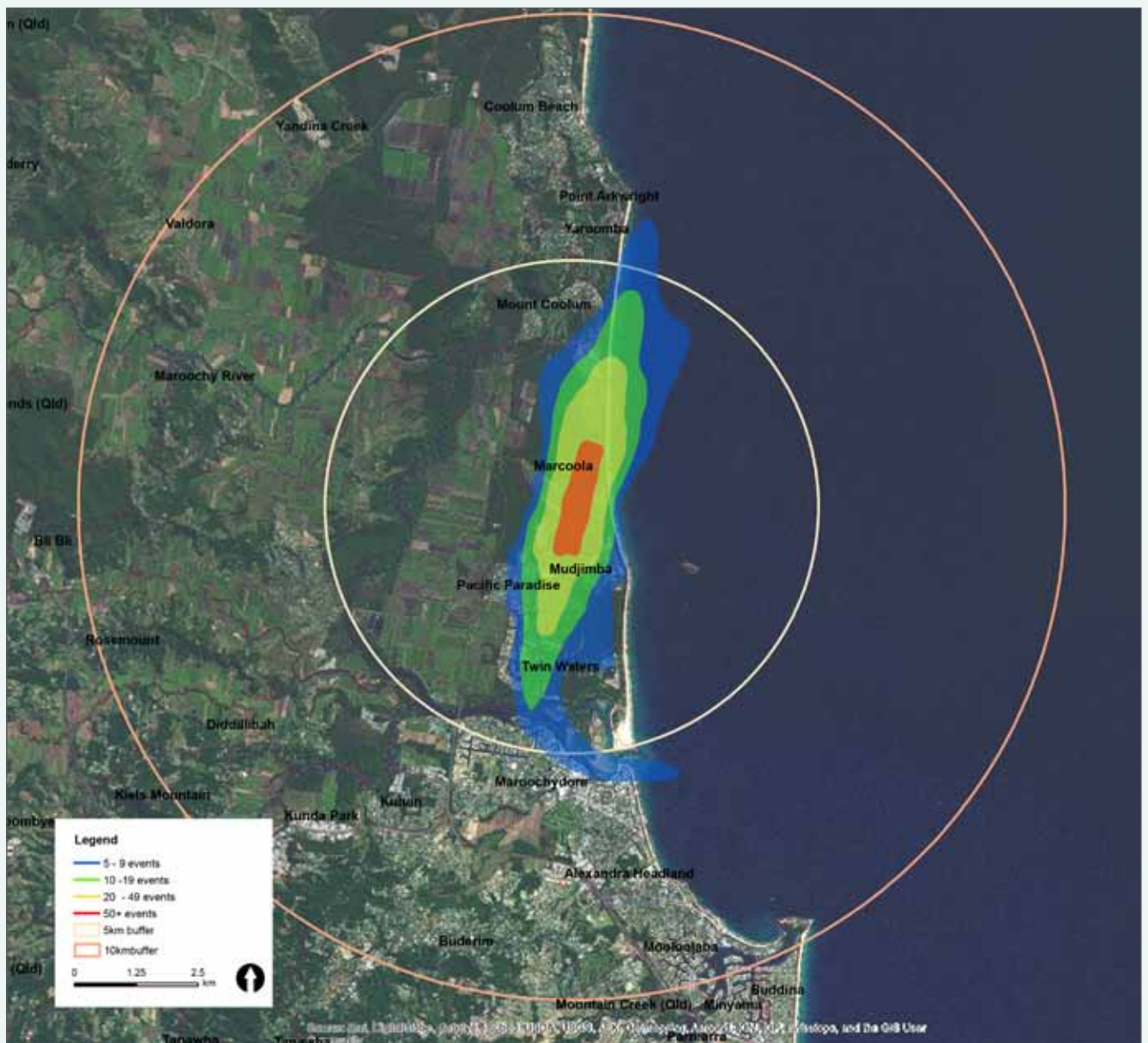
- Aroona (part)
- Battery Hill
- Bells Creek
- Birtinya
- Bokarina
- Bridges
- Buddina
- Buderim (part)
- Burnside
- Castaways Beach
- Chevallum
- Coes Creek
- Cooloolabin (part)
- Currimundi
- Diddillibah (part)
- Doonan
- Dulong (part)
- Eumundi (part)
- Forest Glen
- Glenview
- Highworth
- Hunchy (part)
- Ilkley
- Image Flat
- Kiels Mountain (part)
- Kureelipa (part)
- Little Mountain (part)
- Marcus Beach
- Meridan Plains

Table 5.5c: N70 counts for dwellings located 5 km to 10 km from SCA – base case (day)

N70 2020 Do Minimum (summer weekday day)											
	No. of dwellings 5km to 10 km of SCA	N70 (5-9 events)	Percentage of dwellings affected	N70 (10-19 events)	Percentage of dwellings affected	N70 (20-49 events)	Percentage of dwellings affected	N70 (50+ events)	Percentage of dwellings affected	Suburb totals	Percentage of suburb affected
Maroochydore	6,400	525	8%	0	0%	0	0%	0	0%	525	8%

Note: This data reports on dwellings that will receive five or more N70 noise events during the specified period. Dwellings outside these contours may still hear aircraft noise but it will be at lower decibel level than 70 dB(A) and will be less frequent than five events during a summer weekday day. Dwellings within these contours may also experience noise events of greater than 70dB(A).

Figure 5.5I: N70 contours – base case (Do Minimum) summer weekday day (7:00am – 6:00pm)



- Minyama
- Mons
- Mountain Creek
- Nambour
- Ninderry
- North Arm
- Palmview
- Palmwoods
- Parklands
- Parrearra
- Peregian Beach
- Peregian Springs
- Perwillowen
- Rosemount (part)
- Sippy Downs
- Tanawha
- Tower Mountain
- Valdora (part)
- Verrierdale
- Warana
- West Woombye
- Weyba Downs
- Woombye
- Wurtulla
- Yandina
- Yandina Creek.

People living/working/recreating in areas located within 10 to 20 km of the airport currently see and hear aircraft flying at altitudes of around 1,500 feet (500 m) to 3,000 feet (1,000 m) as they approach or depart SCA. Operations at these altitudes generate some noise on the ground in specific areas but this noise would be at a level lower than 70dB(A).

5.5.3.1 Over flights

Parts of the suburbs of Warana, Buddina, Minyama Mountain Creek, Sippy Downs and Buderim are more frequently overflown by fixed wing aircraft on arrival or departure from the airport. Some suburbs in this 10 to 20 km band currently experience helicopter over flights as shown in **Figure 5.5f**. Aircraft may also fly over this area at high altitudes en-route to other locations such as Brisbane Airport.

5.5.3.2 ANEF

The ANEF for SCA does not extend into the area 10 km to 20 km from SCA; therefore no dwellings in this area are affected by an ANEF contour.

5.5.3.3 N70 contour

70dB(A) or greater noise events do not extend into areas 10 to 20 km from SCA.

5.5.3.4 Community facilities

There are many community facilities located in areas 10 to 20 km from SCA. This includes the region's major health facilities – Nambour Hospital, the new Sunshine Coast University private Hospital and the planned Sunshine Coast Hospital. The University of the Sunshine Coast is also located in this area.

5.5.3.5 Visual impact of the airport

Aircraft within airspace 10 to 20 km from SCA generally operate at altitudes of around 1,500 feet (500 m) to 3,000 feet (1,000 m). At this altitude aircraft do not form a prominent feature of the view, though they are visible from the ground. As described in **Section 5.5.3.1** the suburbs of Warana, Buddina, Minyama Mountain Creek, Sippy Downs and Buderim are most likely to be overflown by aircraft, therefore these suburbs will have the clearest view of aircraft operating in this area.

It can be generally assumed that the greater the distance from the airport, the higher aircraft will be and therefore the less visually prominent these aircraft are in views toward them.

5.5.4 Within 20 km to 40 km of SCA

Other suburbs within the Sunshine Coast LGA and Noosa Shire LGA are located 20 to 40 km from the SCA. People living/working/recreating in these areas currently see and hear aircraft flying at altitudes of around 3,000 feet (1,000 m) to 6,000 feet (2,000 m) as they approach or depart SCA. Operations at these altitudes generate some noise on the ground in specific areas. The noise from aircraft operations above 5,000 feet is not considered to be significant according to the Environmental Principles for Minimising the Impact of Aircraft Noise (Airservices Australia, 2002) .

5.5.4.1 Over flights

Fixed wing aircraft do not frequently fly within the 20 to 40 km band because flight paths associated with SCA take aircraft out over the ocean as quickly as possible on departure and bring aircraft in over the ocean for as long as possible on arrival. That said aircraft do fly over this area at high altitudes en-route to other locations such as Brisbane Airport.

Some suburbs in this 20 to 40 km band currently experience helicopter over flights as shown in **Figure 5.5f**.

5.5.4.2 N70 contour

70dB(A) or more noise events do not extend into areas 20 to 40 km from SCA.

5.5.4.3 Visual impact of the airport

Aircraft within airspace 20 to 40 km from SCA generally operate at altitudes of around 3,000 feet (1,000 m) to 6,000 feet (2,000 m). At this altitude aircraft are difficult to see from the ground and are not a prominent feature of the view.

5.5.5 Other airspace users

As described in Chapter D1 – Introduction, there are a number of aviation facilities located within 40 km of SCA:

- **Caloundra Aerodrome** – Caloundra Aerodrome is located approximately 20 km south of SCA. The aerodrome primarily caters for the needs of light aircraft operations in the Sunshine Coast Region including recreational activities such as sky diving. The airport is operated by Sunshine Coast Council.
- **Noosa Airstrip** - Noosa Airstrip is a private airfield located in Noosa located approximately 35 km north of the SCA.
- **Teewah Airfield** – Teewah airfield is located approximately 30 km north of the SCA. It is owned by the State Government with Noosa Council acting as trustee. As of January 2014 Noosa Council has given notice that it intends to prohibit commercial aircraft operations at the airfield and will seek to restrict the airspace above it and surrounding localities.

Other aviation facilities in the vicinity of the study area include:

- **Gympie Airport** – Gympie airport is a small regional airport managed by Gympie Council located approximately 50 km north-west of the SCA. It is used frequently for recreational gliding.
- **Caboolture Airport** – Located approximately 60 km from SCA, Caboolture Airport is used for general aviation, recreational and flight training activities. The airfield is operated and maintained by Caboolture Aero Club Incorporated.
- **Redcliffe Airport** – Located approximately 70 km from SCA, Redcliffe Airport is owned and operated by Moreton Bay Regional Council. The aerodrome is used by general aviation aircraft for pilot training, aircraft hire and charter services.
- **Brisbane Airport** – located approximately 90 km south of SCA, Brisbane Airport is the closest major airport to SCA. Aircraft en-route to Brisbane Airport (and other destinations) currently use en-route flight paths in the vicinity of SCA.

Aircraft that use these aerodrome facilities, as well as other aircraft that are en-route to other destinations, all utilise airspace in the vicinity of SCA.

As described in Chapter D2 – Airspace Architecture and Modes of Operation, SCA currently operates with air traffic control to manage airspace over and close to the airport. Aircraft can currently operate with relative freedom outside the airport control zone and control area.

5.6 IMPACT ASSESSMENT

A key feature of the expansion of SCA is the construction of a new main runway on an east-west alignment. The new RWY 13/31 would become the main operational runway for SCA and as such, the arrival and departure flight paths and the airspace in the vicinity of the airport would change to accommodate the new runway alignment. Operations on the existing 18/36 runway would significantly reduce with jet operations on this runway ceasing and general aviation aircraft only using this runway when operational conditions on the new main runway are unfavourable for smaller aircraft (such as when there are strong crosswinds).

By 2020 aircraft traffic is forecast to have grown to 38,270 fixed-wing movements per annum (8,900 jet and 29,370 general aviation), an increase of around 20 per cent from 2012 movement numbers. This growth is forecast to occur whether or not the new runway is implemented. On opening day, this traffic would switch to the new runway arrangements, but the actual opening of the new runway will not create additional demand from day one. From 2020 onwards aircraft traffic is expected to continue to grow with the annual forecast for 2040 predicted to be 53,840 fixed-wing movements (comprising 18,210 jet and 35,630 general aviation movements). This represents around a 30 per cent increase in traffic from 2020 forecasts.

Even with this growth SCA will continue to be a relatively small airport servicing a regional population. For comparison, Brisbane Airport is forecast to have 227,000 annual aircraft movements by 2015 and 393,000 annual movements by 2035 (Brisbane Airport Corporation, 2007).

The impact assessment section uses 2020 new runway (opening year) data to predict changes to the social environment created by the airport expansion project. Where relevant, 2040 new runway data is used to predict additional changes that may occur over time after the opening of the new runway. The do minimum options (2020 and 2040 without the new runway) are discussed separately in **Section 5.6.7** of this chapter.

The proposed flight paths associated with the new 13/31 runway are shown in **Figure 5.6a**.

5.6.1 Impact assessment framework

The standard impact assessment framework used throughout this EIS has been tailored to allow for objective assessment of the predicted level of impact on the social environment. The assessment of potential impacts has been undertaken using the categories of magnitude shown in **Table 5.6a**.

The assessment of the consequence and likelihood of impacts has been guided by the likelihood and consequence ratings as discussed in Chapter A1 – Introduction.

Figure 5.6a: Proposed arrival (green) and departure (red) paths for the new 13/31 runway

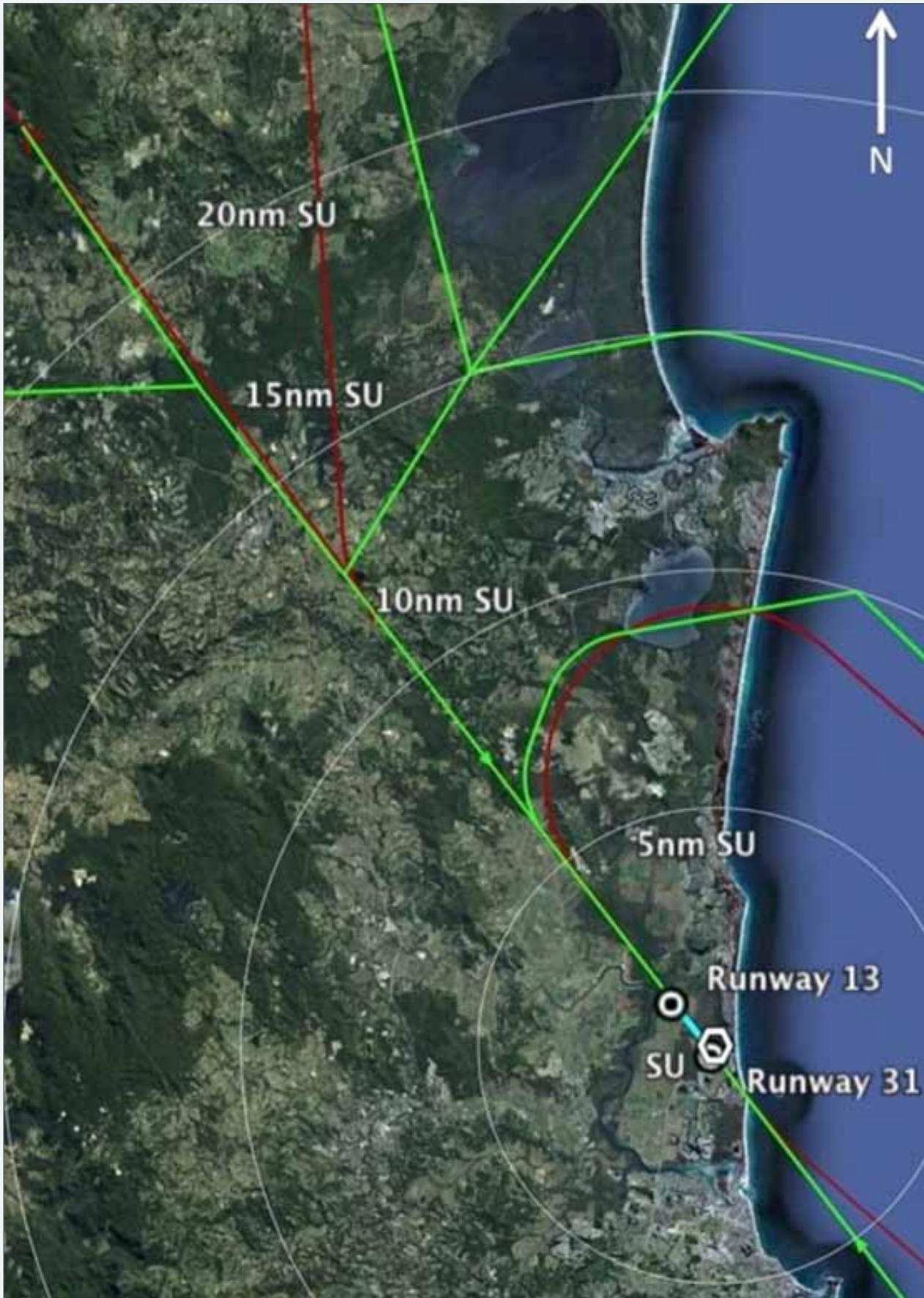


Table 5.6a: Magnitude of impact table

Impact Significance/Consequence	Description of significance
Very High	<ul style="list-style-type: none"> • The impact is considered critical to the decision-making process. • Impacts tend to be permanent or irreversible or otherwise long term and can occur over large scale areas. • People can no longer safely live/work/recreate within an area because of impacts associated with aircraft noise. • The social environment is irrevocably damaged because people no longer use the impacted area.
High	<ul style="list-style-type: none"> • The impact is considered likely to be important to decision-making. • Impacts tend to be permanent or irreversible or otherwise long to medium term. • Impacts can occur over large or medium scale areas. • People chose not to live/work/recreate within an area because of impacts associated with aircraft noise. • The social environment is damaged because some people will choose to no longer use the impacted area.
Moderate	<ul style="list-style-type: none"> • The effects of the impact are relevant to decision-making including the development of environmental mitigation measures • Impacts can range from long term to short term in duration • Impacts can occur over medium scale areas or otherwise represents a significant impact at the local scale • People continue to live/work/recreate within the area but are moderately annoyed by noise impacts. • The social environment is changed because people who are frequently annoyed by aircraft noise interact differently within the social environment (i.e. they no longer see their neighbours as they choose not to use their outdoor spaces).
Minor	<ul style="list-style-type: none"> • Impacts are recognisable/detectable but acceptable. • These impacts are unlikely to be of importance in the decision making process. Nevertheless, they are relevant in the consideration of standard mitigation measures. • Impacts tend to be short term or temporary and/or occur at local scale (e.g. regular noise events that would cause minor annoyance). • People continue to live/work/recreate within the area but are sometimes annoyed by noise impacts. • Limited changes to the social environment.
Negligible	<ul style="list-style-type: none"> • Minimal change to the existing situation. This could include for example impacts which are beneath levels of detection, impacts that are within the normal bounds of variation or impacts that are within the margin of forecasting error.
Beneficial	<ul style="list-style-type: none"> • Overall reduction in the number of dwellings within the ANEF/ANEC. • Overall reduction in the number of dwellings impacted by (more than five) 70 dB(A) noise events.

5.6.2 Locations within 5 km of the airport

The suburbs located closest to SCA would continue to experience the greatest effects of aircraft operations. The level of noise experienced in parts of these suburbs and over flights from fixed wing aircraft would change in line with the new main runway alignment; however it is assumed that people living/working/ recreating in this area will all continue to hear aircraft at varying sound levels given they are located in very close proximity to the airport. As discussed in **Section 5.4.2** helicopter operations at the airport are not forecast to change significantly due to the change in runway alignment, though growth in annual movements is expected as discussed in Chapter D2 – Airspace Architecture and Modes of Operation.

5.6.2.1 Over flights

The new main 13/31 runway is oriented on north-west/south-east alignment; therefore suburbs that sit at each end of the new runway would be overflown as fixed wing aircraft (jet and general aviation) approach and depart from the new main runway. Within five kilometres of the airport these suburbs include parts of:

- Bli Bli (part)
- Maroochy River (part)
- Mudjimba
- Yandina Creek (part).

Dwellings in Mudjimba located closest to the south-eastern end of the new runway would be overflown at altitudes of less than 500 feet (150 m) above ground level as aircraft approach 13/31 runway. Aircraft gain altitude quickly after take-off, therefore it is expected that aircraft will be above 500 feet when departing SCA over Mudjimba. It is forecast that 23 per cent of arrivals to SCA will approach from the south over Mudjimba the rest will approach the airport from the north over parts of Bli Bli, Maroochy River and Yandina Creek. It is forecast that 77 per cent of departures from SCA will leave from the south over Mudjimba the rest will leave the airport from the north over parts of Bli Bli, Maroochy River and Yandina Creek.

The 18/36 runway would remain operational for use by general aviation aircraft when conditions on the new main runway are unfavourable, such as when there are strong crosswinds. It is forecast that this runway would need to be used around 10 per cent of the time for general aviation aircraft (see Chapter D3 – Aircraft Noise). When this runway is used, parts of Twin Waters, Pacific Paradise, Mudjimba, Marcoola and Mt Coolum would be overflown by general aviation aircraft.

While there would be some growth in the number of helicopter operations in 2020 (as described in Chapter D2 – Airspace Architecture and Modes of Operation) the expansion of SCA is expected to have minimal impact on the majority of helicopter operations. Areas that are currently overflown by helicopters would continue to be overflown by these aircraft.

That said, the existing helicopter training area (as shown in Figure) would close to allow for construction and operation of the new 13/31 runway. Traffic that currently uses this area (approximately 10 per cent of helicopter operations) would be redistributed onto other existing helicopter flight tracks with parts of the suburbs of Twin Waters, Mudjimba and Marcoola predicted to be overflown by a small number of additional helicopters.

5.6.2.2 ANEC

The Sunshine Coast Planning Scheme 2014, the preceding Maroochy Plan 2000 and previous planning documents have anticipated the development of RWY 13/31 and included ANEC contours to illustrate future aircraft noise impacts.

It should be noted that the methodology for calculating the ANEC has recently changed and has resulted in a change in contours.

Table 5.6b shows counts of existing dwellings that would be located in the different ANEC scenarios. **Figure 5.6b** shows the location of these N70 contours. See Chapter B2 – Land Use and Tenure, for more information about the land use impact of the ANEC contours.

5.6.2.3 N70 contour

As described in **Section 5.4.2** the N70 noise metric is used to show locations that will experience five or more noise events of 70dB(A) or more during a daytime, evening or night-time period. **Table 5.6c** provides details of N70 counts for the new runway case for the daytime period. For comparative purposes the N70 counts from the base case are also included in this table. **Figure 5.6c** shows the location of these N70 contours. **Table 5.6d** provides details of N70 counts for the new runway case for the evening period. For comparative purposes the N70 counts from the 2020 Do Minimum are also included in this table. **Figure 5.6d** shows the location of these N70 contours.

Night-time operations are not forecast until the 2040 scenario, and then only two operations are forecast, both in the early morning period between 6.00am and 7.00am. N70 contours for the 2040 night-time period can be found in Chapter D3 – Aircraft Noise.

Figure 5.6e shows the difference between runway options at 2020. On opening of the new runway areas shown in red and yellow would receive more N70 noise events and areas shown in blue and aqua would receive less N70 noise events.

While N70 contours are used to show areas that would receive certain numbers of noise events of 70dB(A) or more, there are areas outside these contours that also receive less than five 70dB(A) noise events. There are also areas within these contours that receive noise events in excess of 70dB(A).

Table 5.6b: ANEC comparison 2020 and 2040 Do Minimum and New Runway (dwelling count)

Suburbs affected	Contour	2020 Do minimum	2020 New Runway	2040 Do minimum	2040 New Runway
Marcoola	ANEC 20	849	627	993	412
	ANEC 25	287	230	313	504
	ANEC 30	67	46	84	0
	ANEC 35	11	13	0	0
Mudjimba	ANEC 20	313	252	362	514
	ANEC 25	33	0	117	55
	ANEC 30	0	0	1	0
	ANEC 35	0	0	0	0
Twin Waters	ANEC 20	0	0	155	0
	ANEC 25	0	0	0	0
	ANEC 30	0	0	0	0
	ANEC 35	0	0	0	0

Figure 5.6b: SCA ANEF contour (2020 New Runway)

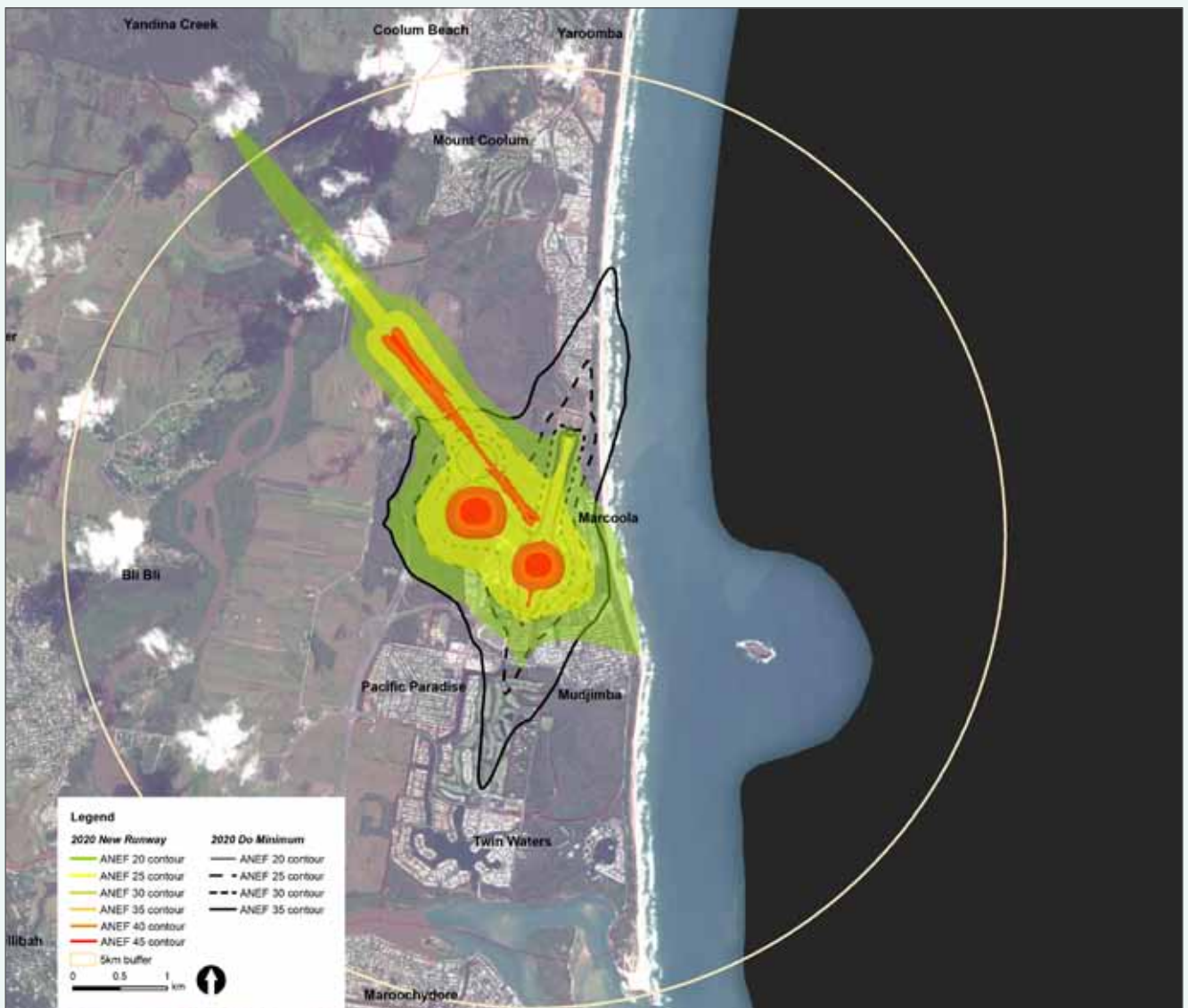


Table 5.6c: N70 comparison table – 2020 New Runway and 2020 Do Minimum (base case) summer weekday day

		N70 2020 NEW RUNWAY/2020 DO MINIMUM COMPARISON - SUMMER WEEKDAY DAY DWELLINGS WITHIN 5 KM OF SCA												
		N70 (5-9 events)		N70 (10-19 events)		N70 (20-49 events)		N70 (50+ events)		Totals Do Minimum	Totals New Runway	Difference in dwellings affected		
Suburbs	Number of dwellings in suburb located within 5 km of SCA	NEW RUNWAY		DO MINUMIM		NEW RUNWAY		DO MINUMIM		NEW RUNWAY		DO MINUMIM		
		% of dwellings	N70 (5-9 events)	% of dwellings	N70 (10-19 events)	% of dwellings	N70 (20-49 events)	% of dwellings	N70 (20-49 events)	% of dwellings	N70 (50+ events)	% of dwellings	N70 (50+ events)	
Bli Bli	165	1%	1	0%	0	0%	0	0%	0	0%	0	0%	0	1
Marcoola	1,722	7%	128	6%	96	73%	1,250	53%	916	10%	178	0%	0	1,044
Maroochy River	0	n/a	0	n/a	0	n/a	0	n/a	0	n/a	0	n/a	0	0
Maroochydore	1,526	0%	0	41%	633	0%	0	0%	0	0%	0	0%	0	-633
Mt Coolum	1,264	0%	0	18%	226	0%	20	0%	0	0%	0	0%	0	-246
Mudjimba	953	6%	56	27%	261	39%	367	39%	372	1%	8	0%	0	772
Pacific Paradise	885	0%	0	36%	317	0%	0	0%	0	0%	0	0%	0	-475
Twin Waters	1,172	0%	0	22%	257	4%	49	0%	0	0%	0	0%	0	-788
Yandina Creek	8	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	1
Yaroomba	43	0%	0	1.2%	5	0%	0	0%	0	0%	0	0%	0	-5
TOTALS	7,738		1,795	2.3%	1,175	22%	1,666	1.7%	1,288	2%	186	0%	0	4,822

Note: This data reports on dwellings that will receive five or more N70 noise events during the specified period. Dwellings outside these contours may still hear aircraft noise but it will be at lower decibel level than 70 dB(A) and will be less frequent than five events during a summer weekday day. Dwellings within these contours may also experience noise events of greater than 70dB(A).

Figure 5.6c: N70 contours – New Runway (2020) summer weekday day (7:00am – 6:00pm)

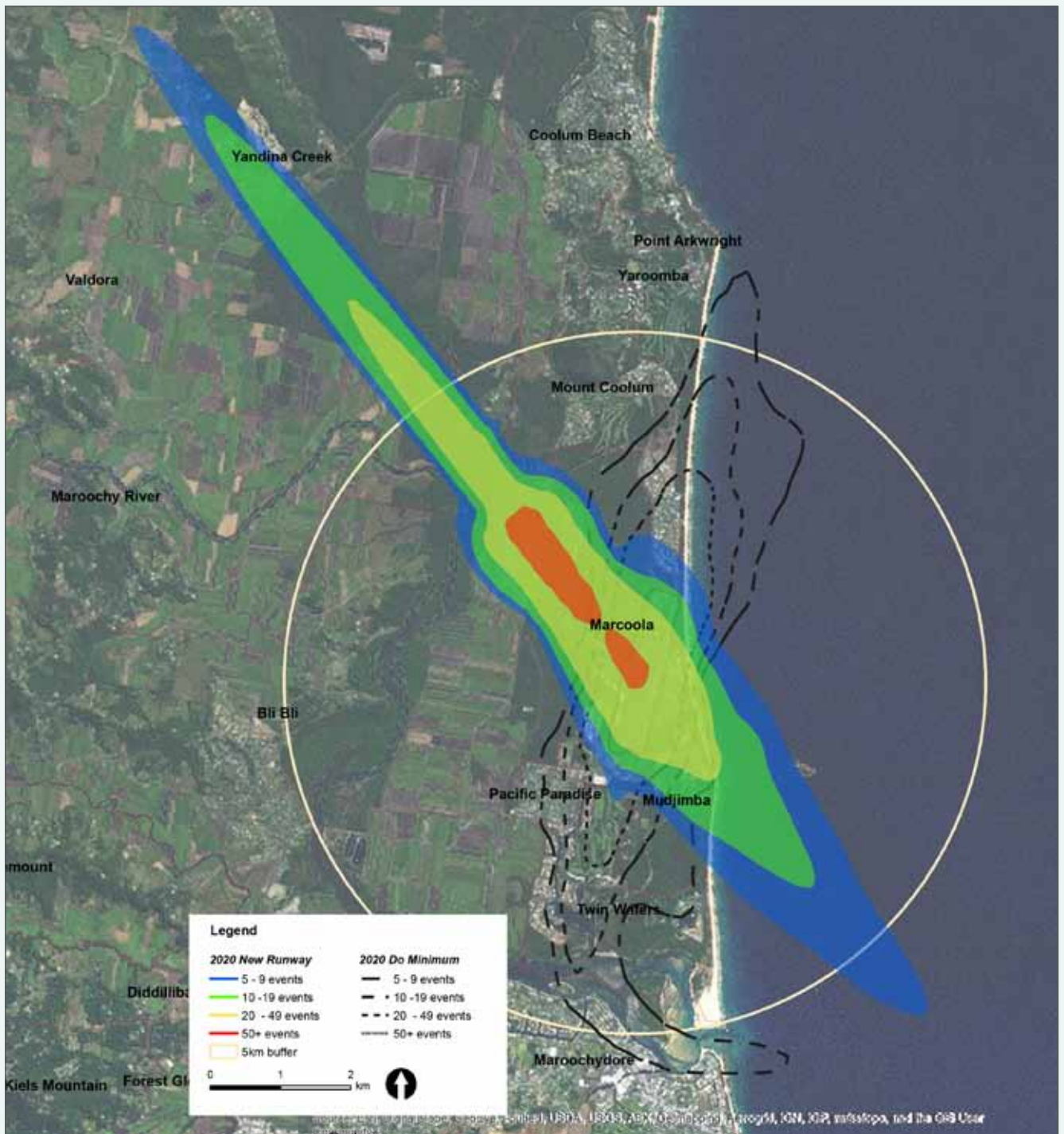


Table 5.6d: N70 comparison table – 2020 New Runway and 2020 Do Minimum (base case) summer weekday evening

		N70 2020 NEW RUNWAY/2020 DO MINIMUM COMPARISON – SUMMER WEEKDAY EVENING DWELLINGS WITHIN 5 KM OF SCA											
		N70 (5-9 events)		N70 (10-19 events)		N70 (20-49 events)		N70 (50+ events)		Totals Do Minimum	Totals New Runway	Difference in dwellings affected	
Suburbs	Number of dwellings in suburb located within 5 km of SCA	NEW RUNWAY		DO MINUMIM		NEW RUNWAY		DO MINUMIM		NEW RUNWAY		DO MINUMIM	
		% of dwellings	N70 (5-9 events)	% of dwellings	N70 (10-19 events)	% of dwellings	N70 (20-49 events)	% of dwellings	N70 (10-19 events)	% of dwellings	N70 (50+ events)	% of dwellings	N70 (50+ events)
Bli Bli	165	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0
Marcoola	1,722	49%	870	19%	328	0%	0	0%	0	0%	0	0%	0
Maroochy River	0	n/a	0	n/a	0	n/a	0	n/a	0	n/a	0	n/a	0
Maroochydore	1,526	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0
Mt Coolum	1,264	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0
Mudjimba	953	25%	235	8%	79	0%	0	0%	0	0%	0	0%	0
Pacific Paradise	885	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0
Twin Waters	1,172	26%	308	0%	0	0%	0	0%	0	0%	0	0%	0
Yandina Creek	8	0%	1	0%	0	0%	0	0%	0	0%	0	0%	1
Yaroomba	43	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0
TOTALS	7,738	18%	1,393	5%	407	0%	0	0%	0	0%	0	0%	-616

Note: This data reports on dwellings that will receive five or more N70 noise events during the specified period. Dwellings outside these contours may still hear aircraft noise but it will be at lower decibel level than 70 dB(A) and will be less frequent than five events during a summer weekday evening. Dwellings within these contours may also experience noise events of greater than 70dB(A).

Figure 5.6d: N70 contours – New Runway (2020) summer weekday evening (6:00pm – 10:00pm)

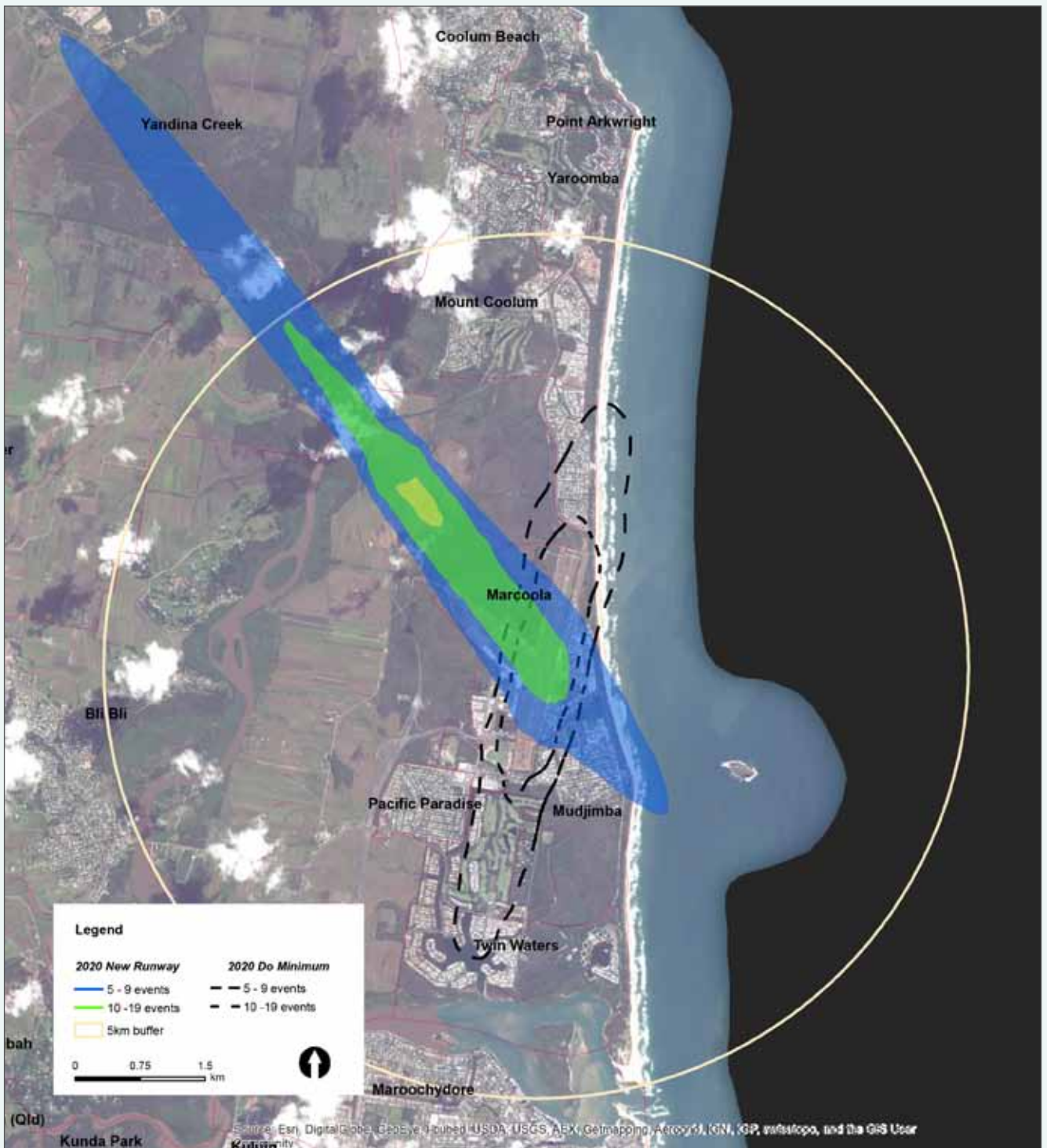
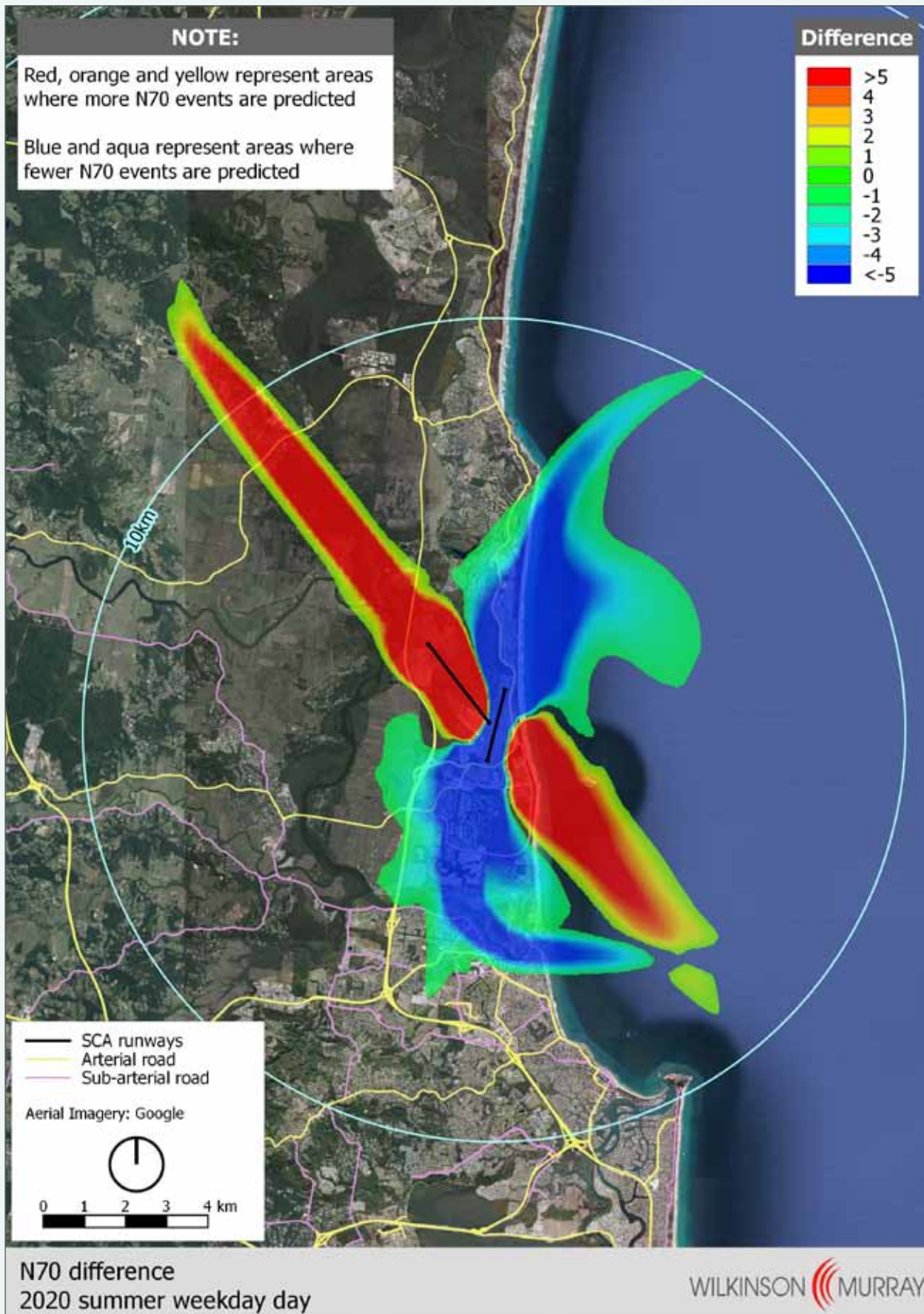


Figure 5.6e: Difference in Daytime N70 noise events at 2020 for New Runway and Do Minimum (no new runway options)



5.6.2.4 Noise induced vibration

As discussed in **Section 5.5.1.4**, noise induced vibration may begin to occur where the maximum external noise level reaches approximately 90dB(A). The effect is more common on take-offs than for landings, since the noise spectrum for a take-off close to the airport has stronger low frequency components.

With the new RWY 13/31, parts of Mudjimba and Marcoola immediately east of the new runway are predicted to experience noise levels exceeding 90dB(A) during departures and arrivals. It is noted that the additional length of RWY 13/31 permits departing aircraft to gain more altitude before overflying the residential areas beyond the runway end. Hence the extent of 90dB(A) contour beyond the

runway end is reduced with the new runway, as compared with the existing runway.

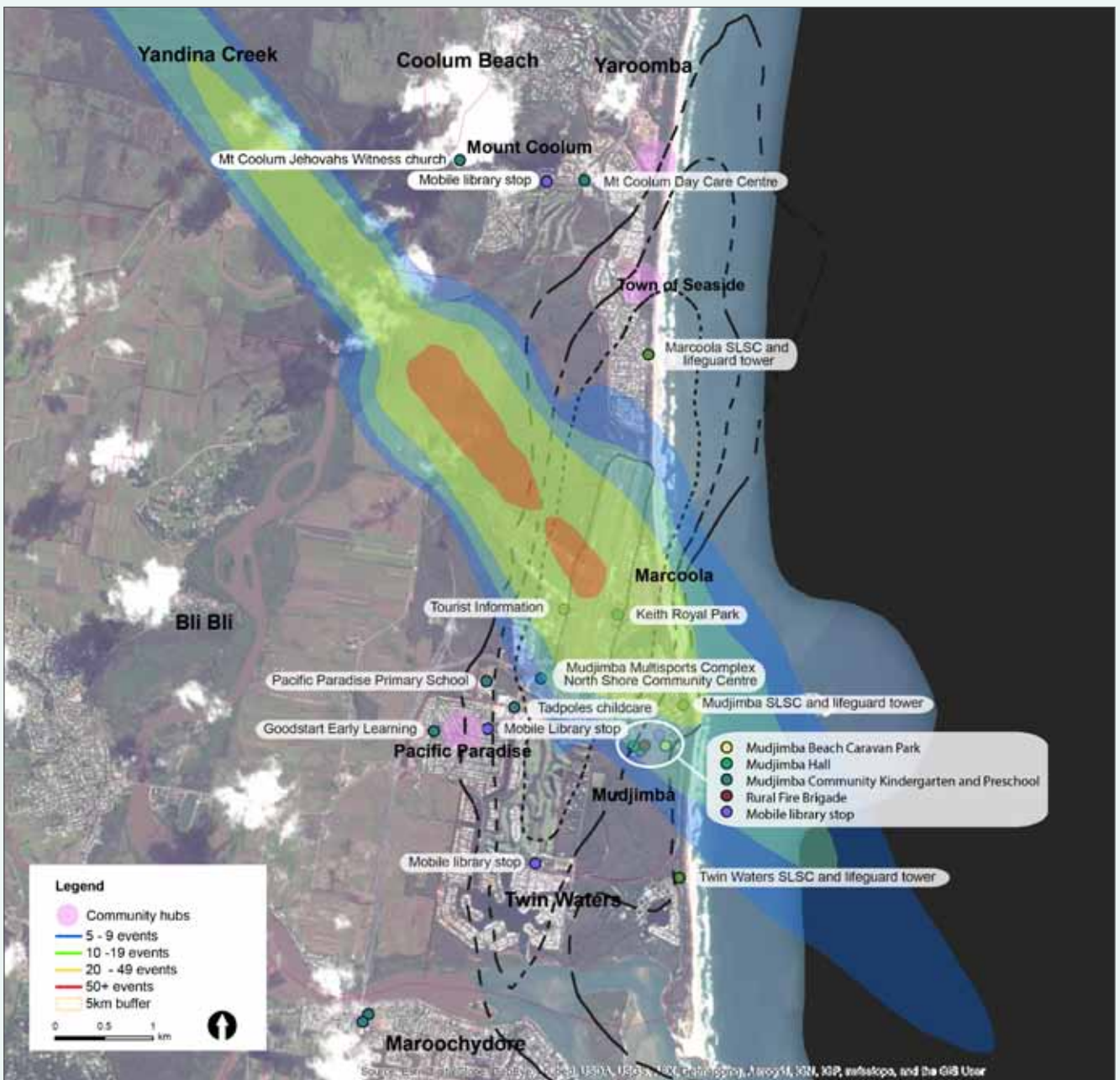
The number of residential dwellings within the respective 90dB(A) contours is approximately equal between the New Runway and Do Minimum scenarios.

5.6.2.5 Community facilities

As shown in **Figure 5.6f** the following community facilities would no longer sit within a N70 five or greater contour once the new 13/31 runway is operational:

- Town of Seaside Local Community Hub
- Pacific Paradise Local Community Hub
- Marcoola Lifeguard Tower and SLSC

Figure 5.6f: Community facilities located within 5 km (from SCC Social Infrastructure Strategy 2011 and other sources)



- Pacific Paradise Primary School
- Tadpoles Childcare Centre
- Mobile Library stop at Pacific Paradise.

Community facilities that would now sit within the 70dB(A) five or more contour once the new 13/31 runway is operational:

- Mudjimba Lifeguard Tower and SLSC
- Mudjimba Beach Caravan Park.

The following facilities would experience more frequent 70dB(A) noise events as a result of the new runway:

- Rural Fire Brigade Mudjimba
- Mudjimba Hall
- Mudjimba Community Kindergarten and Preschool
- Mobile library stop at Mudjimba.

These facilities would experience an increase in N70 events from five to nine events to 10 to 19 events.

It is acknowledged that other community facilities that are not impacted by five or more 70dB(A) noise events may experience some 70dB(A) noise events given their proximity to the airport.

There are no new community facilities (as outlined in SCC's Social Infrastructure Strategy 2011) proposed in areas that would receive frequent N70 noise events.

5.6.2.6 Commercial accommodation providers

Marcoola accommodation facilities currently receive high numbers of N70 noise events from lateral noise as aircraft land and take off on the 18/36 runway which is adjacent to the accommodation facilities as shown in **Figure 5.6g**.

All the Marcoola apartment buildings would sit within the N70 (20 to 49 noise events) once the new 13/31 runway opens as shown in **Figure 5.6h**. The noise profile will change from the current situation where lateral noise is generated by all aircraft movements (arrivals and departures) to noise generated by aircraft nearby over flights on either an arrival or a departure. As described in **Section 5.6.2.1** arrivals from the south would generate more noise than departures to the south. It is forecast that 23 per cent of arrivals to SCA will approach from the south-east (RWY 31), the rest will approach from the north-west (RWY 13). It is forecast that 77 per cent of departures off RWY 13/31 will be to the south-east (RWY 13), the rest to the north-west (RWY 31). Aircraft departing to the south-east would gain altitude quickly reducing their noise footprint on the ground.

5.6.2.7 Visual impact of the airport

As described in **Section 5.5.1**, fixed wing aircraft operate at altitudes of up to 500 feet (150 m) on approach to and departure from SCA. At this low altitude, aircraft form a very prominent feature of the view for a short period of time as they transition between the ground and air and vice-versa. Their visual prominence and the sound they generate at these low altitudes is consistent with the airport environ.

Figure 5.6g: Accommodation facilities and N70 contours for the Do Minimum scenario

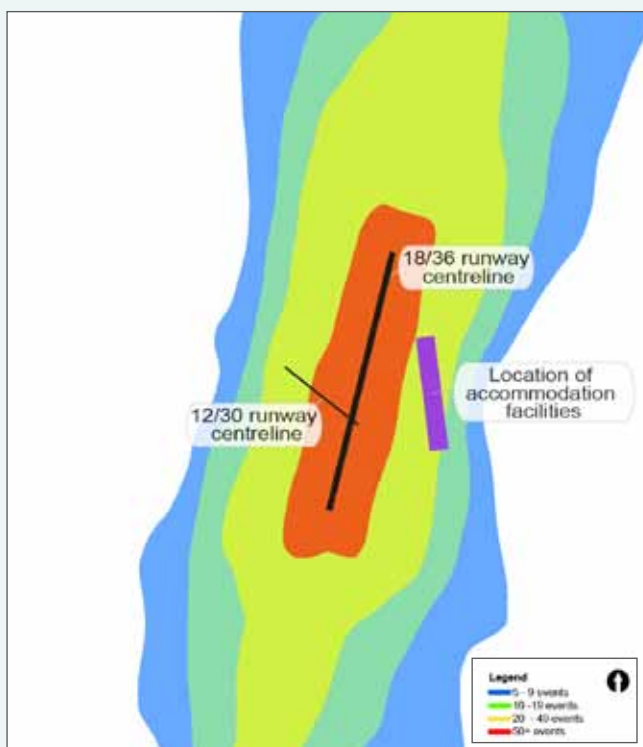
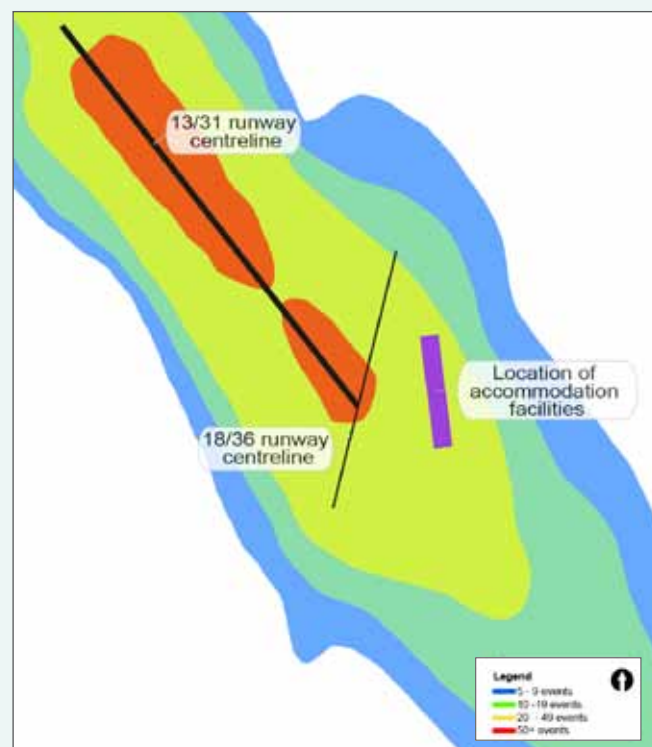


Figure 5.6h: Accommodation facilities and N70 contours for the New Runway scenario



Dwellings that sit at the ends of the north-west /south-east runway, in the suburbs of Yandina Creek and Mudjimba, would be located under approach and departure paths. People using these dwellings are likely to see aircraft operating in the vicinity of SCA.

5.6.3 Locations within 5 km to 10 km of the airport

The new runway alignment will result in a change to aircraft noise and over flights in parts of some suburbs located 5 to ten km from the airport.

5.6.3.1 Over flights

Parts of the suburbs of Yandina Creek and Maroochy River would be overflowed by fixed wing aircraft on arrival or departure from the airport once the new 13/31 runway is operational.

While there would be some growth in the number of helicopter operations in 2020 (as described in Chapter D2 – Airspace Architecture and Modes of Operation) the expansion of SCA is expected to have minimal impact on the majority of helicopter operations. Areas that are currently overflowed by helicopters would continue to be overflowed by these aircraft.

5.6.3.2 N70 contours

As described in **Section 5.4.2** the N70 noise metric is used to show locations that will experience more than five noise events of 70dB(A) or more during a daytime, evening or night-time period. **Table 5.6e** provides details of N70 counts for the new runway case for the daytime period. For comparative purposes the N70 counts from the base case are also included in this table. **Figure 5.6i** shows the location of these N70 contours. There are no dwellings affected by N70 noise events in the evening or night-time periods in the five to 10 km band.

5.6.3.3 Community facilities

There are no community facilities in this area located within the N70 contours for a summer weekday day (five or more), but it is acknowledged that Coolool Beach Christian College may experience a lower frequency of 70dB(A) noise events (less than five) during this time period.

5.6.3.4 Visual impact of the airport

Aircraft within airspace five to 10 km from SCA generally operate at altitudes of around 500 feet (150 m) to 1,500 feet (500 m). At this altitude aircraft form a prominent feature of the view for a short period of time as they approach or depart the airport.

As described in **Section 5.6.3.1**, the suburbs of Yandina Creek and Maroochy River are most likely to be overflowed by aircraft, therefore these suburbs will have the clearest view of aircraft operating in this area.

It can be generally assumed that the greater the distance from the airport, the higher aircraft will be and therefore the less visually prominent these aircraft are in views toward them.

5.6.4 Locations within 10 km to 20 km of the airport

New areas 10 km to 20 km from the airport would be overflowed by aircraft as they approach or depart the new runway.

5.6.4.1 Over flights

New flight paths associated with the new runway would see aircraft fly over the suburbs of Verrierdale, Yandina Creek, Marcus Beach, Peregian Beach and Weyba Downs. The new arrival paths would see aircraft cross the coastline just north of Marcus Beach at an altitude of around 3,500 feet. These aircraft would join the arrival path over Yandina Creek at approximately 2,000 feet.

5.6.4.2 N70 contour

As described in **Section 5.4.2** the N70 noise metric is used to show locations that will experience more than five noise events of 70dB(A) or more during a daytime, evening or night-time period. **Table 5.6f** provides details of N70 counts for the new runway case for the daytime period. For comparative purposes the N70 counts from the base case are also included in this table. Other dwellings in Yandina Creek may also experience noise events of 70dB(A) that are less frequent than five events. There are no dwellings affected by N70 noise events in the evening or night-time periods in the 10 to 20 km band.

5.6.4.3 Visual impact of the airport

Aircraft within airspace 10 to 20 km from SCA generally operate at altitudes of around 1,500 feet (500 m) to 3,000 feet (1,000 m). At this altitude aircraft do not form a prominent feature of the view, though they are visible from the ground.

As described in **Section 5.6.4.1** the suburbs of Verrierdale, Yandina Creek, Marcus Beach, Peregian Beach and Weyba Downs are most likely to be overflowed by aircraft, therefore these suburbs will have the clearest view of aircraft operating in this area.

It can be generally assumed that the greater the distance from the airport, the higher aircraft will be and therefore the less visually prominent these aircraft are in views toward them.

5.6.5 Locations within 20 km to 40 km of the airport

New areas 20 km to 40 km from the airport would be overflowed by aircraft as they approach or depart the new runway.

5.6.5.1 Over flights

New flight paths associated with the new runway would see aircraft fly over the suburbs of Cooran, Pomona, Lake McDonald, Cooroy, Tinbeerwah, Eumundi, Boreen Point, Ringtail Creek, Cooroibah and Cootharaba.

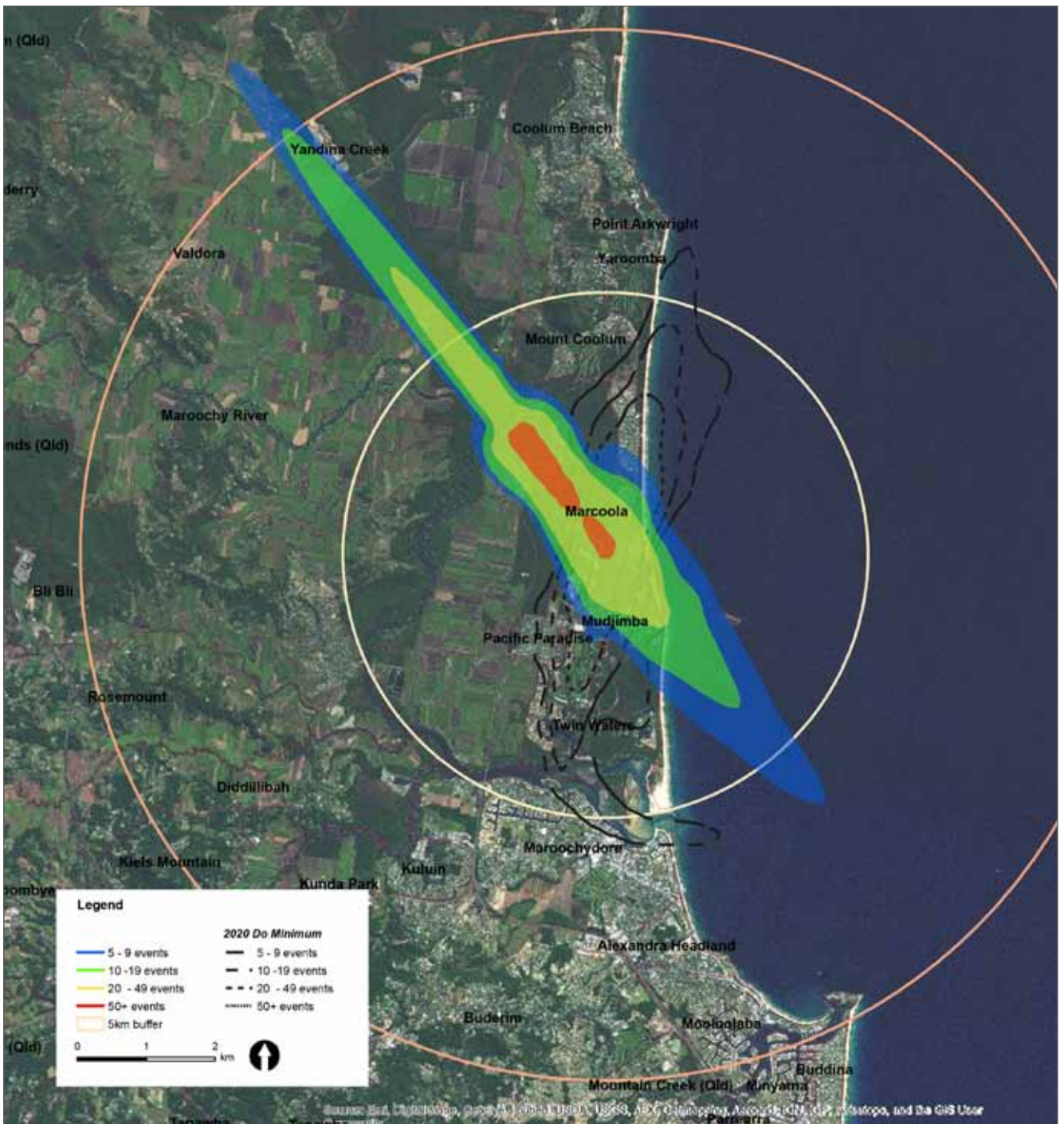
The new arrival paths would see aircraft cross the coastline at Noosa North Shore at an altitude of around 6,000 feet and further north near Lake Cootharaba at around 7,000 feet.

Table 5.6e: N70 comparison table – 2020 New Runway and 2020 Do Minimum (base case)

		N70 2020 NEW RUNWAY/2020 DO MINIMUM COMPARISON - SUMMER WEEKDAY DAY DWELLINGS WITHIN 5 – 10 KM OF SCA							
		N70 (5-9 events)		N70 (10-19 events)		N70 (20-49 events)		N70 (50+ events)	
Suburbs	Number of dwellings in suburb located within 5-10 km of SCA	NEW RUNWAY		NEW RUNWAY		NEW RUNWAY		NEW RUNWAY	
		% of dwellings	N70 (5-9 events)	% of dwellings	N70 (10-19 events)	% of dwellings	N70 (20-49 events)	% of dwellings	N70 (50+ events)
Maroochydore	6,400	DO MINIMUM		DO MINIMUM		DO MINIMUM		DO MINIMUM	
		% of dwellings	N70 (5-9 events)	% of dwellings	N70 (10-19 events)	% of dwellings	N70 (20-49 events)	% of dwellings	N70 (50+ events)
Yandina Creek	42	NEW RUNWAY		NEW RUNWAY		NEW RUNWAY		NEW RUNWAY	
		% of dwellings	N70 (5-9 events)	% of dwellings	N70 (10-19 events)	% of dwellings	N70 (20-49 events)	% of dwellings	N70 (50+ events)
TOTALS	6,442	NEW RUNWAY		NEW RUNWAY		NEW RUNWAY		NEW RUNWAY	
		% of dwellings	N70 (5-9 events)	% of dwellings	N70 (10-19 events)	% of dwellings	N70 (20-49 events)	% of dwellings	N70 (50+ events)
Totals New Runway		Totals Do Minimum		Difference in dwellings affected					

Note: This data reports on dwellings that will receive five or more N70 noise events during the specified period. Dwellings outside these contours may still hear aircraft noise but it will be at lower decibel level than 70 dB(A) and will be less frequent than five events during a summer weekday day. Dwellings within these contours may also experience noise events of greater than 70dB(A).

Figure 5.6i: N70 contours – New Runway (2020) summer weekday day (7:00am – 6:00pm)



These aircraft would join an arrival path around Cooroibah at approximately 5,000 feet. These aircraft would join the final approach path in the vicinity of Cooroy Mountain at a height of around 3,500 feet before tracking north of the town of Eumundi on approach to the airport.

5.6.5.2 N70 contour

70dB(A) noise events do not extend into areas 20 to 40 kilometres from SCA.

5.6.5.3 Visual impact of the airport

Aircraft within airspace 20 to 40 km from SCA generally operate at altitudes of around 3,000 feet (1,000 m) to 6,000 feet (2,000 m). At this altitude aircraft are difficult to see from the ground and are not a prominent feature of the view.

Table 5.6f: N70 comparison table - 2020 New Runway and 2020 Do Minimum (base case)

N70 2020 NEW RUNWAY/2020 DO MINIMUM COMPARISON - SUMMER WEEKDAY DAY DWELLINGS WITHIN 10 - 20 KM OF SCA										
Suburbs	Number of dwellings in suburb located within 10-20 km of SCA	N70 (5-9 events)		N70 (10-19 events)		N70 (20-49 events)		N70 (50+ events)		
		DO MINUMIM	NEW RUNWAY	DO MINUMIM	NEW RUNWAY	DO MINUMIM	NEW RUNWAY	DO MINUMIM	NEW RUNWAY	DO MINUMIM
Yandina Creek	217	% of dwellings	5%	0%	0%	0%	0%	0%	0%	0%
		N70 (5-9 events)	11	0	0	0	0	0	0	0
TOTALS	217	% of dwellings	5%	0%	0%	0%	0%	0%	0%	0%
		N70 (5-9 events)	11	0	0	0	0	0	0	0
Difference in dwellings affected									12	12
Totals New Runway									12	12
Totals Do Minimum									0	0

Note: This data reports on dwellings that will receive five or more N70 noise events during the specified period. Dwellings outside these contours may still hear aircraft noise but it will be at lower decibel level than 70 dB(A) and will be less frequent than five events during a summer weekday day. Dwellings within these contours may also experience noise events of greater than 70dB(A).

5.6.6 Other airspace users

Chapter D2 – Airspace Architecture and Modes of Operation, describes the changes to airspace in detail. The change in runway alignment and the predicted amount of traffic into the future requires a change not only to flight paths, but also to the airspace classification around SCA. This change of airspace classification would result in more restricted airspace around SCA which may impact other users. This may include commercial, training and recreational general aviation activities conducted from SCA, Caloundra Airport, Teewah airstrip and Noosa airstrip. These aircraft would require air traffic control clearance to access certain areas that were previously unrestricted airspace.

Recreational activities within new areas of controlled airspace, such as skydiving, would experience greater restriction and procedural controls as a result of the newly classified airspace and a changed traffic environment.

Gliding and hang gliding activities on the Blackall Range between Gympie and Cooroy would also be affected by the new airspace classifications.

5.6.7 Do minimum

The ‘Do Minimum’ scenario explored in this EIS looks at 2020 and 2040 if the existing 18/36 runway was to remain the main runway with a minimal upgrade to infrastructure to ensure current services could continue (such as runway widening). The do minimum cases assume the existing runways continue to operate under the same procedures as they currently do and that the necessary actions would be taken to permit the continued use of RWY 18/36 for classes of aircraft that currently operate on this runway.

From a social perspective, the Do Minimum options see the 2012 N70 contours grow as more traffic utilises the airport over time. Suburbs to the north and south of the 18/36 runway would continue to be overflown by aircraft on approach and departure from the airport. **Figure 5.6j** shows the predicted growth of the N70 (five to nine events on a summer weekday day) from 2012 to 2040.

If the do minimum option was adopted and the current main runway alignment (18/36) retained, by 2040 60 per cent more dwellings would be impacted by N70 (five to nine events).

Table 5.6g provides detail regarding the number of dwellings located within the N70 (five to nine event) contour for each time period.

5.6.8 Impact summary

Changing the orientation of the main runway at SCA from 18/36 to 13/31 would result in a number of social impacts and benefits. Some suburbs would experience a decrease in the number of over flights and associated aircraft noise. Some suburbs would experience a change in the intensity and location of over flights within the suburb, while other suburbs would be exposed to new over flights and new noise impacts.

5.6.8.1 Over flights

Suburbs that would experience a reduction in over flights when the new runway is operational include:

- Buddina
- Buderim
- Maroochydore
- Minyama
- Mooloolaba
- Mountain Creek
- Mt Coolum
- Pacific Paradise
- Sippy Downs
- Twin Waters
- Warana
- Yaroomba.

Suburbs that would experience a change intensity/location of over flights when the new runway is operational include:

- Marcoola
- Mudjimba.

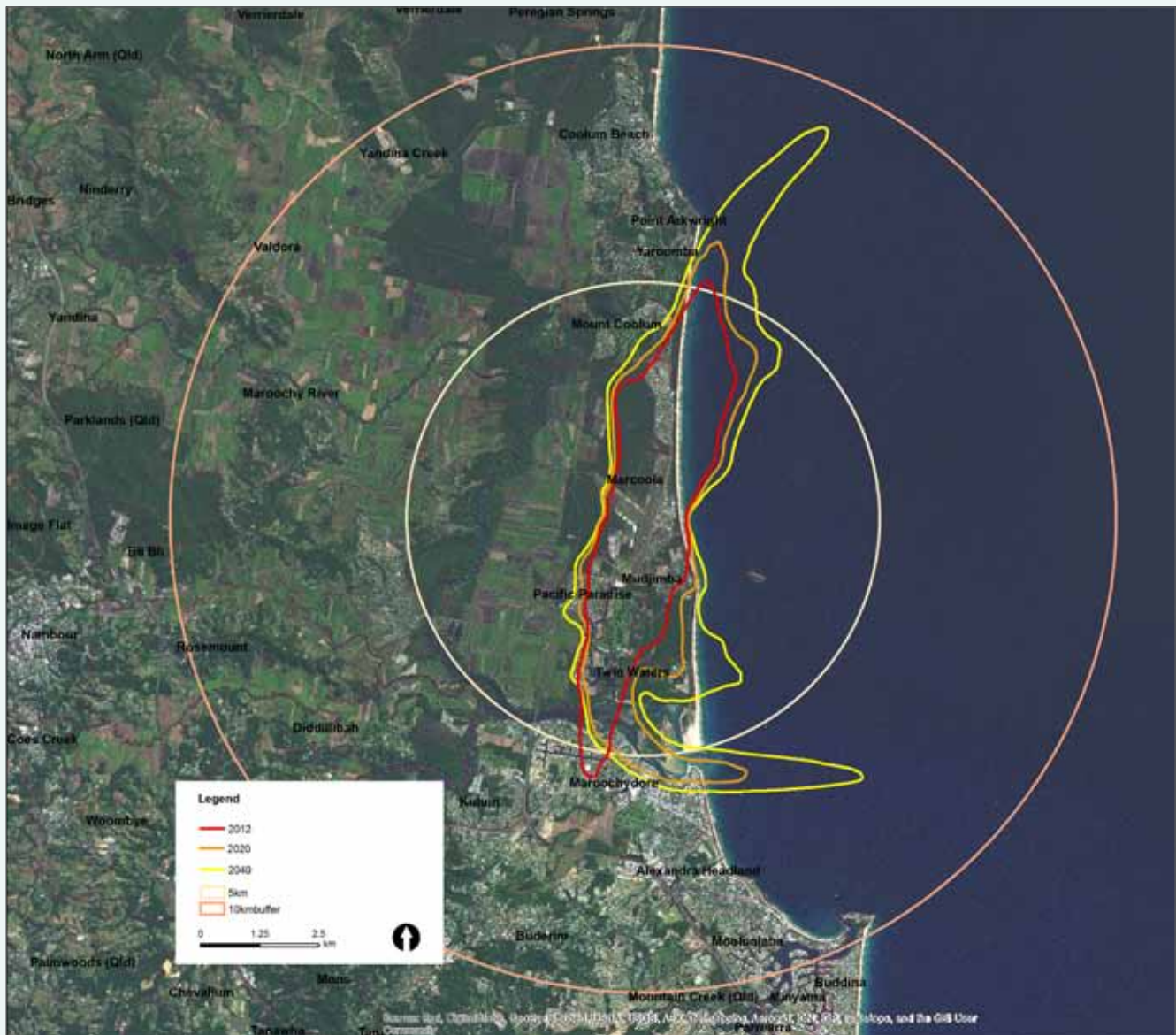
Suburbs that would experience new over flights when the new runway is operational include:

- Bli Bli
- Boreen Point
- Cooroibah
- Cooroy

Table 5.6g: Growth of N70 (5 or more) events over time (summer week day day) – 2012, 2020, 2040

Year	No. of dwellings within N70 (5-9 events) on a summer weekday day	Percentage change
2012	4,388	-
2020	5,347	21 per cent increase on 2012 dwelling numbers
2040	6,883	28 per cent increase on 2020 dwelling numbers

Figure 5.6j: Growth of the N70 for Do Minimum (five or more events on a summer weekday day) – 2012, 2020 and 2040



- Cootharaba
- Eumundi
- Lake McDonald
- Marcus Beach
- Maroochy River
- Peregian Beach
- Pomona
- Ringtail Creek
- Tinbeerwah
- Verrierdale
- Weyba Downs (inc. Lake Weyba)
- Yandina Creek (some dwellings would also experience new N70 events in this suburb).

5.6.8.2 N70

Overall, there would be fewer dwellings impacted by N70 aircraft noise (using the example summer weekday day and evening example).

In the 2020 base case, 5,347 dwellings in the vicinity of SCA are impacted by five or more 70dB(A) or more noise events on a summer weekday day.

Once the new runway is operational (2020 New Runway case) the number of dwellings impacted by N70 noise events on a summer weekday day drops to 1,825. By 2040 this would grow marginally to 1,875 dwellings as additional traffic utilises the airport.

If the new runway was not implemented and the existing 18/36 runway was to remain the main runway, by 2040 some 6,883 dwellings would be impacted by five or more N70 noise events on a summer weekday day.

Table 5.6h provides details of the difference between Do Minimum and New Runway options at 2020 and 2040.

5.6.8.3 ANEC

As discussed in Chapter B2 – Land Use and Tenure, the ANEF/ANEC is a tool used for land use planning to manage the future development potential of land located within ANEF/ANEC contours. The ANEF/ANEC contour does not affect existing land uses.

Table 5.6i provides a summary of the ANEC dwelling counts for each contour band for the different runway scenarios (Do Minimum and New Runway 2020 and 2040) based on the forecasts described in Chapter D2 – Airspace Architecture and Modes of Operation.

As also explained in Chapter D3 – Aircraft Noise, Section 3.7.2, there are a number of changes that have occurred since the ANEF was produced in the planning scheme that result in a different ANEC for the new runway.

1,560 dwellings sit within the ANEF/ANEC 20 or more contour in the 2020 Do Minimum scenario. At 2020 with the new runway:

- 522 dwellings are removed from the ANEF 20 or more contour
- 516 dwellings remain within the ANEF 20 or more contour
- 130 dwellings in Mudjimba are newly included in the ANEF 20-25 contour.

Overall, at 2020 there are 392 fewer dwellings within the ANEF 20 or more with the new runway in place.

2025 dwellings sit within the ANEF 20 or more contour in the 2040 Do Minimum scenario. At 2040 with the new runway:

- 51 dwellings in Mudjimba are newly included in the ANEF 25-30 contour
- 926 dwellings are removed from the ANEF 20 or more contour
- 173 dwellings remain within the ANEF 20 or more contour
- 335 dwellings in Mudjimba are newly included in the ANEF 20-25 contour.

Overall, at 2040 there are 540 fewer dwellings within the ANEF 20 or more with the new runway in place.

Overall, changing the runway location would result in fewer people being located in areas covered by the ANEF/ANEC contour who may be ‘seriously’ or ‘moderately’ affected by airport related noise (as described in **Section 5.4.1**).

5.6.9 Impact discussion

As described in **Section 5.2**, social impacts from SCA airspace changes on affected populations will be discussed in the context of how people live their lives on a daily basis, their interaction within the community, their social environment and their health and well-being. As required by the TOR this discussion will focus on vulnerable groups, sensitive community facilities, effects of noise on amenity including outdoor activities and other relevant health related effects such as sleep, annoyance and physical and psychological health.

This section draws upon the literature on aircraft noise and health to provide context and scientific basis to the discussion.

Table 5.6h: Difference between 2020 and 2040 Do minimum and 2020 New Runway N70 (five or more events) summer weekday day

Suburb	Difference between 2020 Do minimum and 2020 New Runway	Difference between 2040 Do minimum and 2040 New Runway
Bli Bli	1 additional dwelling impacted	1 additional dwelling impacted
Marcoola	678 fewer dwellings impacted	713 fewer dwellings impacted
Maroochydore	1,158 fewer dwellings impacted	2,056 fewer dwellings impacted
Mt Coolum	246 fewer dwellings impacted	518 fewer dwellings impacted
Mudjimba	181 fewer dwellings impacted	114 fewer dwellings impacted
Pacific Paradise	475 fewer dwellings impacted	698 fewer dwellings impacted
Twin Waters	788 fewer dwellings impacted	1,170 fewer dwellings impacted
Yandina Creek	8 additional dwellings impacted	26 additional dwellings impacted
Yaroomba	5 fewer dwellings impacted	43 fewer dwellings impacted
Reduced impact	3,531 fewer dwellings impacted	5,312 fewer dwellings impacted
Additional impact	9 additional dwellings impacted	27 additional dwellings impacted

Table 5.6i: Number of dwellings within ANEC contours for different runway scenarios

ANEF/ ANEC contour	2020 (Do minimum)	2020 (new runway)	2040 (Do minimum)	2040 (new Runway)
20 – 25	1,162	879	1,510	926
25 – 30	320	230	430	559
30 – 35	67	46	85	0
35 – 40	11	13	0	0
Total dwellings within ANEF/ANEC contour 20 or more	1,560	1,168	2,025	1,485

5.6.9.1 Literature of aircraft noise and health

The scientific literature on aircraft noise and health is mainly published in peer-reviewed journals and involves epidemiological studies on the linkages between noise exposure and adverse effects. It is outside the scope of this SIA to review individual studies, and for this reason, literature reviews already undertaken by reputable authors have been referenced:

- Berglund and Lindvist for World Health Organisation, Guidelines for Community Noise, 1999.
- Lex Brown for Brisbane Airport Corporation New Runway Project EIS, Health Impact Assessment (Noise), 2006.
- enHealth Council a subcommittee of the National Public Health Partnership (multi-sectoral and intergovernmental), The health effects of environmental noise- other than hearing loss, 2004.
- Jones for the UK Civil Aviation Authority, ERCD Report 0907, Environmental Noise and Health: A Review, 2010.

Given the noise generated by aircraft at SCA will not be at a level, frequency, or exposure length to cause physical damage to hearing, the most relevant health effects are indirect and are often triggered by effects on people's quality of life, health and well-being or social environment.

As shown, stress and cardiovascular disease are often aggravated by annoyance. This means that factors such as frequent interruptions to daily activities or negative attitudes to overflying planes have the potential to result in annoyance and if not mitigated can lead to medical conditions in chronically annoyed individuals. As outlined in **Section 5.3**, government and airport planning controls seek to limit the number of people exposed to noise at a level that would cause annoyance or any physiological effects.

It should also be noted that the strength of scientific evidence supporting a pathway between exposure and manifest disorders is variable. Whilst there is sufficient evidence supporting the association between noise exposure levels and annoyance or night-time sleeplessness for example, the evidence linking exposure levels with cardiovascular disorders is weaker and less conclusive (Brown, 2006; WHO, 1999; Jones, 2010; enHealth Council, 2004). Further to this, studies on large airports or on chronic levels of noise exposure may not be directly relevant to smaller airports such as SCA.

5.6.9.2 Vulnerable populations

Noise is generally defined as unwanted sound (World Health Organisation, 1999). Individuals also respond to sound and noise differently and there can be large variations in these responses. It is for this reason that the average or majority response by a population is used to determine noise thresholds (see **Section 5.4**).

There is however, a small segment within the population that is particularly noise sensitive or vulnerable to new or increased noise exposure levels. The World Health Organisation (1999) notes these same people are often underrepresented in socio-acoustic studies on noise exposure. These people include (WHO,1999; Brown, 2006):

- Infants and children
- The aged
- People with mental or physical medical conditions
- People with hearing or speech challenges
- Shift workers.

These people may be more vulnerable to noise exposure depending on the nature of their condition or circumstance. For example, people with hearing impairments may be most vulnerable to speech interference. People with depression or anxiety issues may experience increased effects due to fear of accidents from overflying planes. Or shift workers may be more sensitive to daytime and evening noise events.

Vulnerable people may be less able to cope with noise exposure and therefore may be at greater risk of harmful effects (World Health Organisation, 1999). Sensitive community facilities such as schools, child care centres, hospitals and nursing homes are mostly used by noise sensitive segments of the population.

There have been a number of studies (mainly laboratory) conducted on the effects of noisy environments on children and workers (WHO, 1999, enHealth Council, 2004).

These studies have found noise is a distracting stimulus and can in chronic exposure cases adversely impact cognitive tasks. According to the WHO Guidelines (1999) reading, attention, problem solving and memorisation are among the cognitive effects most strongly affected by noise. Schools are of particular concern due to the potential detrimental effects of noisy environments on cognitive development (Jones, 2010; WHO, 1999; Brown, 2006).

Section 5.6.2.5 in this chapter describes the community facilities that would no longer sit within an N70 (5-9) contour and those that would be exposed to new or increased noise.

5.6.10 Effects of aircraft noise

5.6.10.1 Interference with daily activities

According to the WHO Guidelines (1999) the effects of community noise (such as aircraft and road transportation) depends on the extent to which it interferes with different activities. They state that in the context of aircraft noise interference with rest, recreation and watching television are the most important issues.

The N70 noise contour was adopted by the Australian Government as the threshold for interference with speech communication and can be used as a proxy for determining dwellings that may be affected by noise related disturbance (see for example Brown, 2006).

People who live in areas that are predicted to experience noise events of more than 70dB(A) may experience the following:

- Use of dwellings – people who experience N70 noise events may change the way they use their dwelling, such as keeping windows closed or not using outdoor living spaces
- Television and radio watching – people who are watching television or listening to the radio may need to turn these devices up to hear them during a N70 noise event
- Speech disturbance – Conversations may be interrupted by an N70 noise event. People may have to talk louder or cease talking/listening until the aircraft has passed overhead.

Table 5.6b in this chapter quantifies the number of dwellings that would be exposed to N70 noise events under the 2020 and 2040 do minimum and new runway scenarios.

5.6.10.2 Outdoor activities and community interaction

People's connection to their community comes from their interaction with neighbours and other people in their local environment. This can occur at home through interaction with neighbours or at local facilities such as shopping areas, schools or other community facilities. The impact of excessive noise on certain sections of the community has the potential to change the way that people utilise their outdoor living spaces, reducing incidental interactions with neighbours where people aren't outside as frequently. This may result in some people being or feeling less connected to their local community.

In relation to the social environment and community interaction, according to the WHO Guidelines (1999), there is potential for noise above 80dBA to have a range of social behaviour impacts such as reducing community interaction and increasing aggressive behaviour. However, the WHO notes that this is still subject to further research.

5.6.10.3 Rest and sleep

Disturbance of night-time sleep has attracted numerous epidemiological studies in the literature. Adequate sleep is well recognised as essential for physical and mental performance and functioning (World Health Organisation, 1999). Noise has both a primary and secondary effect on sleep. According to the WHO Guidelines, primary effects may include:

- Difficulty in falling asleep
- Awakenings and alterations of sleep stages or depth
- Increased blood pressure, heart rate and finger pulse amplitude
- Vasoconstriction
- Changes in respiration
- Cardiac arrhythmia
- Increased body movements.

The secondary, or after-effects, the following morning or day(s) may include:

- Reduced perceived sleep quality
- Increased fatigue
- Depressed mood or well-being
- Decreased performance.

According to Jones (2010) there is a general consensus in the scientific literature that above a certain threshold, environmental noise can induce sleep state changes and cause awakening, however what this threshold is remains controversial. The EnHealth Council (2004) states this threshold may be 45 dB(A) LA_{max} more than 10 or 15 times per night.

SCA is not forecast to have night-time flights (between 10:00pm and 7:00am) of fixed wing aircraft until 2040, therefore disturbance of night-time rest is not relevant. At 2040 it is forecast that there may be flight/s between 6:00am and 7:00am which fall into the night-time period. The operation of fixed wing aircraft on the new runway will therefore not disturb sleep between the hours of 10:00pm and 7:00am until at least 2040 based on the forecast flight schedule used for this EIS.

Noise sensitive people who live close to the airport and are sleeping outside of these hours, such as infants and children, shift workers or people who go to bed prior to 10:00pm may have their day time sleep disturbed by the operation of aircraft.

5.6.10.4 Effects on levels of annoyance

Annoyance relates to the perception or belief that one is being “avoidably harmed” (Jones, 2010). The term refers to a collection of negative emotional responses to noise that include fear, withdrawal, anger or dissatisfaction (Brown, 2006). Social, psychological or economic factors can influence an individual’s response to noise exposure and determine their level of annoyance (World Health Organisation, 1999). The socio-acoustical study undertaken to inform the creation of the ANEF found that the person’s attitudes towards the aviation industry, personal sensitivity to noise and fear of aircraft crashing were important factors in relation to the extent to which a person will be affected by a given amount of aircraft noise. Demographic variables such as age, sex, occupation and education were found to be of generally minor importance in explaining people’s subjective reaction to noise. Chronic annoyance when not mitigated may result in stress or manifest disorders over time.

According to Jones (2010), there is agreement in the scientific literature that there is sufficient evidence for environmental noise (and specifically aircraft noise) causing annoyance in those exposed to certain thresholds. The N70 and ANEF contours set the Australian standard for noise as described in earlier sections. Noting that some people, particularly those with noise sensitivity, may still experience annoyance at or below this threshold.

In their review of the scientific literature on exposure-effect of annoyance for the Brisbane Airport New Runway Project, Brown (2006) developed a summary table identifying the percentage of the population that would be annoyed (A) or highly annoyed (HA) at various noise levels. These values include:

- ANEC 8 = 11 per cent A and 1 per cent HA
- ANEC 18 = 28 per cent A and 10 per cent HA
- ANEC 38 = 73 per cent A and 49 per cent HA.

Table 5.6b in this chapter provides a comparison of ANEC contours for 2020 and 2040 for the do minimum and new runway.

5.6.10.5 Effects on physical and mental health

Cardiovascular and physiological effects of noise involve an increase in heart rate, blood pressure and vascular constriction within the automatic nervous system and the endocrine system. Temporary noise exposure may cause a short term reversible effect, whereas chronic exposure can result in stress on the physiologic system and lead to a threshold shift that increases cardiovascular risk factors (Brown, 2006).

Mental health effects of noise exposure are related to effects on people with pre-existing conditions such as depression and anxiety who may be more sensitive to the effects of exposure. Noise exposure has not been shown to directly cause mental illness (Brown, 2006; WHO, 1999).

The EnHealth Council (2004) observes that whilst there have been a number of studies of the effects of environmental noise on cardiovascular health, the majority of these studies have been conducted in occupational settings with very high noise exposure levels. Therefore these findings may not be directly applicable to the airport context.

There is general agreement in the scientific literature that the evidence supporting an association between aircraft noise exposure and adverse physical and mental health effects is mixed, weak or inconclusive and that further research is required in this area (WHO, 1999, Jones, 2010, Brown, 2006). For this reason, no agreed threshold values have been established for when noise exposure levels can cause chronic disease.

5.7 CONSISTENCY WITH AVIATION POLICY

The change in runway direction is consistent with the policy context and legislative framework discussed in Section 5.3. By reducing the number of dwellings that would be affected by aircraft noise, SCA is reducing noise impacts on communities in the vicinity of the airport, enhancing the safety of the airport, improving the viability of the airport and protecting the potential for the future growth of aviation operations at SCA.

5.8 MITIGATION

Changing the alignment of the main runway at SCA to 13/31 results in a significant reduction of the number of dwellings impacted by aircraft noise, therefore mitigating the impact of aircraft related noise associated with SCA. This section discusses mitigation measures that would reduce residual social impacts.

5.8.1 Current mitigation practices

SCA currently has the following mitigation measures in place to manage noise associated with the airport:

- **Fly Neighbourly Policy** – As discussed in Chapter B13 – Social Impact, SCA has in place a Fly Neighbourly Policy.
- **Hands on approach to addressing noise complaints** – SCA works with its aviation tenants to minimise noise as much as possible. When noise complaints are made these are investigated by SCA, enabling the airport to work closely with its tenants to resolve issues
- **Relocation of helicopter operations** – As described in **Section 5.5.1.1** SCA has already moved a majority of helicopter operations after 4:00pm west to reduce noise impacts on local residents. Helicopter operations to be relocated to the western GA area progressively after 2021 when hangar leases start to expire

- **Community and Aviation Forum** – Meets quarterly with the purpose of enhancing co-operation and understanding between the airport community and the general community by providing a forum for dissemination of information. Current membership includes:
 - Buderim 2000
 - Coolum Development Watch
 - Coolum Residents Association
 - East-West Runway Action Group (ERWAG)
 - Marcoola Progress Association
 - Mudjumba Residents Association
 - Twin Waters Residents Association
 - Sunshine Coast Council Division 8 and 9 Councillors, Aviation Portfolio Councillor
 - Airservices Australia
 - Aviation Industry representatives
 - SCA management team
 - Ad hoc invitees as determined by the agenda for each meeting.

These activities will continue independent of the Project progressing.

5.8.2 Mitigation inherent in the design

Mitigation for social impact is inherent in the design through:

- **Runway alignment** – Alignment of the new main runway reduces the number of dwellings impacted by N70 events and the ANEF/C
- **Flight paths** – Flight paths associated with new runway alignment have been designed to limit social impacts as much as possible (see Chapter D2 – Airspace Architecture)
- **Project design** – The Project has largely been contained within the airport boundary to limit direct impacts on adjacent properties.

5.8.3 Additional mitigation measures

To further manage potential social impacts associated with the Project:

- **Runway mode of operation** - Design of the preferred runway mode of operation to take noise impacts into consideration.
- **Airspace Management Plan** – The Airspace Management Plan contained in this EIS (see Chapter E5) outlines SCA's approach to managing the airspace in the vicinity of SCA.
- **ANEF/C** - Amendments to the Sunshine Coast Council Planning Scheme to include up to date planning controls for new runway layout and associated flight paths (see Chapter B2 – Land Use and Tenure)
- **Community and Aviation Forum** – Membership of the Community and Aviation Forum will be expanded to include representatives of newly affected areas.
- **Community engagement** – SCA will maintain a dialogue with its neighbours in the lead up to and post new runway opening. The aim of this engagement is to discuss potential changes prior to the opening of the runway and to address any issues that may arise from the new operational modes.

5.9 CONCLUSION

Changing the runway alignment at SCA to 13/31 significantly reduces the number of dwellings affected by aircraft noise. This includes a:

- 73 per cent reduction (5,285 fewer dwellings) in the number of dwellings impacted by frequent noise events (five or more events 70dB(A) noise events on a summer weekday day)
- 27 per cent reduction (540 fewer dwellings) in the in the SCA's ANEF/ANEC 20 or more contour.

By reducing the number of dwellings, and therefore the number of people, exposed to aircraft noise, the potential for social impact as a result of airport operations is also significantly reduced.

With the new runway, there are a number of dwellings in the vicinity of SCA that would be affected by changes in the ANEF/ANEC contour (as described in Chapter D3, Section 3.7.2). Most notably, there are a number of dwellings in Mudjimba that will be newly included in the ANEF/ANEC. There are also a number of dwellings in Marcoola, Mudjimba and Twin Waters that are removed from the ANEF/ANEC. Overall, at 2040 there are 540 fewer dwellings within the ANEF 20 or more with the new runway in place.

There are a small number of dwellings (9 dwellings at 2020 and 27 dwellings at 2040) that will experience new N70 (5-59 event) noise. There are also locations within the suburb of Mudjimba that will experience a change in the frequency and sound level of aircraft movements.

Areas outside of the N70 and ANEF contours described in this chapter may still hear and see aircraft operating in the vicinity of SCA. New flight paths associated with the new runway would see aircraft fly in places that are not currently used by aircraft. Areas that are directly overflowed by aircraft are most likely to see and hear these aircraft. Some people will consider themselves to be affected by aircraft noise even though their dwellings are not located within these noise contours. Changes to airspace in the vicinity of SCA to accommodate new flight paths may also impact other airspace users, such as recreational pilots.

Overall, changing runway alignment at SCA to 13/31 significantly reduces the potential for social impacts associated with the operation of SCA.

A summary impact assessment table is shown as **Table 5.9a**.

Table 5.9a: Impact assessment table

Item	Mitigation inherent in the design	Initial assessment with mitigation inherent in the preliminary design in place			Additional mitigation measured proposed	Residual assessment with additional mitigation in place		
		Significance of impact	Likelihood of impact	Risk rating		Significance of impact	Likelihood of impact	Residual risk rating
Number of dwellings in ANEF/ ANEC contours	<ul style="list-style-type: none"> New runway alignment reduces the overall number of dwellings located within the ANEF/ ANEC 20 or more contours of dwellings. 	Beneficial	Almost Certain	Beneficial	n/a	Beneficial	Almost Certain	Beneficial
	<ul style="list-style-type: none"> Dwellings in Mudjimba newly included in ANEF/ ANEC contour – SCC has required dwellings located in ANEC for new runway to incorporate noise attenuation - enforced through Planning Scheme. 	Moderate	Almost Certain	High	ANEF/ ANEC overlay to be updated in the Planning Scheme.	Moderate	Likely	Medium
Number of dwellings newly affected by N70 noise events	<ul style="list-style-type: none"> New runway alignment reduces the number of dwellings impacted by N70 events. 	Beneficial	Almost Certain	Beneficial	n/a	Beneficial	Almost Certain	Beneficial
Number of community facilities impacts by frequent N70 noise events	<ul style="list-style-type: none"> Very few community facilities newly impacted or impacted through increased intensity. 	Minor	Possible	Low	n/a	Minor	Possible	Low
Number of dwellings affected by noise events of more than 70 dB(A)	<ul style="list-style-type: none"> New runway alignment reduces the overall number of dwellings that will receive noise events greater than 70dB(A). 	Beneficial	Almost Certain	Beneficial	n/a	Beneficial	Almost Certain	Beneficial
By aircraft	<ul style="list-style-type: none"> New runway alignment will result in a change to flight paths for aircraft arriving and departing SCA. 	Minor	Possible	Low	n/a	Minor	Likely	Low
Health impacts	<ul style="list-style-type: none"> New runway alignment reduces overall number of dwellings that will receive noise events greater than 70dB(A). 	Minor	Possible	Low	n/a	Minor	Likely	Low

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