December 2020

SAFETY CASE

CLOSURE OF CROSS RUNWAY 16/34 KEMPSEY AIRPORT

Prepared for Kempsey Shire Council

AVIATION PROJECTS

AVIATION PROJECTS

DOCUMENT CONTROL

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GLOSSARY

AEST	Australian Eastern Standard Time
ANEF	Australian Noise Exposure Forecast
ARFFS	aerodrome rescue and firefighting service
ATSB	Australian Transport Safety Bureau, Australia's national transport safety investigator
BoM	Bureau of Meteorology (Australia)
CASA	Civil Aviation Safety Authority, Australia's principal aviation regulator
CASR	Civil Aviation Safety Regulations 1998
ERSA	En Route Supplement Australia (part of Aeronautical Information Package)
FIFO	fly-in fly-out
GA	general aviation
ICAO	International Civil Aviation Organization
ILS	instrument landing system
MOS	Manual of Standards
MTOW	maximum take-off weight
OLS	obstacle limitation surfaces
PANS-OPS	procedures for air navigation services-aircraft operations
RESA	runway end safety area
RPT	regular public transport

UNITS OF MEASUREMENT

ft	feet	(1 ft = 0.3048 m)
km	kilometres	(1 km = 0.5399 nm)
kt	knots	(1 kt = 1.85 km per hour)
m	metres	(1 m = 3.281 ft)
nm	nautical miles	(1 nm = 1.852 km)

EXECUTIVE SUMMARY

Introduction

Kempsey Shire Council (KSC or Council) operates Kempsey Airport, located to the west of the town of Kempsey in the New South Wales Mid North Coast.

Council wishes to close the cross runway 16/34 for several reasons and is therefore interested in understanding the safety impacts associated with its closure.

An image of the airport site relative to the town of Kempsey is shown in Figure 1 (source: Google Earth).

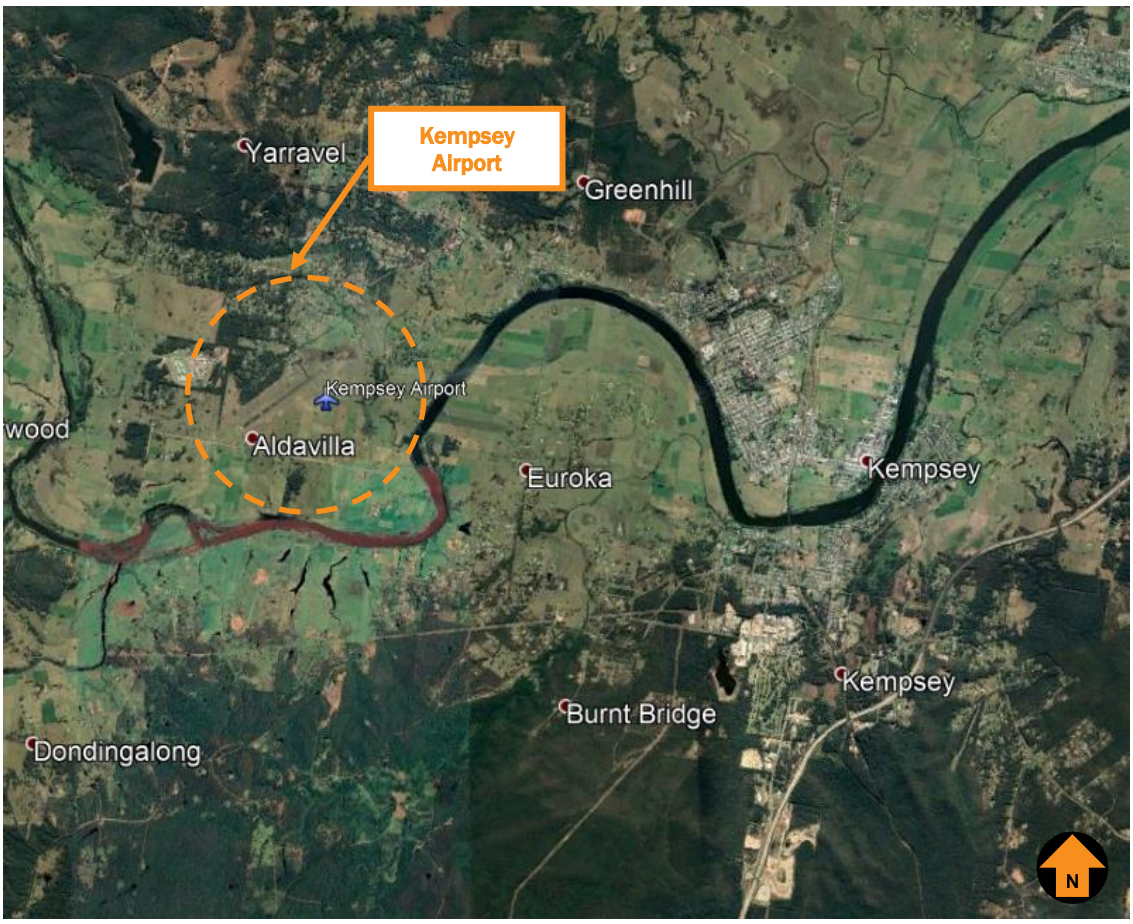

Figure 1 Kempsey Airport site

Conclusions

As a result of this study, Aviation Projects draws the following conclusions:

1. The threshold of runway 16 has been permanently displaced by 200 m to provide a 5% approach gradient clear of obstacles. This results in a landing distance of 414 m on runway 16, and a take-off distance with 5% gradient clear of obstacles of 414 m on runway 34. Full length is available for take-off on runway 16 and landing on runway 34.
2. Runway 16/34 has been unavailable following flood, heavy and prolonged rainfall events. No operational safety concerns were raised or recorded as a result of the closure of runway 16/34 due to flooding heavy or prolonged rainfall.
3. For the period 12 October 2017 through to 04 January 2021 (a total of 1181 days), the runway will have been unavailable for 764 days or 65% of the time.
4. In 2020, the runway has been available for only 16 days, between 1-16 January 2020.
5. Runway 16/34 is currently unavailable to night operations in any capacity other than as a taxiway (with portable lighting) or a helicopter final approach and take-off area
6. There are no regulatory requirements to retain runway 16/34 as a runway
7. There are no straight-in instrument approaches to runway 16/34, and aircraft do not land on runway 16/34 during instrument meteorological conditions or at night
8. Runway 16/34 offers practically the lowest usability value (74.4%) at the 10 kt limit applicable to code 1 and 2 aircraft for the reference period 2000–0900 UTC
9. Runway 04/22 does not meet International Civil Aviation Organization recommendations, as it is usable only 78.7% of the time, at the lowest nominated crosswind limit (10 kt) applicable to code 1 and 2 aircraft for the reference period 2000–0900 UTC
10. Runway usability for both runway orientations did not change for either runway during the full 24-hour period
11. Closing runway 16/34 will not significantly affect aerodrome usability or reduce aviation safety below an acceptable level from a crosswind limit perspective
12. Current aeronautical infrastructure (excluding runway 16/34) will provide sufficient capacity to support the number of current aircraft movements
13. New and improved fencing around the perimeter of Kempsey Airport would likely decrease the kangaroo hazard
14. Closure of runway 16/34 will likely reduce the potential for runway incursions
15. If runway 16/34 is closed, the option of returning the runway to operational service in the future will not be available unless airport safeguarding provisions are retained in applicable planning instruments. Substantial infrastructure works will also be required
16. If runway 16/34 is closed, an acceptable level of aviation safety can be maintained at Kempsey Airport. The safe decommissioning of the runway should be informed by preparation of a full and thorough risk management plan in consultation with applicable external stakeholders

Recommendations

As a result of this study, Aviation Projects makes the following recommendations:

1. Prior to closing runway 16/34, a full and thorough risk management plan should be prepared and implemented in consultation with applicable external and internal stakeholders
2. Prior to closing runway 16/34, consideration should be given to implementing a long- term strategy to improve the operational efficiency of aeronautical infrastructure according to anticipated growth in the scale and scope of the airport's operations.

1. INTRODUCTION

1.1. Project Description

KSC operates Kempsey Airport, located to the west of the town of Kempsey in the New South Wales Mid North Coast.

KSC wishes to close the cross runway 16/34 for several reasons and is therefore interested in understanding the safety impacts associated with its closure.

1.2. Purpose of task

KSC seeks to understand whether an acceptable level of aviation safety can be maintained at Kempsey Airport if runway 16/34 is closed.

Therefore, this safety case was commissioned to investigate regulatory requirements and technical provisions associated with this matter, with a view to:

1. Providing the information required to support future grant application for the wildlife fencing of 04/22 runway (ie grass runway needs to be closed in order to erect fencing)
2. Providing for potential future development opportunities at Kempsey Airport (for example Adventure Park, RFDS, etc).

1.3. Scope of work

The scope of work is to assess, in an aeronautical study, whether an acceptable level of safety can be maintained at Kempsey Airport if runway 16/34 is closed.

1.4. Methodology

In undertaking this task, the following activities were conducted:

1. confirm the scope and deliverables
2. conduct a site visit and meet applicable on-airport stakeholders (subject to COVID-19 travel restrictions)
3. consider other aspects as per the scope
4. formally correspond/engage with stakeholders as agreed by Council
5. undertake additional stakeholder consultation as required and agreed
6. provide a draft report for review
7. finalise the report after receiving formal feedback.

1.5. Stakeholders

Stakeholders consulted and/or considered in this assessment included:

- Australian International Aviation College (AIAC)
- Civil Aviation Safety Authority (CASA)
- Coffs City Sky Divers
- CareFlight Pty Ltd
- City and Country Charters
- Kempsey Flying Club
- Kempsey Shire Council
- Little Wings
- Local aircraft hangar tenants
- Macleay Aircraft Maintenance
- Mid Coast Flying (Flight School)
- Royal Flying Doctor Service (RFDS)
- Rural Fire Service.

1.6. Client material

Material provided by the Council for preparation of this assessment included:

- JASKO Airport Services Pty Ltd, Kempsey Airport 2019 Airport Safety Inspection, dated December 2019
- Kempsey Shire Council, Business Paper Item 9.1 Kempsey Airport Noise Management Plan & Fly Neighbourly Advice, dated 25 June 2019
- Kempsey Shire Council, Business Paper Item 9.2 Kempsey Airport Fly Neighbourly Advice, dated 17 December 2019
- Kempsey Shire Council, Kempsey Airport Fly Neighbourly Advice, version 3.0, dated 10 December 2019
- Kempsey Shire Council, Minutes of the Ordinary Meeting of Kempsey Shire Council, dated 17 December 2019
- The Airport Group, Noise Management Plan and Fly Neighbourly Advice, version 7.0, dated 12 June 2019.

2. PLANNING CONTEXT

2.1. Airport general description

Kempsey Airport (YKMP) is a certified aerodrome operated by KSC. The airport is used for a range of commercial and recreational purposes, such as aircraft maintenance, charter operations, pilot training, skydiving, a local flying club and general aviation, as well as medical and emergency services.

Kempsey Airport has two runways. The main runway 04/22 is 1643 m long and 30 m wide, published as a code 2 instrument non-precision runway. The secondary runway 16/34, the subject of this study, is 614 m long and 18 m wide, published as a code 1 non-instrument runway. Runway 16 threshold is displaced by 200 m.

The largest and most limiting aircraft that can use the airport at present are ATR-42-300, Bombardier Dash 8 (code 2C). Currently, the largest aircraft which operates to Kempsey Airport is Beechcraft Super King Air, Model 300C, operated by the RFDS.

There are no regular public transport (RPT) services to/from Kempsey Airport.

Figure 2 shows the airport site (source: Google Earth).

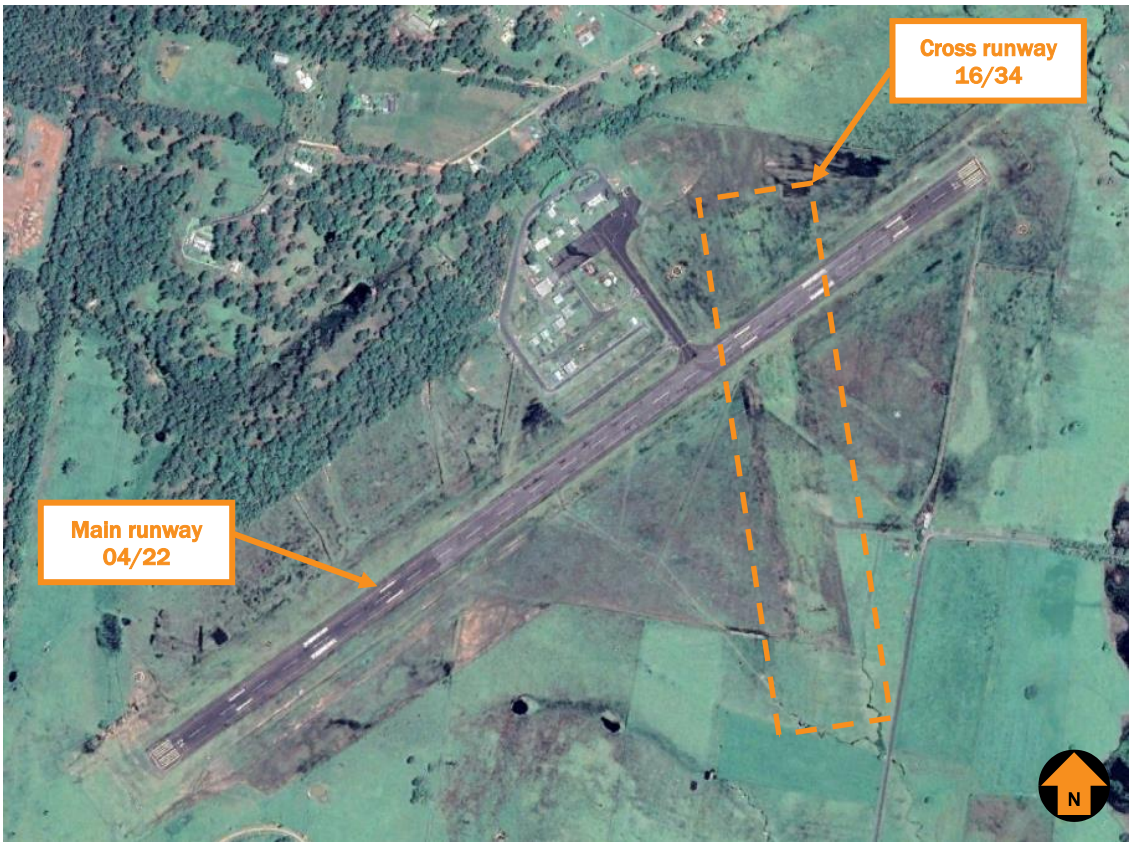

Figure 2 Site overview

2.2. ICAO Regulatory framework

The Civil Aviation Safety Authority (CASA) regulates aviation activities in Australia. Applicable requirements include the Civil Aviation Safety Regulations 1998 Part 139—*Aerodromes* (CASR 139), the associated Manuals of Standards Part 139—*Aerodromes* (MOS 139) and other guidance and advisory material.

Aerodrome physical infrastructure must conform to standards published in Manual of Standards *Part 139 (Aerodromes) Manual of Standards 2019* (MOS139) applicable to design aircraft characteristics.

2.3. Planning framework

Planning of the airport site is specifically regulated by the following instruments:

- Final Kempsey Airport Noise Management Plan and Fly Neighbourly Advice 2019
- Kempsey Local Environmental Plan 2013 version dated 2 October 2020.

Local Environmental Plans (LEPs) are prepared by Councils to guide planning decisions in their Local Government Areas and establish the requirements for the use and development of land. Through zoning and development controls they allow Councils to supervise the ways in which land is used. Section 7.7 Airspace Operations details the following with respect to operations at Kempsey Airport:

> *(1) The objectives of this clause are as follows—*
>
> *(a) to provide for the effective and ongoing operation of the Kempsey Airport by ensuring that its operation is not compromised by proposed development that penetrates the Limitation or Operations Surface for that airport,*
>
> *(b) to protect the community from undue risk from that operation.*
>
> *(2) If a development application is received and the consent authority is satisfied that the proposed development will penetrate the Limitation or Operations Surface, the consent authority must not grant development consent unless it has consulted with the relevant Commonwealth body about the application.*
>
> *(3) The consent authority may grant development consent for the development if the relevant Commonwealth body advises that—*
>
> *(a) the development will penetrate the Limitation or Operations Surface but it has no objection to its construction, or*
>
> *(b) the development will not penetrate the Limitation or Operations Surface.*
>
> *(4) The consent authority must not grant development consent for the development if the relevant Commonwealth body advises that the development will penetrate the Limitation or Operations Surface and should not be carried out.*
>
> *(5) In this clause—*
>
> ***Limitation or Operations Surface** means the Obstacle Limitation Surface or the Procedures for Air Navigation Services Operations Surface as shown on the Obstacle Limitation Surface Map or the Procedures for Air Navigation Services Operations Surface Map for the Kempsey Airport.*

> ***relevant Commonwealth body*** *means the body, under Commonwealth legislation, that is responsible for development approvals for development that penetrates the Limitation or Operations Surface for the Kempsey Airport.*

The *Horizon 2030 - Macleay Valley Economic Development and Tourism Strategy* is a blueprint for enhancing the vibrancy, diversity and sustainability of the Macleay Valley economy. Additionally, the *Local Strategic Planning Statement* (LSPS) sets the 20-year vision for land use planning. Both documents detail the timeline for the Kempsey Airport as below:

> *1.23. Following completion of the Kempsey Airport Noise Management Plan and Fly Neighbourly Advice, commission the preparation of a master plan to guide future development at Kempsey Airport.*

None of the applicable planning instruments referred to above prevents closing runway 16/34 and/or converting it to an alternative use; however, there may be conditions on lease or other documents not made available that may need to be considered when determining the future of the runway.

2.4. ICAO guidance

International Civil Aviation Organization (ICAO) Doc 9870 *Manual of the Prevention of Runway Incursions* is instructive. It defines a runway incursion as:

> *Any occurrence at an aerodrome involving the incorrect presence of an aircraft, vehicle or person on the protected area of a surface designated for the landing and take-off of aircraft.*

Under the heading 'Aerodrome Design Factors', ICAO notes:

> *2.6.1 Complex or inadequate aerodrome design significantly increases the probability of a runway incursion. The frequency of runway incursions has been shown in many studies to be related to the number of runway crossings and the characteristics of the aerodrome layout.*

Closing runway 16/34 will result in a reduction in aerodrome complexity and therefore a reduced potential for runway incursions.

2.5. Skybrary notes

Skybrary, an online resource funded by various aviation agencies including ICAO, the Flight Safety Foundation and Eurocontrol, provides guidance on the prevention of runway incursions. With respect to intersecting runway operations, it notes on the web page titled 'Intersecting Runway Operations':

> *Many airports have intersecting runways, often as a consequence of expansion but also to provide a minimal crosswind option where wind direction is variable. Although the use of both runways simultaneously may serve to increase flight efficiency, shorter approach tracks and taxi routes for example, there are significant inherent risks associated with simultaneous operation of intersecting runways; strict procedures must be in place to prevent a runway incursion.*
>
> *In terms of total throughput, using just one runway in mixed mode will in most cases provide a similar capacity to that which is possible with both runways operating, but with a substantially reduced potential for runway incursion incidents. (author's underlining)*

In *European Action Plan for the Prevention of Runway Incursions* Edition 1.0 dated 20 November 2017, Eurocontrol provided the following guidance:

- On a multi-runway system, including convergent or crossing runways, a particular attention should be given to taxiway design in order to avoid confusions between the runways. As far as practicable, two runways intersecting at one of their extremity should be clearly separated.
- Airfield design should avoid configurations including crossing a runway as a basic route for gaining access to another part of the aerodrome.
- Runways should not be designed to be used as occasional taxiways and vice versa.

Generally, it can be concluded that single or parallel runway layouts provide a higher level of aviation safety than intersecting runway layouts.

2.6. FAA guidance

The Federal Aviation Administration (FAA) provided guidance on the reduction of runway incursions in the booklet *Improving Runway Safety Airfield Configuration*. A number of layout considerations are provided. These considerations, along with a simple analysis of their applicability to the current layout at Kempsey Airport, are shown in Table 1.

Table 1 FAA guidance on aerodrome layout to prevent runway incursions

Consideration	*Notes*	*Applicability to Kempsey Airport*
Avoid layouts that include complex intersections	Not planned	No
Avoid layouts that result in closely spaced parallel runways	Not feasible at Kempsey Airport	No
Avoid layouts that require aircraft and vehicles to cross runways	Mitigated with all-weather perimeter road. Consider during planning for parallel taxiway	No
Avoid layouts that require aircraft taxiing for take-off to cross the active runway at an intermediate point to reach the approach end of the active runway	Consider during planning for parallel taxiway	Yes
Avoid layouts that will result in aircraft taxiing or back taxiing on runways	Significant problem in current layout	Yes

The FAA also publishes a runway decommissioning checklist on the Airports/Runway and Taxiway Construction page of its website. This checklist, although applicable to the regulatory context of the United States of America, is informative of the scope and range of administrative and operational considerations applicable to the task of decommissioning a runway. If Council decides to close runway 16/34, the checklist would be a valuable reference in the preparation of a full and thorough risk management program.

2.7. Kempsey Airport master plan

Council plans to develop an Airport Master Plan for Kempsey Airport in financial year 2021/22.

2.8. Historical aeronautical demand

The Bureau of Infrastructure, Transport and Regional Economics (BITRE) provides statistics on aircraft and passenger movements in Australia.

A search of the BITRE' statistics in relation to aircraft movement at Kempsey Airport returned no information.

The historical aircraft movement data between 2013 and 2018 at Kempsey Airport is shown in the Noise Management Plan 2019 prepared by The Airport Group, refer to Figure 3 (source: The Airport Group).

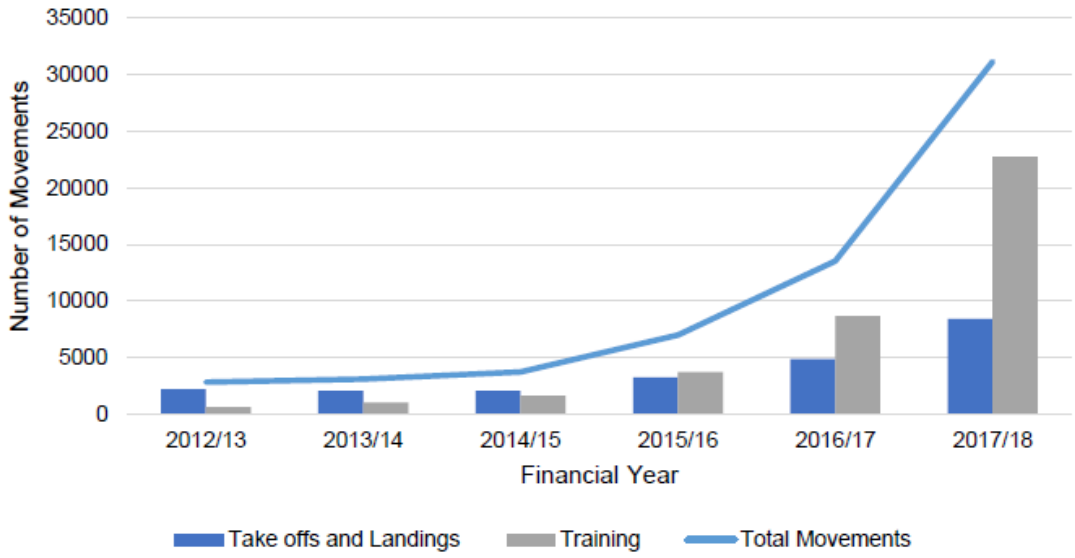

Figure 4: Historical aircraft movements at KPS by financial year (2013 to 2018)

Figure 3 Copy of Figure 5 from TAG Noise Management Plan 2019

KSC provided aircraft movement data for the period between 19 September 2019 and 30 September 2020 in relation to all aircraft movements, and for the last 2.5 financial years (01 July 2017 and 31 November 2020) for RFDS, other aeromedical, firefighting and rescue aircraft movements.

Table 2 provides a summary of aircraft total movement.

Table 2 Kempsey Airport aircraft movements

	17/18 FY	*18/19 FY*	*19/20 FY (July – November)*	*19 September 2019 - 30 September 2020*	*Total*
RFDS	126	100	30	69	325
Other aeromedical	52	138	44	119	353
Fire fighting	312	142	1154	2	1610
Rescue	62	30	10	43	145
Training/recreational	N/A	N/A	N/A	5367	5367
Other	N/A	N/A	N/A	942	942
Total	552	410	1238	6542	8742

2.9. Future aeronautical demand

The number of aircraft movements at Kempsey Airport has grown in recent years, primarily as a result of the ongoing growth and development in the flight training operations at the airport. Therefore, the future aeronautical demand is characterised by incremental growth of current aircraft movements.

3. AIRCRAFT OPERATIONS

3.1. Historical scope of operations

Kempsey Airport has been in operation since World War 2. In 2016, the airport was upgraded to make it suitable to become a full-service Aviation Business Park.

The primary use for the airport is for flight training, charter flights, general aviation users, aeromedical and aerial firefighting operations.

There are currently several aviation related business operating at the airport including AIAC, City and Country Charters, Coffs City Sky Divers, Kempsey Flying Club, and Macleay Aircraft Maintenance.

3.2. Current scope of operations

Aircraft operations at Kempsey Airport are characterised by the following types of aircraft and activities:

- Smaller turbo-prop and piston-engined aircraft conduct charter, other commercial and private operations to nearby regional airports as well as flight training and recreational flying (e.g., Cessna, PAC P-750 XSTOL, Beechcraft, Air Tractor, Diamond, Extra Flugzeugbau, GLASAIR, Mooney, Partenavia, Piper, Pitts Special, Robin, Pitts Special, Cirrus, Socata and Vans Aircraft)
- Small aircraft (including helicopters) operate to and from the airport for maintenance activities
- Small aircraft of emergency services operations (e.g, Beechcraft, AgustaWestland and Eurocopter).

3.3. Aerodrome circuit operations

Circuit operations at Kempsey Airport should follow the standard left-hand circuit directions.

All aircraft conducting circuits are required to climb to 1,000 ft above mean sea level (AMSL) prior to making a turn onto crosswind (except for those aircraft that operate at circuit heights lower than 1,000 ft).

Circuits below 500 ft AGL are not permitted.

Figure 4 shows a typical left-hand circuit for aircraft at Kempsey Airport (source: AsA).

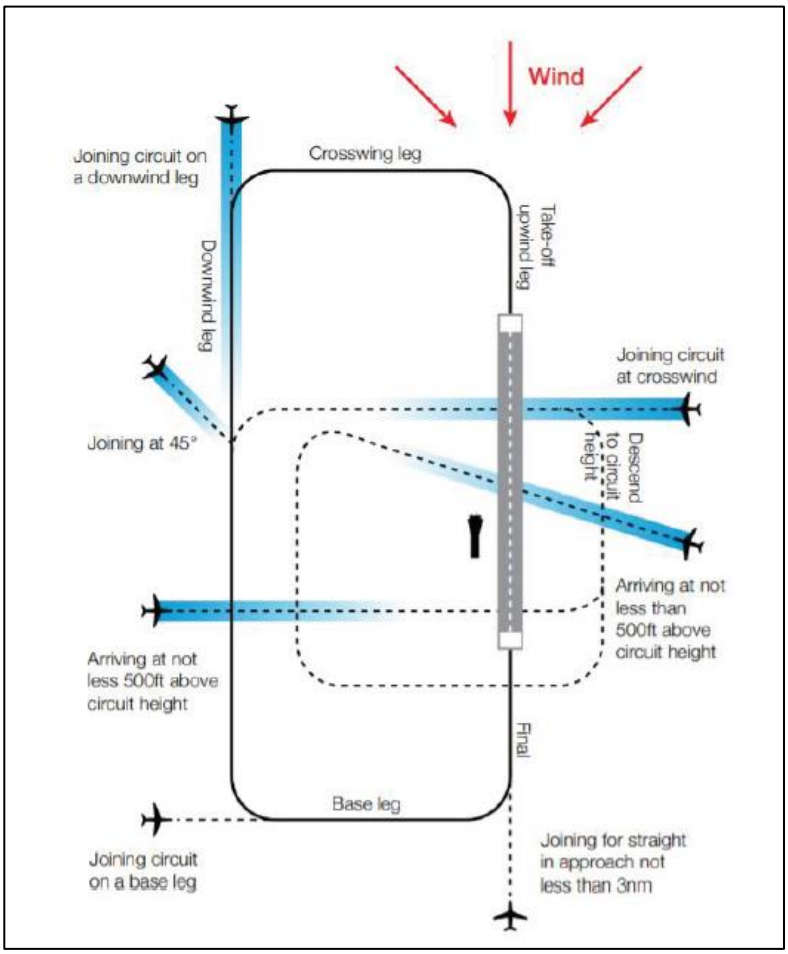

Figure 4 Typical left-hand circuit

3.4. Aircraft operational limitations

The aircraft operational limitations are noted in the Kempsey Airport Fly Neighbourly Advice 2019:

- Departing aircraft
    - Aircraft departing from KPS off either runway should climb to 1,000 feet AGL prior to commencing a turn in the direction of the circuit
- Overflying Noise Sensitive Areas
    - As described above, there are three Noise Sensitive Areas that lay directly underneath the centreline approach to Runway 22. As such, when using this Runway pilots should use the minimum power necessary on approach to minimize noise over the sensitive areas

- Simulated Engine Failure Practice
    - Where practicable, EFATOs should not be performed over Noise Sensitive Areas surrounding KPS
- Transponder Usage
    - If fitted to aircraft, transponders are to be turned on and operated in accordance with CAAP 166-01 V4.2 for all operations
- Runway Usage
    - The preferred runways at KPS are Runway 04 and 22, based on meteorological and operating conditions at the time of operation
- Altitude of Operations
    - Operators flying in proximity to KPS should maintain altitudes as required by the *Civil Aviation Regulations (1988)* and *the Civil Aviation Safety Regulations (1998*)
- Model Jet Aircraft
    - Model jet aircraft operating at KPS should maintain operations in conjunction with their CASA Instrument of Approval and operate at altitudes of less than 1,000 feet, or the height specified by CASA if that is lower.
- Aircraft flight tracks
    - Aircraft operators should follow published flight tracks on approach to KPS whilst maintaining requirements and altitudes as outlined in the *Civil Aviation Regulations (1988)*
- Operating procedures
    - All aircraft operating from KPS should operate in accordance with aircraft manufacturing requirements, CASA regulations, and company Standard Operating Procedures (SOPs). Private or leisure operators without SOPs operating from KPS should operate in accordance with aircraft manufacturing requirements and CASA regulations
- Take Off Point
    - When practicable, pilots are encouraged to use the full length of the runway for take-off
- Aircraft Noise Regulations and Standards
    - All aircraft operating at KPS should be compliant with the Air Navigation (Aircraft Noise) Regulations 2018 and/or other relevant airworthiness regulations and standards.

3.5. Noise management arrangements

A Noise Management Plan and Fly Neighbourly Advice for Kempsey Airport was developed in 2019. The document titled *Final Kempsey Airport Noise Management Plan and Fly Neighbourly Advice 2019* details noise management strategies, compliant handling processes, noise sensitive areas and the next steps for Council to undertake in relation to noise management at Kempsey Airport.

No special considerations were made in the document pertaining to runway 16/34.

4. AERONAUTICAL INFRASTRUCTURE

4.1. Current infrastructure

The airport is characterised by the following elements of aeronautical infrastructure:

- The main runway 04/22 is 1643 m long and 30 m wide with runway strip of 90 m, and published as a code 2 instrument non-precision runway
- The secondary runway 16/34 is 614 m long and 18 m wide with runway strip of 60 m, and published as a code 1 non-instrument runway
- GA aprons are not available to aircraft above 5,700 kg MTOW and wingspan great than 15 m
- Use of parking Bay 1 is restricted to aerial ambulance (excluding HEL). Other aircraft above 5,700 kg as approved by aerodrome operator with 72 hours prior notice
- Taxiway C, C1, D and E not available to aircraft above 5,700 kg MTOW and wingspan greater than 15 m.

Figure 5 shows the Kempsey Airport runway layout (source: AsA, Aerodrome Chart, dated 13 August 2020).

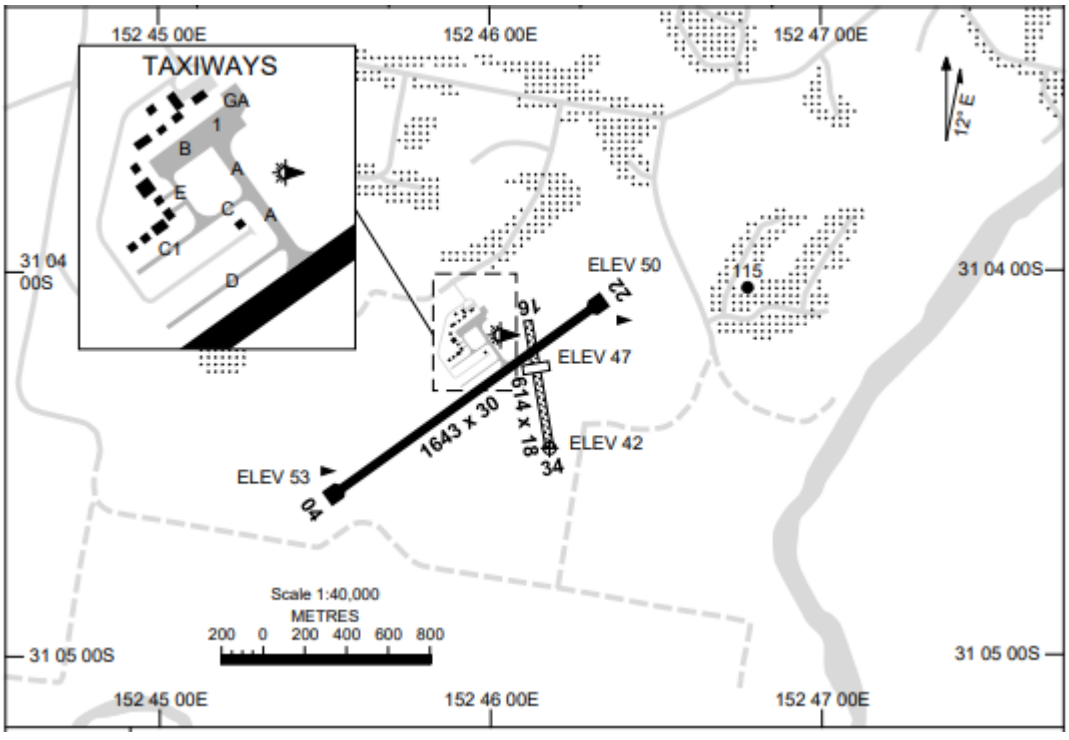

Figure 5 Kempsey Airport runway layout

4.2. Displaced threshold on runway 16

The threshold of runway 16 has been displaced by 200 m to provide a 5% approach gradient clear of obstacles. This results in a landing distance of 414 m on runway 16, and a take-off distance with 5% gradient clear of obstacles of 414 m on runway 34. Full length is available for take-off on runway 16 and landing on runway 34.

An image of the trees in the departure path of runway 34 (approach to runway 16), taken looking north west, is provided at Figure 6.

Figure 6 Take-off gradient runway 34

An image showing the displaced threshold markers on the southern side of runway 04/22, taken from the start of take-off on runway 16 looking south west, is provided in Figure 7. A close-up of the same image is provided in Figure 8.

Figure 7 Start of take-off runway 16

Figure 8 Close-up displaced threshold runway 16

A copy of the current Runway Distance Supplement for Kempsey Airport is provided at Figure 9 (source: Airservices, AIP-ERSA RDS). The reduced length for landing on runway 16, and the steep gradient to obstacles on take-off from runway 34 are highlighted for ease of reference.

RUNWAY DISTANCE SUPPLEMENT 05 NOV 2020 RDS YKMP - 1

KEMPSEY

RWY	(CN)	TORA	TODA	ASDA	LDA
04	(2)	1643 (5390)	1703 (5587) (2.85%)	1643 (5390)	1643 (5390)
22	(2)	1643 (5390)	1703 (5587) (4.72%)	1643 (5390)	1643 (5390)
	Slope 0.4% 340M down to SW, 0.5% 450M down to NE, LVL 850M to NE. RWY WID 30 RWS WID 90				
16	(1)	614 (2014)	644 (2113) (5.22%)	614 (2014)	414 (1358)
	DTHR 200M.				
34	(1)	614 (2014)	644 (2113) (7.37%)	614 (2014)	614 (2014)
	Slope 0.4% down to S. RWY WID 18 RWS WID 60				

SUPPLEMENTARY TAKEOFF DISTANCES

RWY04- 1219(3999)(1.6) 1408(4619)(1.9) 1528(5013)(2.2) 1620(5315)(2.5)
RWY22- 813(2667)(1.6) 1070(3510)(1.9) 1255(4117)(2.2) 1394(4573)(2.5) 1569(5148)(3.3)

Figure 9 Runway Distance Supplement

A satellite image of the runway arrangement is provided in Figure 10 (source: Google Earth).

Figure 10 Satellite image of runway 16/34 - displaced threshold

4.3. Ground access and movements

The GA apron is connected to the main runway 04/22 by a single taxiway, identified as taxiway A. There is also a network of minor taxiways connecting to taxiway A including taxiway B, taxiway C and taxiway D.

Runway 16/34 is not connected by any of the taxiways to the GA apron. An aircraft operating on runway 16/34 needs to taxi via the main runway 04/22 to get to/from the GA apron and hangars.

Figure 11 shows the taxiway layout at Kempsey Airport (source: AsA, Aerodrome Chart, dated 13 August 2020).

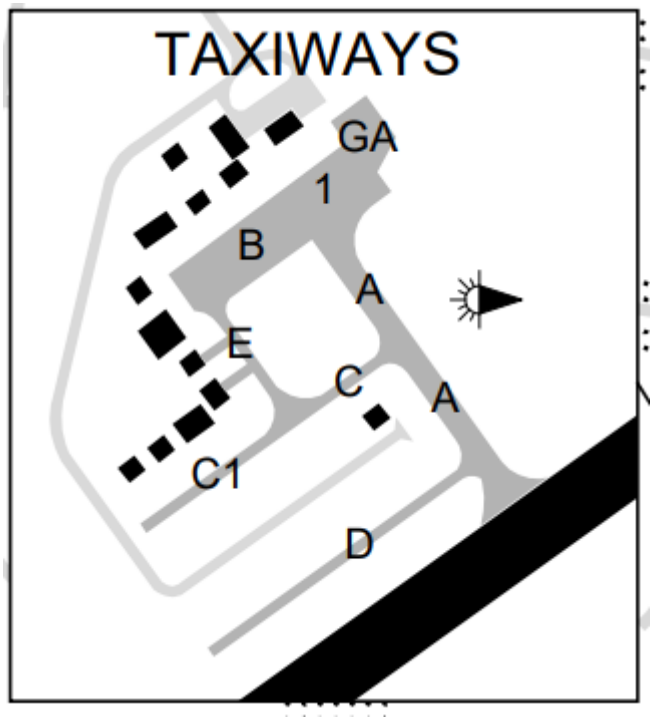

Figure 11 Taxiways

4.4. Pavement investigation report - 2019

A strategic review of airport pavements was conducted by JASKO Airport Services Pty Ltd in December 2019. JASKO noted that runway 16/34 is an unsealed runway and is adequate for the aircraft currently utilising the aerodrome.

The Aerodrome Safety Inspection report also notes that prolonged rain can saturate the surface of the runway 16/34 and when this occurs the runway is closed via NOTAM action.

4.5. Lighting and electrical systems

Runway 04/22 has aviation lighting of the following characteristic and function:

- white low intensity runway lights (LIRL)
- pilot-activated lighting (PAL)
- edge lights are spaced at 90 m
- blue edge taxiway lighting.

Runway 16/34 has no lighting, and therefore, is not used at night.

4.6. Instrument flight procedures

A check of the AIP via the Airservices Australia website showed that Kempsey Airport is served by non-precision terminal instrument flight procedures, as detailed in Table 3 (source: Airservices Australia, effective 5 November 2020).

Procedure charts for Kempsey Airport are designed by Airservices Australia (AsA) and The Airport Group (TAG) and noted accordingly.

Note that TAG has closed, subsequently procedures designed by TAG have been given to Airservices Australia.

Table 3 Kempsey Airport (YKMP) aerodrome and procedure charts

Chart name	*Effective date*
AERODROME CHART (AsA)	13 August 2020 (KMPAD01-164)
RNAV-S GNSS (TAG)	13 August 2020 (KMPGN02-164)
RNAV-GNSS RWY 22 (AsA)	5 November 2020 (KMPGN01-165)

Runway 16/34 does not have any instrument procedures, and the closing of the runway will not impact on the existing instrument non-precision procedures for runway 04/22.

There are no immediate plans to introduce additional or different instrument non-precision flight procedures.

5. RUNWAY USABILITY

5.1. Introduction

A key consideration for the future use of runway 16/34 is the issue of aerodrome usability, defined by representative crosswind limits according to aircraft performance capabilities.

In Annex 14 to the *Convention on International Civil Aviation*, Aerodromes Volume I *Aerodrome Design and Operations,* ICAO makes the following recommendations:

> *Number and orientation of runways*
>
> *3.1.1* ***Recommendation****.— The number and orientation of runways at an aerodrome should be such that the usability factor of the aerodrome is not less than 95 per cent for the aeroplanes that the aerodrome is intended to serve.*
>
> *...*
>
> *3.1.3 Choice of maximum permissible crosswind components*
>
> ***Recommendation****.— In the application of 3.1.1 it should be assumed that landing or take-off of aeroplanes is, in normal circumstances, precluded when the crosswind component exceeds:*
>
> *— 37 km/h (20 kt) in the case of aeroplanes whose reference field length is 1 500 m or over, except that when poor runway braking action owing to an insufficient longitudinal coefficient of friction is experienced with some frequency, a crosswind component not exceeding 24 km/h (13 kt) should be assumed;*
>
> *— 24 km/h (13 kt) in the case of aeroplanes whose reference field length is 1 200 m or up to but not including 1 500 m; and*
>
> *— 19 km/h (10 kt) in the case of aeroplanes whose reference field length is less than 1 200 m.*

5.2. Methodology

A conservative approach was undertaken to adopt the lowest recommended crosswind limit as the basis for the usability analysis. Ensuring that the most likely users of the runway in its current form were represented in the analysis.

The most likely users of runway 16/34 are small aircraft such as Cessna 172/182/177, Piper PA-28/31, Diamond models and other smaller aircraft and helicopters. These aircraft are defined as being code 1A and below aircraft, whose reference field lengths are less than 800 m. In this case, the 10 kt crosswind limit recommended by ICAO would be applicable.

Since the most likely users of runway 16/34 would normally fly in daylight hours and the early evening, the usability analysis was conducted for both the full 24-hour day and the more representative period 2000 to 0900 UTC (0600 to 1900 AEST).

The usability of runway 16/34 for these two reference periods was then compared with that of runway 04/22 so that the relative benefit, from a usability perspective, of retaining runway 16/34 could be determined.

5.3. Wind data

ICAO Annex 14 (Aerodromes Volume I *Aerodrome Design and Operations)* makes the following recommendation about data to be used in a usability analysis:

> *3.1.4 Data to be used*
>
> ***Recommendation**. — The selection of data to be used for the calculation of the usability factor should be based on reliable wind distribution statistics that extend over as long a period as possible, preferably of not less than five years. The observations used should be made at least eight times daily and spaced at equal intervals of time.*

Wind direction and speed at 30 minute intervals (averaged over the last 10 minutes of each period), collected from the Kempsey Aerodrome weather station for the period 20 February 2001 to 29 October 2020, was sourced from the Bureau of Meteorology (BoM) and used for the analysis.

For reference purposes, wind roses correlating average wind direction and speed at Kempsey Airport at 0900 and 1500 AEST for the period 20 February 2001 to 11 August 2020, sourced from the BoM website, are provided in Figure 12 and Figure 13.

Note: Indicative runway directions are shown in red colour on the diagrams for ease of interpretation.

Rose of Wind direction versus Wind speed in km/h (20 Feb 2001 to 11 Aug 2020)

Custom times selected, refer to attached note for details

KEMPSEY AIRPORT AWS

Site No: 059007 • Opened Feb 2001 • Still Open • Latitude: -31.0711° • Longitude: 152.7717° • Elevation 13m

An asterisk (*) indicates that calm is less than 0.5%.
Other important info about this analysis is available in the accompanying notes.

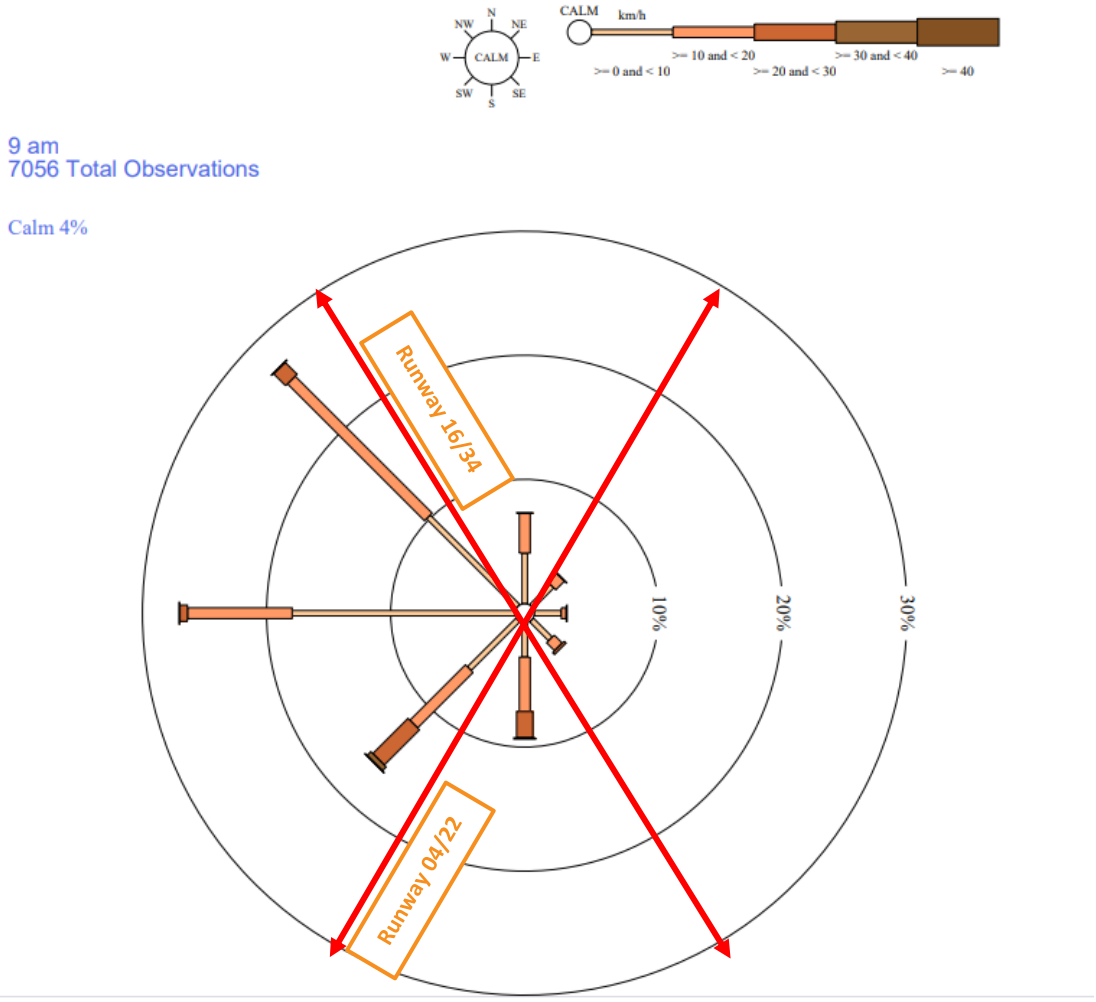

Figure 12 Wind direction and speed at Kempsey Airport at 9 am

Rose of Wind direction versus Wind speed in km/h (20 Feb 2001 to 11 Aug 2020)

Custom times selected, refer to attached note for details

KEMPSEY AIRPORT AWS

Site No: 059007 • Opened Feb 2001 • Still Open • Latitude: -31.0711° • Longitude: 152.7717° • Elevation 13m

An asterisk (*) indicates that calm is less than 0.5%.
Other important info about this analysis is available in the accompanying notes.

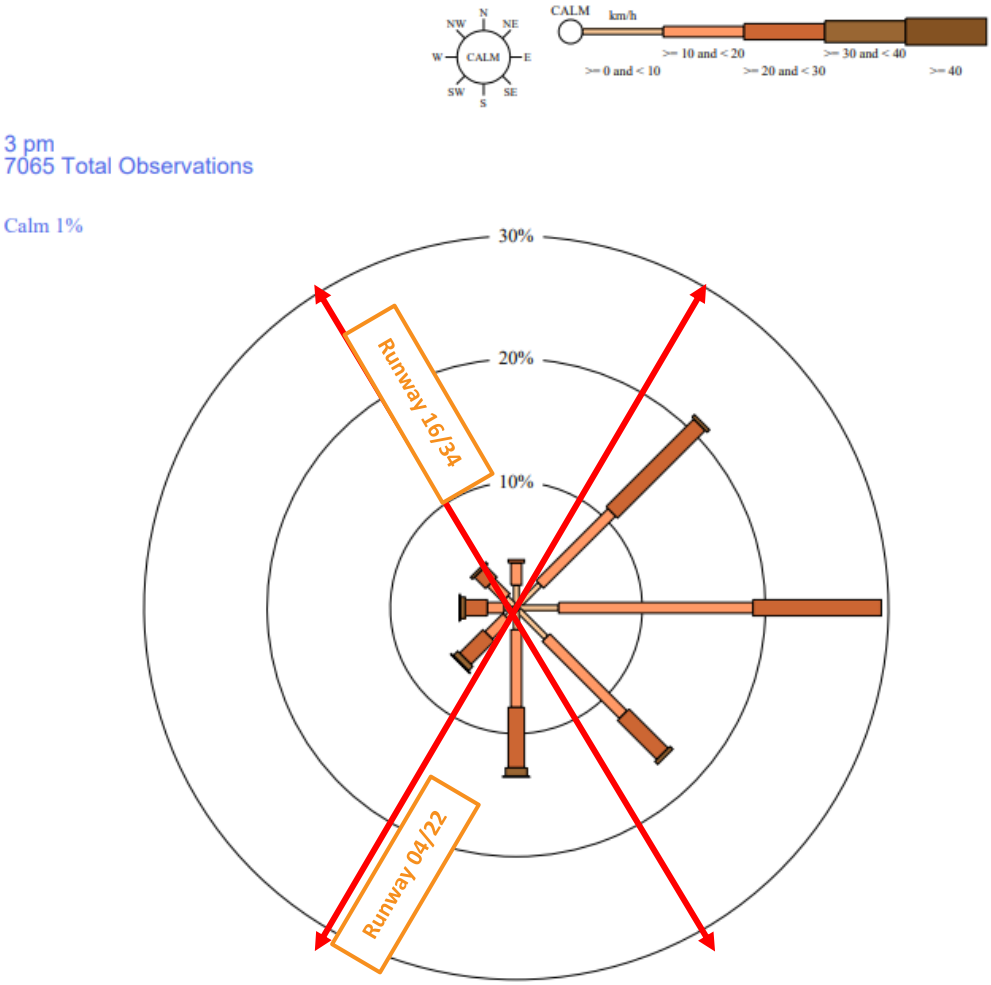

Figure 13 Wind direction and speed at Kempsey Airport at 3 pm

5.4. Analysis

Historical wind data for Kempsey Airport was collected from the Bureau of Meteorology for the time period 16 February 2001, through to 26 October 2020 in 30-minute intervals. The data was analysed using the runway function of software application WindRose Pro 3.

Each current runway orientation was analysed for the two representative periods (all hours and 2000-0900 UTC) at the 10 kt limit and 20 kt limit.

The same data was then analysed for all orientations in 3-degree for the period 2000–0900 UTC.

5.5. Results

The results of the analysis of current runway orientations for 2 representative periods are shown in Table 4.

Table 4 Runway usability at 10 kt limit

Analysis period	*Runway 04/22*	*Runway 16/34*
2000–0900 UTC (0600 to 1900 AEST)	78.7%	74.4%
All hours	78.7%	74.4%

It can be seen that both runway 04/22 and runway 16/34 are below the recommended 95% usability factor at the 10 kt crosswind limit for the most applicable representative period 2000-0900 UTC and at all hours of the day.

The results of the all-orientations analysis with 3-degree step are shown in Figure 14.

The 95% runway usability during the reference period is not reached for runway orientations between 028°/218° true (040°/220° magnetic) and 148°/328° true (160°/340° magnetic) which includes runway 16/34).

Note that the crosswind component applicable to one orientation is equal to the reciprocal of that orientation, hence the graph would look the same for orientations between 180° and 360°.

Note also that wind direction data provided by BoM was oriented to True North, and so the analysis was conducted with reference to True North. Magnetic variation is 12° east, so magnetic bearings can be derived by subtracting 12° from the true bearings shown in the graphic.

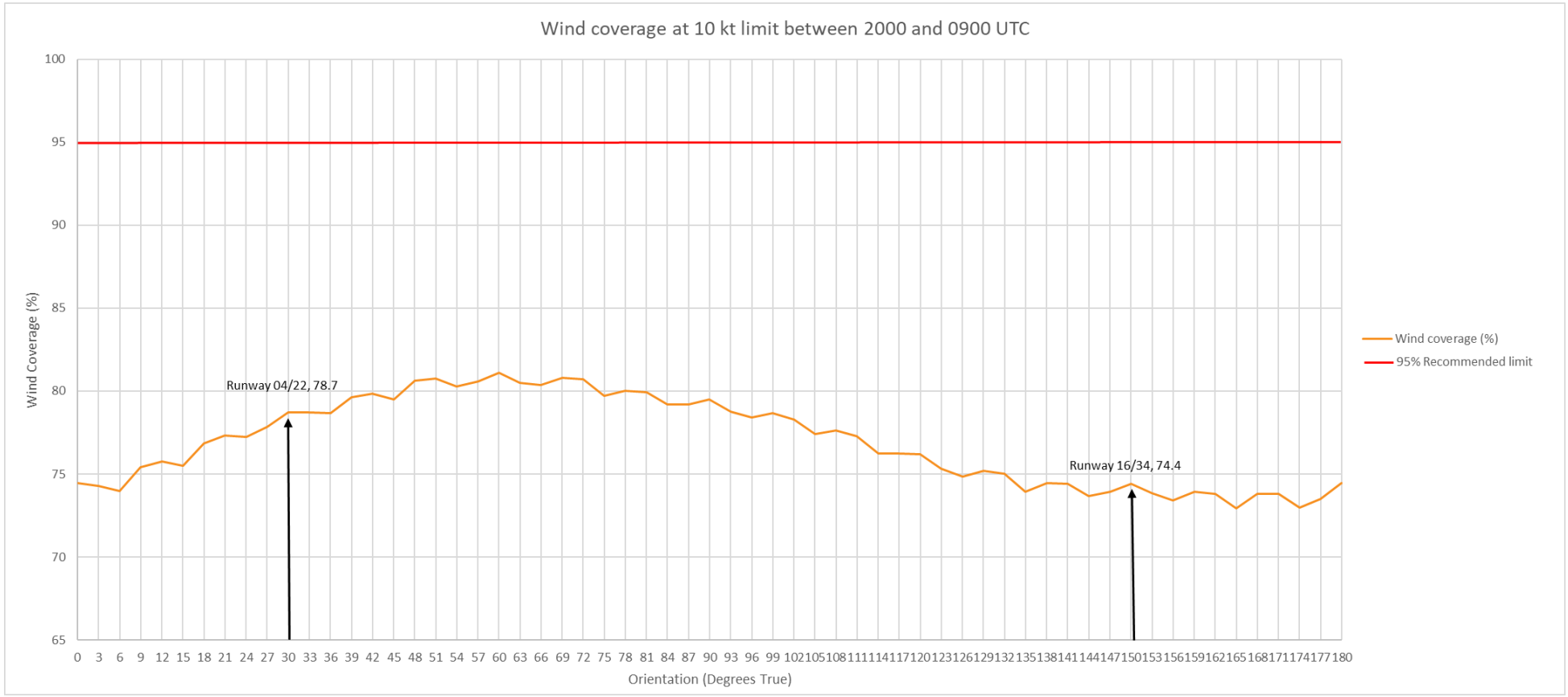

Figure 14 Kempsey Airport crosswind coverage at 10 kt limit – all orientations

5.6. Conclusions about runway usability

As a result of the usability analysis, the following conclusions are drawn:

- Runway 16/34 has been unavailable during flood, heavy and prolonged rainfall events at some periods of the year. No operational safety concerns were raised or recorded as a result of the closure of runway 16/34 due to flooding heavy or prolonged rainfall
- Runway 16/34 does not meet ICAO's recommendations of 95% usability and offers practically the lowest usability value (74.4%) at the 10 kt limit applicable to code 1 and 2 aircraft for the reference period 2000–0900 UTC
- Runway 04/22 does not meet ICAO's recommendations of 95% usability. Runway 04/22 is usable 78.7% of the time, at the lowest nominated crosswind limit (10 kt) applicable to code 1 and 2 aircraft for the reference period 2000–0900 UTC
- Runway usability conditions for both runway orientations did not change for either runway 04/22 or 16/34 during the full 24-hour period
- Closing runway 16/34 will not significantly affect aerodrome usability or reduce aviation safety below an acceptable level from a crosswind limit perspective.

6. HISTORIC RUNWAY AVAILABILITY

Runway 16/34 has often been unavailable due to the susceptibility of the runway surface to become soft after rain.

A search of NOTAM requests issued by Kempsey Shire Council for the period 12 October 2017 through to 04 January 2021 (a total of 1181 days) revealed the runway will have been unavailable for 764 days or 65% of the time.

In 2020, the runway has been available for only 16 days, between 1-16 January 2020.

The image at Figure 15 indicates in orange the times when NOTAM records indicate the runway being unavailable.

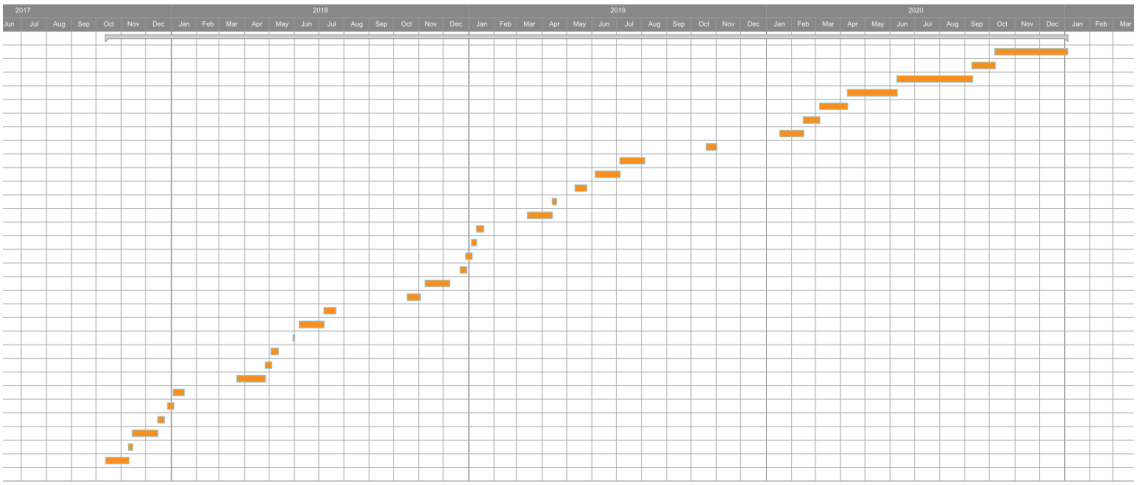

Figure 15 Periods runway 16/34 not available since 12 October 2017

A copy of the current NOTAM, sourced from Airservices Australia's NAIPS portal, is provided in Figure 16.

```
                                        C79/20 REVIEW C74/20

RWY 16/34 NOT AVBL DUE MAINT
FROM 10 070443 TO 01 040000 EST
```

Figure 16 Current NOTAM

7. AIR TRAFFIC MANAGEMENT

7.1. Current airspace

Kempsey Airport is located within class G (non-controlled) airspace and within the horizontal extent of, but below, Restricted Area R587B associated with RAAF Base Williamtown military restricted airspace.

The restrictions of Restricted Area R587B on the airspace are detailed below:

- vertical limits: FL125 – FL600
- hours of activity as detailed by NOTAM
- operated by No 453 Squadron at RAAF Base Williamtown.

An overview of the airspace and aerodromes within the vicinity of Kempsey Airport is provided in Figure 17 (source: OzRunways, Coffs Harbour VTC).

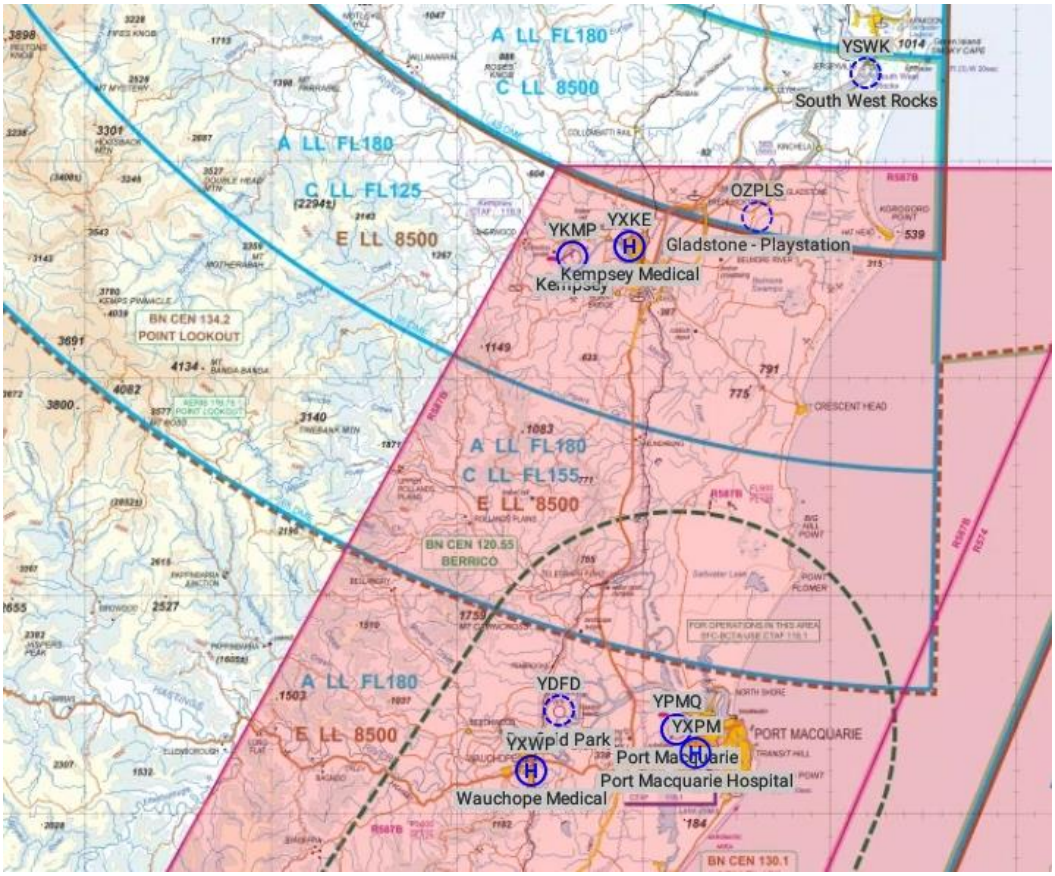

Figure 17 Airspace in the vicinity of Kempsey Airport

7.2. Air traffic service

Kempsey Airport has no Air Traffic Control tower, and its airspace is controlled by Brisbane's Flight Information Area (FIA) Centre.

7.3. Airspace review

The Airspace Act 2007 provides CASA with the authority to administer and regulate Australian-administered airspace and obligates CASA to conduct regular reviews of the existing classifications of Australian administered airspace.

A search conducted on the CASA website returned no results for an airspace review of Kempsey Airport.

CASA published the document *Preliminary Airspace Review of Port Macquarie* in May 2018. The report did not consider the airspace at Kempsey Airport as it was located outside the scope of review. It did, however, note the proximity of instrument approach procedures and a preference for Kempsey Airport to have its own discrete CTAF frequency. Further, the report did not have any considerations pertaining to runway 16/34 at Kempsey Airport.

7.4. Future airspace

There are no current or immediate plans for the introduction of RPT services, the introduction of new instrument flight procedures or re-arranging existing airspace.

7.5. ERSA entry

According to information published in En Route Supplement Australia (ERSA), the following flight arrangements are in place due to noise abatement and circuit training procedures:

- pilots should, where safe, practicable and consistent with expected training outcomes, maintain runway heading after take-off until reaching a height of 1,000 ft above aerodrome elevation before making a turn into the circuit
- pilots of transponder-equipped aircraft should ensure that, at all times, the transponder is selected to ON/ALT (Mode C)
- circuit training is only permitted during set hours.

A copy of the information published in ERSA in relation to flight training operations is provided at Figure 18 (source: Airservices Australia).

a. Local Aircraft Operators:
   (i) MON-FRI (except public holidays)
      • Between 0700-1900 Local (excluding HDS)
      • Between 0700-2200 Local HDS
   (ii) SAT (except when Saturday is declared as a public holiday)
      • Between 0800-1900 Local
   (iii) SUN (except when Sunday is declared as a public holiday)
      • Between 0900-1800 Local
   (iv) NSW public holidays
      • Between 0900-1800 Local
   Note: Circuit training is not permitted on Christmas Day
b. Visiting Aircraft Operators:
   (i) MON-FRI (except public holidays)
      • Between 0800-1900 Local
   Note: Circuit training is not permitted on SAT, SUN, public holidays or Christmas Day.

Figure 18 Kempsey Airport ERSA entry

8. SAFETY REPORTING

8.1. ATSB Occurrence Data

An analysis was conducted for Australian Transport Safety Bureau (ATSB) safety occurrence data for the period 1 January 2000 to 2 November 2020 for all occurrences within a 25 km radius at Kempsey Airport. The search returned 37 occurrences, consisting of one (1) accident, 35 incidents and one (1) serious incident. None of the occurrences were investigated by the ATSB. Table 5 details accidents or incidents which are relevant to this study (source ATSB).

Table 5 ATSB Occurrence Data - Kempsey Airport

Date	*ATSB Reference Number*	*Category*	*Summary*
27/11/2006	200607364	Incident	The pilot reported calling at 20 NM inbound and again on base for runway 22. The aircraft landed but was unable to access the full length of the taxiway due to cones placed there by driver training personnel. (NOTAM C42/06 promulgated the driver training and included the requirement for driver training personnel to monitor the CTAF and to vacate the aerodrome movement areas with five minutes notice of an aircraft movement).
4/10/2007	200707071	Incident	During the landing, the pilot lost control of the aircraft and the propeller struck the runway surface.
27/12/2010	201009187	Incident	During the landing, the aircraft struck a fox.
25/02/2014	201402076	Incident	During the landing roll on runway 04, the aircraft struck a kangaroo resulting in minor damage.
13/01/2016	201600062	Serious Incident	During approach to a closed runway, the pilot clipped a fence and landed short of the runway, resulting in minor damage to the aircraft.
18/05/2016	201602685	Incident	During landing, the aircraft struck a pigeon.
17/07/2017	201703229	Incident	During approach, the aircraft struck a pigeon.
28/09/2017	201704788	Incident	During short final approach, the aircraft struck a pigeon.
30/10/2017	201705566	Incident	During take-off, the aircraft struck a magpie.

There were no reported runway incursions, or cross runway incidents or accidents at Kempsey Airport during the 20-year period.

8.2. Wildlife hazard management

There is a significant presence of wildlife at Kempsey Airport, with numerous bird strikes being reported over the 20 year ATSB data period refer to Table 5. Council has prepared a Wildlife Hazard management Plan for Kempsey Airport. The procedures within it are followed and details of any inspections, sightings, and dispersal activity are recorded in the AVCRM software.

Additional information regarding wildlife hazards is published in the ERSA (source: Airservices Australia, dated 5 November 2020):

1. Significant increase in animal hazard (Eastern Grey Kangaroo) within aerodrome vicinity. Bird hazard (magpies) exists mid field runway 04/22
2. If requesting ARO to conduct wildlife check prior to operations 1-hour phone required.

8.3. Wildlife fencing

During the December 2019 aerodrome safety inspection, which was conducted by JASKO, it was found that the existing aerodrome fencing is in poor condition and should be replaced by appropriate wildlife proof fencing.

KSC is willing to replace the aerodrome fencing, but prefers to resolve the future of runway16/34 before doing so.

8.4. Safety Management System aspects

KSC advised that closure of runway 16/34 is not specifically identified in Kempsey Airport's Safety Management System as a risk to ongoing safe aircraft operations.

9. EMERGENCY RESPONSE

Kempsey Airport has no Aerodrome Rescue and Firefighting Service (ARFFS) located at the airport. The local fire brigade located at Kempsey town is available in case of emergency.

Closing the cross runway 16/34 will not adversely impact the airport's emergency response capability.

10. OPERATIONAL EFFICIENCY

10.1. Runway incursion hotspots

There are no runway incursion hot spots identified in aeronautical information publications applicable to Kempsey Airport. However, the intersection of the main runway 04/22 with the cross-runway 16/34 can be defined as a potential incursion hot spot

A copy of the ERSA entry is provided at in Figure 19 (source: OzRunways).

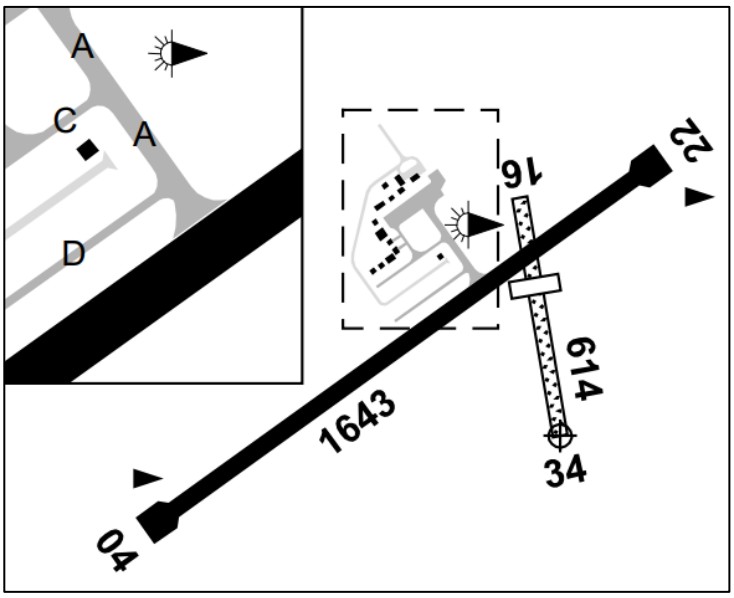

Figure 19 Kempsey Airport ERSA

Closure of runway 16/34 would mitigate the potential incursion hot spot at the intersection of the main runway 04/22 with the cross-runway 16/34.

10.2. Movement and manoeuvring area capacity

The cross runway 16/34 provides a potential aircraft parking overflow area in the event that it is available for use.

10.3. Aircraft operational efficiency issues

Based on discussions with local stakeholders and observations during the site visit, the airport's aeronautical infrastructure adequately provides for current and reasonably foreseeable aircraft operations without the use of runway 16/34.

10.4. Development Options

Kempsey Airport has a small terminal area with amenities and vehicle parking. Any additional development at Kempsey Airport is expected to be accommodated within the Aviation Business Park, which is planned to have fully serviced hangar sites which opened in 2015 as part of the Mid North Coast Regional Aviation Plan.

11. ALTERNATE AERODROMES

There are several aerodromes within relatively close proximity to Kempsey Airport that could be used by aircraft as an alternate to Kempsey in the event that either or both of Kempsey Airport's runways became unserviceable at short notice. The more substantial of these nearby aerodromes (including Gladstone Playstation (OZPLS) and South West Rocks (YSWK) ALAs) are indicated in Figure 20 (source: Google Earth).

The 60 nm and 120 nm range rings conservatively indicate the distance flown in 30-45 minutes and 60-80 minutes at 90-120 kt ground speed applicable to smaller aircraft likely to use runway 16/34.

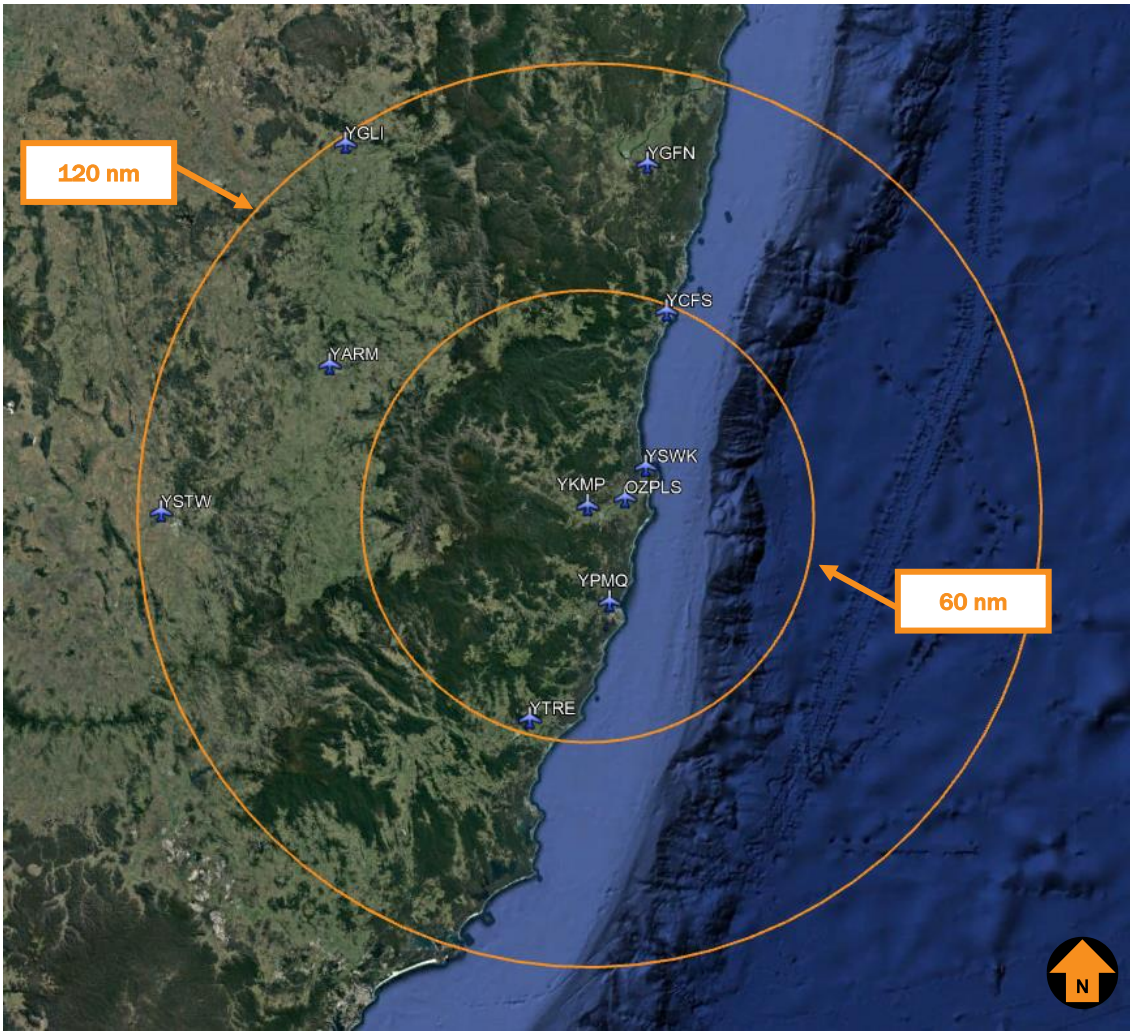

Figure 20 Existing nearby aerodromes to Kempsey Airport

The details of nearby airports which can be used as an alternate is provided in Table 6 (source: AsA).

Table 6 Nearby alternate airport details

Airport	*Registration status*	*Location relative to YKMP*	*Runway details*	*Capability of supporting Code 1/Code 2 aircraft*
Port Macquarie Airport (YPMQ)	Certified	41 km (22 nm) south east	Runway 03/21 - 1800 m x 45 m	Yes
Coffs Harbour Airport (YCFS)	Certified	90 km (48 nm) north east	Runway 03/21 - 2080 m x 45 m	Yes
Taree Airport (YTRE)	Certified	94 km (51 nm) south	Runway 04/22 - 1504 m x 30 m	Yes
Armidale Airport (YARM)	Certified	125 km (68 nm) north west	Two runways: Runway 05/23 - 1738 m x 30 m Runway 09/27 - 1116 m x 30 m	Yes
Grafton Airport (YGFN)	Certified	148 km (80 nm) south east	Runway 18/36 is 1709 m long x 30 m wide	Yes
Tamworth Airport (YSTW)	Certified	183 km (99 nm) west	4 runways: Runway 12L/30R - 2200 m x 45 m Runway 12R/30L - 1110 m x 18 m Runway 18/36 - 1020 m x 30 m Runway 06/24 - 842 m x 30 m	Yes
Glen Innes Airport (YGLI)	Certified	188 km (102 nm) north west	Two runways: Runway 14/32 - 1498 m x 30 m Runway 10/28 - 1200 m x 30 m	Yes

12. STAKEHOLDER CONSULTATION

The stakeholders consulted include:

- Australian International Aviation College (AIAC)
- Civil Aviation Safety Authority (CASA)
- Coffs City Sky Divers
- CareFlight Pty Ltd
- City and Country Air Charters
- Kempsey Flying Club
- Kempsey Shire Council
- Little Wings
- Macleay Aircraft Maintenance
- Microflite
- Mid Coast Flying (Flight School)
- Royal Flying Doctor Service (RFDS)
- Rural Fire Service
- other stakeholders as agreed.

Details and results of the consultation activities are provided in Table 7.

Table 7 Stakeholder consultation details

Agency/Contact	*Activity/Date*	*Response/ Date*	*Issues Raised During Consultation*	*Action Proposed*
Aero Refuellers	KSC email 23/11/20			
Aircraft Traders	KSC email 23/11/20			
Australian International Aviation College (AIAC)	KSC email 23/11/20	Email 27/11/20	No objection to decommissioning runway 16/34	Nil
CareFlight Pty Ltd	KSC email 23/11/20			
Civil Aviation Safety Authority (CASA)				
Coffs City Sky Divers	KSC email 23/11/20	Telecon 04/12/20	Supports proposal to close the cross runway	Nil
Hangar 1 Kempsey Flying Club	KSC email 23/11/20	In-person discussion 26 /11/20	Wants cross runway to remain for emergency situations and pilot proficiency, particularly for low performance aircraft	Validate safety basis for closing runway 16/34
Hangar 2 Aircraft Traders Pty Ltd	KSC email 23/11/20			

Agency/Contact	*Activity/Date*	*Response/ Date*	*Issues Raised During Consultation*	*Action Proposed*
Hangar 4/5 **Macleay Aircraft Maintenance**	KSC email 23/11/20	Meeting arranged 26/11/20	Did not attend pre-arranged meeting	Nil
Hangar 6 **Hastings Aircraft Maintenance**	KSC email 23/11/20	Telecon 24/11/20	Feels it is important for pilots to have options in the case of an aircraft not being able to handle the crosswind on runway 04/22	Validate safety basis for closing runway 16/34
Hangar 7 **Cetnaj Purchasing)**	KSC email 23/11/20			
Hangar 8 **Allen Hilton**	KSC email 23/11/20			
Hangar 10 **Greg Hammond**	KSC email 23/11/20	In-person discussion 25 /11/20	Wants cross runway retained for the odd occasion when the crosswind is out of limits for him on runway 04/22. Concerned that once the runway is closed and other development occurs then it will never be available for re-opening.	Validate safety basis for closing runway 16/34
Hangar 11 **Bill Gibbons**	KSC email 23/11/20	Email 23/11/20	Sees very little problem with the closure of runway 16/34	Validate safety basis for closing runway 16/34
Hangar 12 **City and Country Air Charters**	KSC email 23/11/20	In-person discussion 25 /11/20	No impact on operations	Nil
Little Wings	KSC email 23/11/20			

Agency/Contact	*Activity/Date*	*Response/ Date*	*Issues Raised During Consultation*	*Action Proposed*
Microflite	KSC email 23/11/20			
Mid Coast Flying (Flight School)	KSC email 23/11/20	Telecon 24/11/20	Strongly objects to closing the cross runway	Validate safety basis for closing runway 16/34
Royal Flying Doctor Service (RFDS)	KSC email 23/11/20			
Rural Fire Service	In-person discussion 25 /11/20	In-person discussion 25 /11/20	No impact to RFS operations	Nil

13. RISK ASSESSMENT

A risk assessment was conducted using Kempsey Airport's risk framework, and in keeping with the requirements of ISO 31000:2018 *Risk management—Guidelines*.

Likelihood

Likelihood is defined in ISO 31000:2018 as the chance of something happening. Likelihood descriptors used in this report are as indicated in Table 8.

Table 8 Likelihood Descriptors

No	*Descriptor*	*Description*
1	Rare	The event is expected to occur once every 100 years
2	Unlikely	The event is expected to occur once every 30 years
3	Possible	The event is expected to occur once every 10 years
4	Likely	The event is expected to occur once every 3 years
5	Almost certain	The event is expected to occur once a year or more frequently

Consequence

Consequence is defined as the outcome of an event affecting objectives, which in this case is the safe and efficient operation of aircraft, and the visual amenity and enjoyment of local residents.

Consequence descriptors used in this report are as indicated in Table 9.

Note: Consequence descriptors for People Safety and Total Financial Loss are based on the Kempsey Airport's risk framework, and other consequence descriptors are based on the guidance provided by CASA in its Safety Management System guidance materials.

Table 9 Consequence Descriptors

Value	Descriptor	People Safety	Total Financial Loss	Property/Equipment	Effect on Crew	Environment
1	Insignificant	One or more minor injuries	<$10,000	Superficial damage	Nuisance	No effects or effects below level of perception
2	Minor	One major injury	$10,000 - $100,000	Moderate repairable damage – property still performs intended functions	Operations limitation imposed. Emergency procedures used.	Minimal site impact – easily controlled. Effects raised as local issues, unlikely to influence decision making. May enhance design and mitigation measures.
3	Moderate	One fatality (2-10 major injuries)	$100,000 - $500,000	Major repairable damage – property performs intended functions with some short-term rectifications	Significant reduction in safety margins. Reduced capability of aircraft/crew to cope with conditions. High workload/stress on crew. Critical incident stress on crew.	Moderate site impact, minimal local impact, and important consideration at local or regional level, possible long-term cumulative effect. Not likely to be decision making issues. Design and mitigation measures may ameliorate some consequences.

Value	Descriptor	People Safety	Total Financial Loss	Property/Equipment	Effect on Crew	Environment
4	Major	2 to 10 fatalities	$500,000 - $2 million	Major damage rendering property ineffective in achieving design functions without major repairs	Large reduction in safety margins. Crew workload increased to point of performance decrement. Serious injury to small number of occupants. Intense critical incident stress.	High site impact, moderate local impact, important consideration at state level. Minor long-term cumulative effect. Design and mitigation measures unlikely to remove all effects.
5	Catastrophic	More than 10 fatalities	In excess of $2 million	Damaged beyond repair	Conditions preventing continued safe flight and landing. Multiple deaths with loss of aircraft	Catastrophic site impact, high local impact, national importance. Serious long-term cumulative effect. Mitigation measures unlikely to remove effects.

Risk matrix

The risk matrix, which correlates likelihood and consequence to determine a level of risk, used in this report is shown in Figure 21.

Likelihood	Consequence				
	1 - Insignificant	2 - Minor	3 - Moderate	4 - Major	5 - Catastrophic
5 - Almost Certain	6 - HIGH	7 - HIGH	8 - EXTREME	9 - EXTREME	10 - EXTREME
4 - Likely	5 - MEDIUM	6 - HIGH	7 - HIGH	8 - EXTREME	9 - EXTREME
3 - Possible	4 - MEDIUM	5 - MEDIUM	6 - HIGH	7 - HIGH	8 - EXTREME
2 - Unlikely	3 - LOW	4 - MEDIUM	5 - MEDIUM	6 - HIGH	7 - HIGH
1 - Rare	2 - LOW	3 - LOW	4 - MEDIUM	5 - MEDIUM	6 - HIGH

Figure 21 Risk Matrix

Actions required

Actions required according to the derived level of risk are shown in Figure 22.

EXTREME	8, 9, 10 - Improved actions, resources and strategies are required to be implemented IMMEDIATELY to reduce, transfer or control the level of risk.
HIGH	6, 7 - Existing actions, resources or strategies must be modified AS SOON AS POSSIBLE to reduce, transfer or control the risk.
MEDIUM	4, 5 - Take actions to reduce where benefit exceeds cost and / or continue to implement actions, resources and strategies to prevent and/or reduce the level of risk.
LOW	0, 1, 2, 3 - MAINTAIN current actions, resources and strategies to prevent the escalation of the level of risk.

Figure 22 Actions Required

13.1. Risk Identification

The primary risk being assessed is that of aviation safety, efficiency and regularity. In this case, three options are considered, as listed in Table 10.

Table 10 Runway system configuration options

Option	*Description*
1	16/34 remains unchanged
2	16/34 is decommissioned

Each option has associated risks listed in Table 11.

Table 11 Risk identification and description

Risk ID	*Risk description*
Safety01	There is potential for an aircraft to land or take-off from runway 04/22 in high cross wind conditions, causing a loss of directional control leading to a runway excursion, or a loss of roll control leading to part(s) of the aircraft making contact with the runway and/or runway strip.
Safety02	There is potential for an aircraft to collide with a vehicle or aircraft during the landing or take-off roll on the runway (runway incursion).
Safety03	There is potential for an aircraft to collide with another aircraft during approach or departure manoeuvring.

13.2. Risk Analysis, Evaluation and Treatment

For the purpose of considering applicable consequences, the concept of worst credible effect has been used. Untreated risk is first evaluated, then, if the resulting level of risk is unacceptable, further treatments are identified to reduce the level of risk to an acceptable level.

Each of the nominated risk events are considered in separate tables in the following pages.

Risk ID:	Safety01 – Damage to aircraft on runway during strong crosswinds

Discussion

Historical wind analysis found that runway 16/34 experiences crosswind less than or equal to 10 knots (kt) 74.4% of the time and experiences crosswind less than or equal to 20 kt 94.2% of the time.

The crosswind on runway 04/22 is less than or equal to 20 kt 96.8% of the time.

Two outcomes are considered in this risk:

1. An aircraft experiencing a runway excursion
2. An aircraft experiencing roll instability resulting in part of the aircraft other than the landing gear making contact with the runway or runway strip surface.

In addition to strong cross winds, wind shear events may cause these outcomes.

There have been no runway incursion incidents at Kempsey Airport recorded on the ATSB database. However, runway excursions in strong crosswind conditions have taken place at other airports including:

- 08 July 2013, Moranbah, Runway 34, ATR72-212A, forecast crosswind: 15 knots, directional stability reduced leading to runway excursion
- On 5 October 2005, an ATR72 that was operated by a different operator departed the runway during a landing roll at Queenstown Airport, New Zealand. In that incident, the aircraft touched down without incident, but was then exposed to a strong crosswind gust that exceeded the aircraft's maximum crosswind limit. The aircraft turned and continued its landing roll on the grass adjacent to the runway. Forecasts and observations at Queenstown immediately before the landing did not indicate the potential for a crosswind that exceeded the aircraft's maximum crosswind limit.

There have been no ground strike occurrences recorded at Kempsey Airport.

Ground strike occurrences in strong crosswind conditions at other airports include:

- 08 July 2013, Moranbah, Runway 34, ATR72-212A, forecast crosswind: 15 knots, directional stability reduced leading to runway excursion
- On 5 October 2005, an ATR72 that was operated by a different operator departed the runway during a landing roll at Queenstown Airport, New Zealand. In that incident, the aircraft touched down without incident, but was then exposed to a strong crosswind gust that exceeded the aircraft's maximum crosswind limit. The aircraft turned and continued its landing roll on the grass adjacent to the runway. Forecasts and observations at Queenstown immediately before the landing did not indicate the potential for a crosswind that exceeded the aircraft's maximum crosswind limit.

During times when runway 16/34 was closed due to flooding, there were no reporterd diversions or incidents due to cross winds exceeding aircraft operational limits.

Consequence

If an aircraft suffered a loss of directional control leading to a runway excursion, the worst credible effect would be 2 to 10 fatalities and damage beyond repair. This would be a Major consequence.

Consequence	Major

Untreated Likelihood

There has been no runway incursion incident at Kempsey Airport recorded on the ATSB database. However, runway excursions in strong crosswind conditions have taken place at other airports.

There have been runway excursions / runway scrapes at other airports in strong crosswind conditions.

The worst credible effect (fatalities and damage beyond repair) has not occurred at Kempsey Airport but has happened at other airports. The event may occur at a frequency more than 10 years.

Untreated Likelihood	Rare

Exposure

There is crosswind experienced on the cross-runway 16/34 and also on the main runway 04/22. Exposure to strong crosswind would be defined as infrequent.

Current Treatments

- Aircraft operator proficiency and procedures
- Suitable alternates

Level of Risk

The level of risk associated with a Rare likelihood of a Major consequence is 5 – Medium.

Current Level of Risk	5 – Medium

Risk Decision

A risk level of 5 Medium requires to take actions to reduce where benefit exceeds cost and/or continue to implement actions, resources and strategies to prevent and/or reduce the level of risk.

Refer to operational management.

Risk Decision	Take actions to reduce where benefit exceeds cost and/or continue to implement actions, resources and strategies to prevent and/or reduce the level of risk

Proposed Treatments

Option 1 – The cross runway remains

- Retaining the cross runway would provide an alternative approach or departure direction, although it is commonly unavailable due to soft wet surface.

Option 2 – Decommission the cross runway

- During strong cross wind events, smaller aircraft may need to delay arrival/departure or fly to an alternate aerodrome.
- Operator education may assist with good decision making.

Residual Risk The residual risks associated with each option are listed below (noting that the consequence remains Major and the likelihood remains in the Rare category). Option 1 – 5 Medium Option 2 – 5 Medium	
Residual Risk	5 – Medium

Risk ID:	Safety 02 – Aircraft collision with another aircraft or a ground vehicle during landing or take-off

Discussion

It is generally accepted that taxiways crossing runways, and cross runways, introduce an increased risk of runway incursion that could potentially result in an aircraft colliding with another aircraft or a ground vehicle resulting in multiple fatalities or damage beyond repair.

There have been no recorded runway excursions at Kempsey Airport recorded on the ATSB database.

There is no runway incursion hot spot identified in aeronautical information publications applicable to Kempsey Airport. However, the intersection of the main runway 04/22 with the cross-runway 16/34 can be defined as a potential incursion hot spot.

There has been no runway incursion incident at Kempsey Airport recorded on the ATSB database. However, runway excursions in strong crosswind conditions have taken place at other airports.

Aircraft operating on the cross runway are not visible from the threshold of runway 04.

Consequence

An aircraft colliding with another aircraft or ground vehicle could result in more than 10 fatalities or damage beyond repair.

This would be a Catastrophic consequence.

Consequence	Catastrophic

Untreated Likelihood

There has been no runway incursion incident at Kempsey Airport recorded on the ATSB database. However, runway excursions in strong crosswind conditions have taken place at other airports.

Although a runway incursion event is expected to occur at least annually, the Catastrophic consequence has not occurred within the Council's tenure as Airport operator, and so the overall untreated likelihood is Rare.

Untreated Likelihood	Rare

Exposure

As the runway incursion event occurs regularly, the exposure is considered Frequent.

Current Treatments

- Operator proficiency and procedures
- AIP
- AGL, markers, markings, signs

Level of Risk

The level of risk associated with a Rare likelihood of a Catastrophic consequence is High 6.

Current Level of Risk	6 – High

Risk Decision A risk level of 6 High requires that the existing actions, resources or strategies must be modified AS SOON AS POSSIBLE to reduce transfer or control the risk.	
Risk Decision	Modify existing actions, resources or strategies AS SOON AS POSSIBLE
Proposed Treatments Option 1 – The cross runway remains as it exists. • Maintaining the cross runway may potentially introduce additional runway incursion risk. It should be possible to manage this additional risk to an acceptable level by implementing appropriate AGL, markers, markings and signage, operational procedures and education program. Option 2 – Decommission the cross runway. • Decommissioning the cross runway will remove the associated runway incursion hazard.	
Residual Risk The residual risks associated with each option are listed below: Option 1 – 6 High Option 2 – 2 Low	
Residual Risk (if runway 16/34 closed)	2 Low

Risk ID:	Safety03 – Aircraft collision with another aircraft during approach or departure manoeuvring

Discussion

A search on the ATSB database returned with no loss of separation occurrences between two airborne aircraft at Kempsey Airport.

There was an incident in which traffic information had not been passed by ATC to the pilots of both aircraft when they were in potential conflict, however when a system alert operated, traffic information was passed through to the pilots.

Kempsey Airport airspace is partly constrained by military restricted airspace associated with RAAF Base Williamtown.

Consequence

If two aircraft collided during arrival or approach, the worst credible effect would be more than 10 fatalities and damage beyond repair. This would be a Catastrophic consequence.

Consequence	Catastrophic

Untreated Likelihood

There have been no collisions between aircraft operating to or from Kempsey Airport as reported on the ATSB database.

The worst credible effect (fatalities and damage beyond repair) has not occurred at Kempsey Airport but has happened at other airports. The event may occur at a frequency more than 10 years.

Untreated Likelihood	Rare

Exposure

The potential for the consequence to occur exists whenever aircraft are taking off or landing at Kempsey Airport. There is no curfew, and although there may be some periods of the day (night) when no aircraft are operating at or near Kempsey Airport, the exposure is considered continuous for the purpose of this assessment.

Current Treatments

- Operator proficiency and procedures (pilot and ATC)
- Aircraft equipment
- AIP
- Airspace architecture

Level of Risk

The level of risk associated with a Rare likelihood of a Catastrophic consequence is High 6.

Current Level of Risk	6 – High

Risk Decision A risk level of 6 High requires that the existing actions, resources or strategies must be modified AS SOON AS POSSIBLE to reduce transfer or control the risk.	
Risk Decision	Modify existing actions, resources or strategies AS SOON AS POSSIBLE
Proposed Treatments Option 1 – The cross runway remains as it exists. • Revised aircraft operating procedures Option 2 – Decommission the cross runway. • Revised aircraft operating procedures	
Residual Risk The residual risks associated with each option are listed below: Option 1 – 6 High Option 2 – 4 Medium	
Residual Risk (if runway 16/34 closed)	4 – Medium

14. CONCLUSIONS

As a result of this study, Aviation Projects draws the following conclusions:

1. The threshold of runway 16 has been permanently displaced by 200 m to provide a 5% approach gradient clear of obstacles. This results in a landing distance of 414 m on runway 16, and a take-off distance with 5% gradient clear of obstacles of 414 m on runway 34. Full length is available for take-off on runway 16 and landing on runway 34.
2. Runway 16/34 has been unavailable following flood, heavy and prolonged rainfall events. No operational safety concerns were raised or recorded as a result of the closure of runway 16/34 due to flooding heavy or prolonged rainfall.
3. For the period 12 October 2017 through to 04 January 2021 (a total of 1181 days), the runway will have been unavailable for 764 days or 65% of the time.
4. In 2020, the runway has been available for only 16 days, between 1-16 January 2020.
5. Runway 16/34 is currently unavailable to night operations in any capacity other than as a taxiway (with portable lighting) or a helicopter final approach and take-off area.
6. There are no regulatory requirements to retain runway 16/34 as a runway.
7. There are no straight-in instrument approaches to runway 16/34, and aircraft do not land on runway 16/34 during instrument meteorological conditions or at night.
8. Runway 16/34 offers practically the lowest usability value (74.4%) at the 10 kt limit applicable to code 1 and 2 aircraft for the reference period 2000–0900 UTC.
9. Runway 04/22 does not meet International Civil Aviation Organization recommendations, as it is usable only 78.7%, at the lowest nominated crosswind limit (10 kt) applicable to code 1 and 2 aircraft for the reference period 2000–0900 UTC.
10. Runway usability for both runway orientations did not change for either runway during the full 24-hour period.
11. Closing runway 16/34 will not significantly affect aerodrome usability or reduce aviation safety below an acceptable level from a crosswind limit perspective.
12. Current aeronautical infrastructure (excluding runway 16/34) will provide sufficient capacity to support the number of current and foreseeable aircraft movements.
13. New and improved fencing around the perimeter of Kempsey Airport would likely decrease the kangaroo hazard.
14. Closure of runway 16/34 will likely reduce the potential for runway incursions.
15. If runway 16/34 is closed, the option of returning the runway to operational service in the future will not be available unless airport safeguarding provisions are retained in applicable planning instruments. Substantial infrastructure works will also be required.
16. If runway 16/34 is closed, an acceptable level of aviation safety can be maintained at Kempsey Airport. The safe decommissioning of the runway should be informed by preparation of a full and thorough risk management plan in consultation with applicable external stakeholders.

15. RECOMMENDATIONS

As a result of this study, Aviation Projects makes the following recommendations:

1. Prior to closing runway 16/34, a full and thorough risk management plan should be prepared and implemented in consultation with applicable external and internal stakeholders

2. Prior to closing runway 16/34, consideration should be given to implementing a long- term strategy to improve the operational efficiency of aeronautical infrastructure according to anticipated growth in the scale and scope of the airport's operations.

16. REFERENCES

References used or consulted in the preparation of this report include:

- Airservices Australia, Aeronautical Information Package; including AIP Book, effective 5 November 2020
- Australian Transport Safety Bureau, *Aviation Occurrence Data*, accessed 2 November 2020
- Bureau of Meteorology, various weather datasets, accessed 1 November 2020
- Civil Aviation Safety Authority, *Part 139 (Aerodromes) Manual of Standards 2019*, dated 5 September 2019
- Civil Aviation Safety Authority Office of Airspace Regulation, *Preliminary Airspace Review of Port Macquarie*, version 1.1, file reference OP18 / 49, dated August 2018
- Federal Aviation Administration, Advisory Circular 150/5060-5 *Airport Capacity and Delay*, 1 December 1995
- Federal Aviation Administration, *Runway Decommissioning Checklist*, March 2014, http://www.faa.gov/airports/runway_safety/runway_construction/media/Runway_Decommissioning_Non-fillable.pdf
- ICAO Standards and Recommended Practices, Annex 14 - Aerodromes
- International Civil Aviation Organization, Doc 9157 *Aerodrome Design Manual,* Third Edition 2006
- International Civil Aviation Organization, Doc 9870 *Manual of the Prevention of Runway Incursions*, First Edition 2007
- Kempsey Shire Council, *Your Future Macleay - Growth & Character - Local Strategic Planning Statement*, dated July 2020
- Kempsey Shire Council, *Kempsey Shire Council Horizon 2030: Macleay Valley Economic Development and Tourism Strategy,* dated October 2019
- OzRunways, aeronautical navigation charts extracts
- Standards Australia, ISO 31000:2018 *Risk management – Guidelines.*

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