



Australian Government
Civil Aviation Safety Authority



Instrument Flight Procedures – Flight Validation – Brisbane Australia





Overview

- Instrument Flight Procedures (IFP) Australian context
- Regulatory arrangements
- CASA's validation process for Brisbane New Parallel Runway (NPR):
 - Desktop review
 - Simulator validation
 - On site validation
 - Publication Timelines

Australian IFP Context

Aerodromes and airspace

- Only Military aerodromes are owned by the Federal Government
- Other aerodromes are owned/leased by private companies or local councils
- 340 aerodromes and helicopter landing sites with IFPs,
 - 38 have air traffic control towers (Class C, D and Military)
- All other aerodromes operate in Class G airspace
- Aerodromes with IFPs must be Certified by CASA
 - Annual surveys of OLS & PANS-OPS surfaces
 - CASA rules for building developments within 30NM

Australian IFP Context

PBN General:

- Airservices Navigation Rationalisation Project switched off 179 (approx. 50%) ground-based nav aids 26 May 16.
- GNSS mandated for IFR aircraft.
- Back-up Nav Aid Network established: Supports a GNSS contingency mode of operation, GNSS primary means of navigation for IFR aircraft.

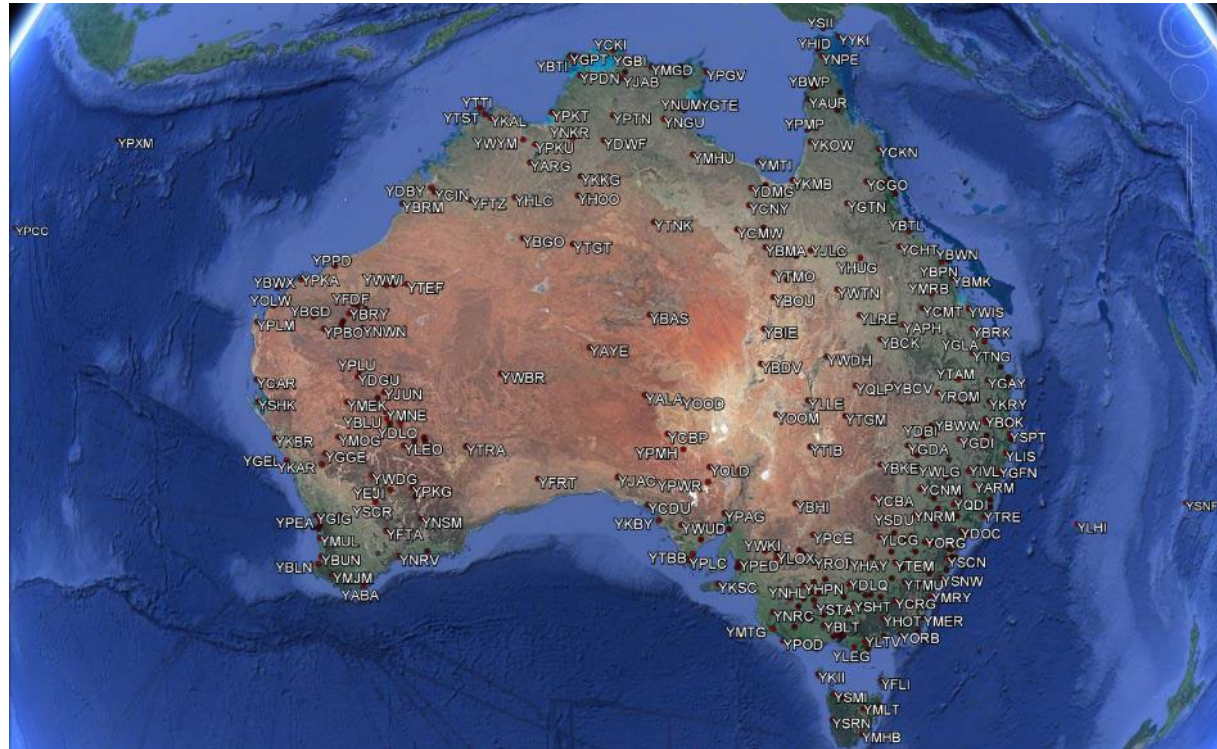
ICAO PBN Navigation specifications - IFPs:

- RNP 1 – Arrivals and departures
- RNP APCH
- RNP AR APCH

Australian IFP Context

Aerodromes & helicopter landing sites with IFPs: August 2019

- Total: 340
- ILS: 27
- GLS: 2 (SYD & MEL)
- RNP-AR: 22
 - ICAO 9905 proc: 32
 - Proprietary proc: 37
- Baro-VNAV:
 - > 135 aerodromes



Regulatory arrangements

IFP Design Organisations:

- Requirements under the Civil Aviation Safety Regulations
 - CASR Part 173 and Manual of Standards (MOS).
- Organisations certified by Civil Aviation Safety Authority (CASA),
 - 1 Government-owned is the ANSP: Airservices Australia
 - 3 private companies.
- Certified Design organisations subject to entry control and regular audit.
- Chief Designers approved by CASA, regulated responsibilities.
- Design criteria: MOS 173, PANS-OPS and Doc 9905.

Regulatory arrangements

IFP Design Organisations - Certified Designer Requirements

- Maintain and comply with an Operations Manual,
- Must have a chief designer approved by CASA,
- Verification procedures for procedure design - 2 qualified designers independently check, one of whom did not carry out original design work.
- Appropriate organisation with sufficient qualified personnel,
- Training and checking program,
- Safety Management System,
- Arrangements with AIS and aerodromes,
- Use of certified navigation aids only (CASR 171),
- 3-yearly maintenance of procedures,
- Ensure all procedures are flight validated by CASA.

Regulatory arrangements

IFP Validation (not navigation aid flight inspection):

- Validation must be done by CASA (CASR 173.095).
- CASA flight validation pilot or contractor acting on behalf of CASA.
- Designer responsible for a new procedure participates.
- Re-validation every three years (MOS 173):
 - Obstacles: Limited vertical obstacle database. Individual aerodrome management.
 - Correct charting, waypoints and coding.
 - Airspace environment.
 - Aerodrome facilities.
 - Feedback provided to designer and aerodrome.
- Re-validation missions flown throughout the year, geographically grouped with all procedures checked over a three-year period.

CASA's Validation process

1. Pre-validation (desktop review)
2. Simulator evaluation (LNAV/VNAV, RNP-AR and others as required, e.g. complex)
3. Flight validation (aircraft on-site)
4. Procedure Validation Certificate

Validation process complies with MOS 173 and Doc 9906.

Further details regarding Baro-VNAV validation:

- CASA's Methodology for Validation of Baro-VNAV Instrument Approaches (contact CASA for copy)

Brisbane International Airport

Existing runways:

Main runway 01/19

3560m x 60m

General aviation runway 14/32

New parallel runway:

01L/19R

3300m x 60m Code F



Brisbane New Parallel Runway (NPR)

Existing Runway 01/19 (becomes 01R/19L)

New Runway 01L/19R

Master plan	1971
BAC planning commenced	2004
Commenced construction	August 2012
Airspace changes approved by CASA	October 2018
Promulgation of new airspace, routes, SIDs, STARs, approaches	21 May 2020 (AIRAC date)
New ATC operating modes	21 May – 12 July
NPR opening	12 July 2020 (not AIRAC date)

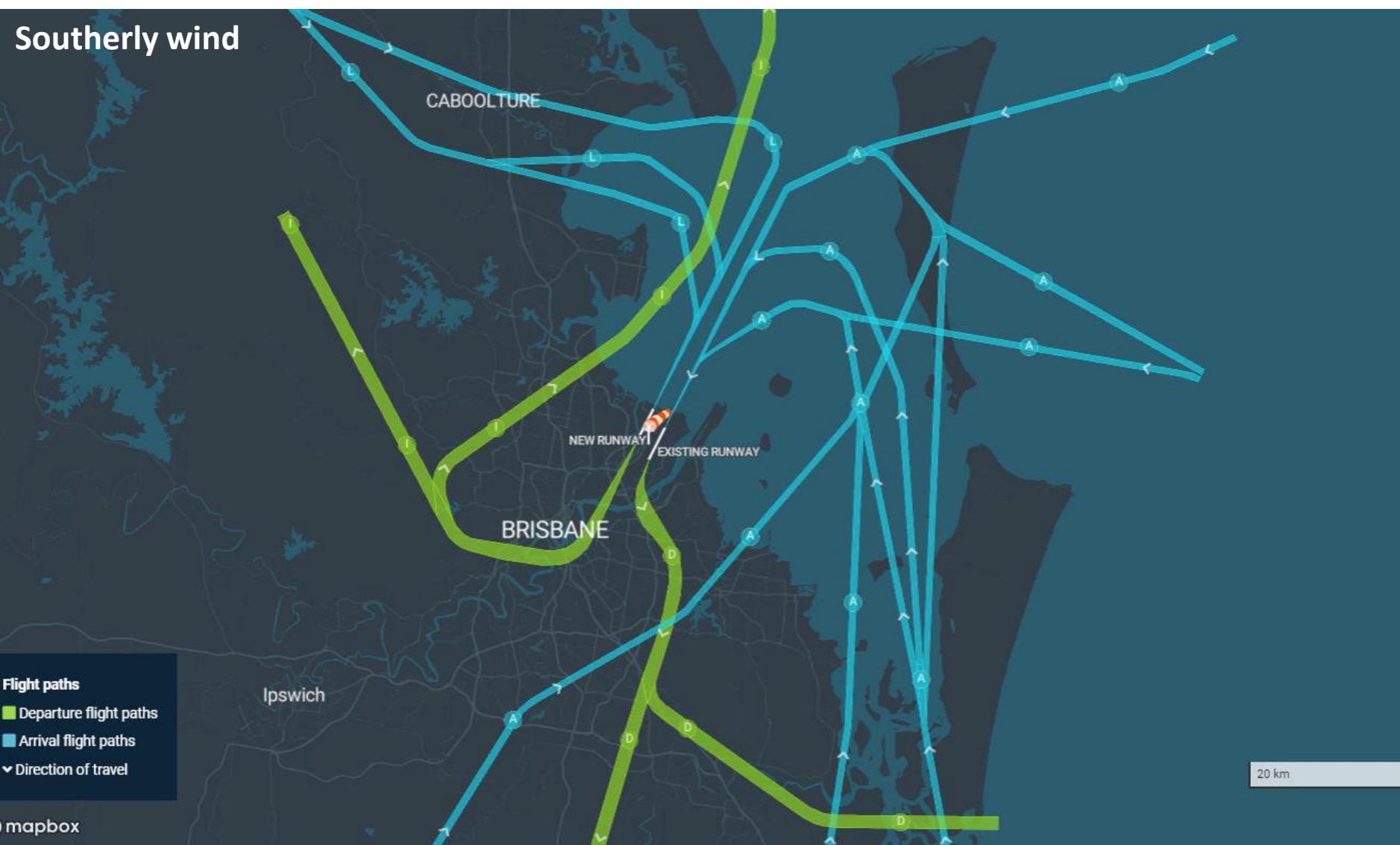
Brisbane NPR – project facts

- Project Aus\$1.1 billion – privately funded – under budget
- 8 years construction, on-time
- ‘Brownfield’ construction, could not impact aerodrome operations
- Reclamation of swamp, environmentally aware sand mining and recycled water used. 500 environmental considerations met
- Major construction challenges included an A380-capable taxiway underpass, 6m below sea level
- Priorities: safety, environment and community

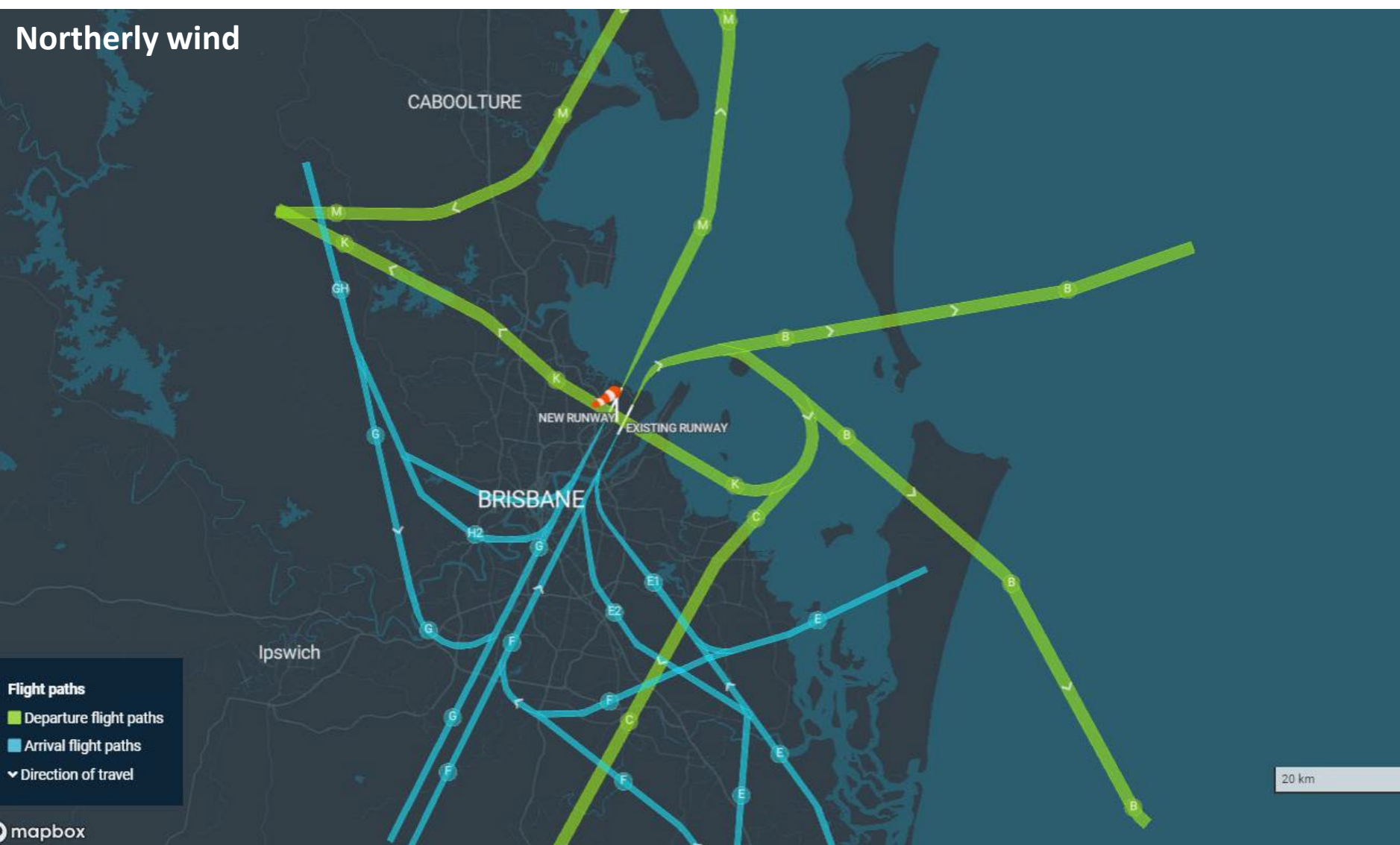
Brisbane NPR – design

- Integrate with neighbouring aerodromes: international, military and general aviation
- Maximise flights over the water for noise abatement
- Routes and procedures designed to maximise aircraft efficiency, decrease noise and emissions
- Increase operations from 50 movements/hour to 105 movements/hour
- Where possible retain existing flight paths to reduce community impact
- Independent parallel approaches (finals monitoring)
- GBAS site reserved, implementation planned 5 years after commissioning

Southerly wind



Northerly wind



Amended/new procedures RWY 01R/19L

New procedures RWY 01L/19R

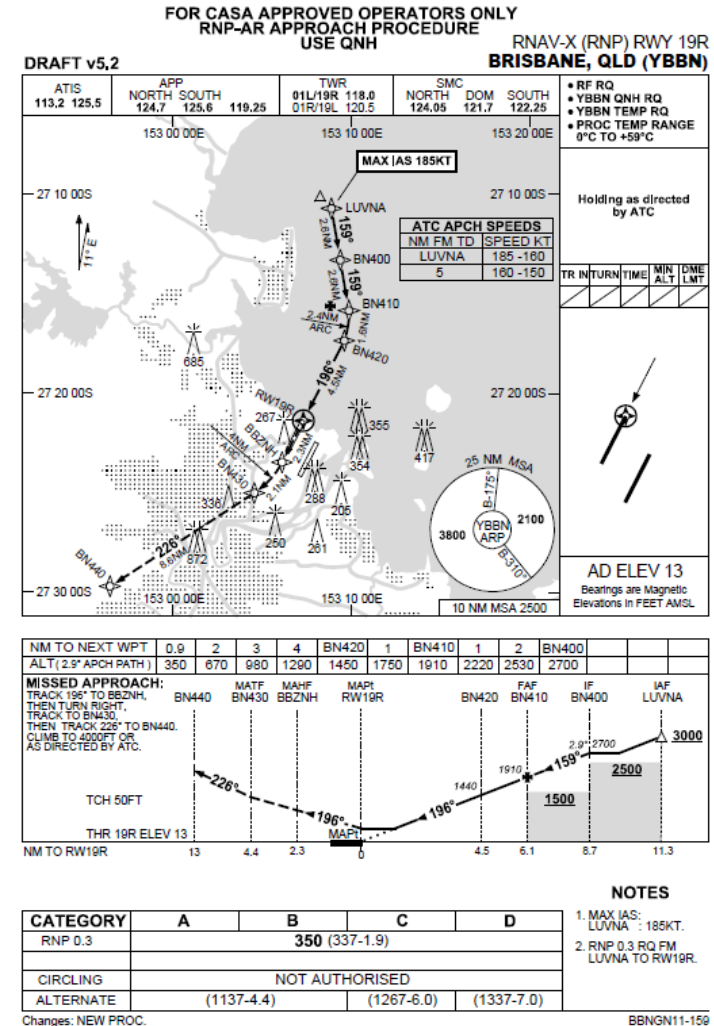
SID	12	SID	6
STAR	27	STAR	23
ILS/LOC (CAT I)	2	ILS/LOC (CAT I)	2
BARO-VNAV	2	BARO-VNAV	2
RNP-AR	3	RNP-AR	2

CASA's Validation process

Pre-Validation (desktop):

Validation package supplied to CASA by Certified Designer after internal QA. Includes:

- Publication-ready procedure plates,
- Aerodrome chart,
- Waypoint & threshold lat/lon,
- Procedure coding compliant with ARINC 424,
- Minimum altitude and visibility calculations for approaches, circling, holding and MSAs,
- Geo-referenced charts showing the nominal track, primary & secondary containment areas, and critical obstacle for each segment.



CASA's Validation process

Pre-Validation (desktop) cont:

- Critical obstacles for each segment,
- Design parameters used, e.g. ISA+30, historical wind information,
- Terrain data source and accuracies,
- Confirmation that the aerodrome meets the standards required for published IFP,
- Confirmation that the procedures comply with MOS Sections 8.1.1.3 Overlapping Procedures and 8.1.1.4 Airspace Buffers,
- Highlight any variations from procedure design criteria,
- Any other information that the designer considers appropriate.

CASA's Validation process

Pre-Validation (desktop):

- Desktop review includes:
 - Chart formatting – correct and standardised
 - Tracks/distances/altitudes/vertical path
 - PANS-OPS and MOS 173 compliance
 - Waypoint names
 - Review critical obstacles
 - Aerodrome infrastructure appropriate
 - PBN requirements
 - Presentation of airspace incl. neighbouring aerodromes
 - Text and notes/are easily understood
 - Differences to standard criteria, consider operator approvals/exemptions

CASA's Validation process

Pre-Validation (desktop) includes:

- Navigation database (ARINC 424) table:

- Waypoints
- Path terminators
- Waypoint type
- Courses
- Turns
- Altitudes & types
- Speeds
- Vertical path angle

[illegible]

CASA's Validation process

Pre-Validation (desktop):

- Pre-validation checklist completed.
- Remarks/considerations for validation activities noted, for example:
 - Flyability considerations
 - Impact of any non-standard procedures
 - Obstacle assessment, especially in non-surveyed areas
 - Amendments to charts and/or coding table
 - New aerodromes have infrastructure commissioned
 - Runway markings, PAPIs, WDI/AWIS, etc
 - ATC, aerodrome operator notified
 - NOTAM and press release published
- Procedure approved for flight validation, and simulator validation where required.

RNP AR Promulgation

Due to the distance between the parallel runways the decision altitude was calculated for the RNP-AR DA using RNP 0.27

DOC 9905 stipulates that RNP 0.30 must be promulgated, lower RNP's only if advantageous

5.6 MINIMA

5.6.1 OCA/H is published on approach charts for all RNP AR APCH procedures with one exception: for RNP AR APCH procedures involving a MAS with RNP navigation accuracy requirements less than 1.0 NM, a DA/H shall be published. An example of minima depiction is provided in PANS-OPS, Volume II, Part 1, Section 4, Chapter 9.

5.6.2 An OCA/H or DA/H for RNP 0.3 must be published for each RNP AR approach procedure. Additional OCA/H or DA/H for RNP navigation accuracy requirements between 0.1 NM and 0.3 NM may be published as applicable.

RNP AR Promulgation

CATEGORY	A	B	C	D
RNP (0.27)	430 (417-2.4)			
RNP*(0.15) _(5.0% MAP)	280 (267-1.5)			
CIRCLING	NOT AUTHORISED			
ALTERNATE	(1137-4.4)		(1267-6.0)	(1337-7.0)

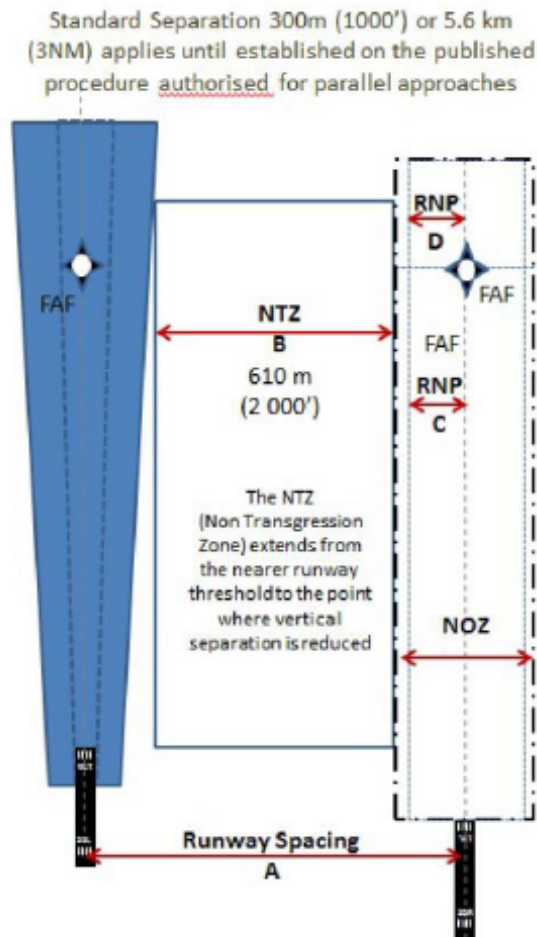
Changes: NEW PROC.

Promulgation of only 0.27 would unnecessarily restrict operators

Simulation of all scenarios found likelihood of minimal nuisance TCAS RA alerts

Safety argument made to implement 0.30 RNP despite runway separation

ICAO Doc 9643 requires the application of the below **Figure 1** to conduct simultaneous independent parallel approaches.



any combination of instrument approaches including:

1) a precision approach

2) an APV procedure designed to RNP AR APCH criteria, provided that:

- the designated RNP (**C** and **D**) does not exceed $\frac{1}{4}$ of the distance between runway centerlines (**A**), and
- the designated RNP is equal to or less than $(A - B) \div 2$

3) an APV procedure that does not meet the provisions in 2) a and b above, provided that

- the safety provided by the performance and operational error mitigation are satisfactorily demonstrated, and
- the designated APV is demonstrated to protect the NTZ from infringement during normal operations to avoid nuisance alerting

Safety Considerations

The Brisbane Airport Parallel Runway centrelines are 2000m apart.

RNP-AR 0.3 value is 555m and is greater than $\frac{1}{4}$ the distance between the runway centrelines.

The following considerations were addressed in the ATC safety case to allow RNP 0.3 despite the runway separation

Since implementation nuisance TCAS alerts have not been an issue

the collision risk from normal and residual (not mitigated) atypical errors

likelihood of TCAS nuisance alerting during normal operations

wake hazard

monitoring and available levels of system automation

data base management

flight management system input and related crew workload

impacts of meteorological conditions and other environmental factors

missed approach guidance, training and published ATC break-out procedures

CASA's Validation process

Simulator validation:

ICAO Doc 9906:

- To assess flyability and human factors issues, at least one on-course/on-path assessment should be flown in an aircraft capable of conducting the procedure.
- Custom navigation database for approaches with coded vertical paths,
 - LNAV/VNAV and RNP-AR procedures are always validated in the simulator. Other IFPs such as complex Arrivals and Departures are simulator validated on a case by case basis
- Manual entry of data should be limited to LNAV procedures

Publication of IFPs prior to validation to allow coding in the public navigation database for flight validation risks unauthorised public use of a procedure that may not be safe.

CASA's Validation process

Simulator validation:

- Conducted by CASA validation pilot, using type-rated CASA Flying Operations Inspector.
- Simulator: Certified Level D approved for the procedure, valid TAWS and current terrain database.
- Navigation database: CASA custom database, reviewed before validation.
- Flyability;
 - The ability to keep an aircraft within the predefined tolerances of the designed lateral and vertical paths.
 - Consider newly rated private pilot or 'approved operator only' procedures
- As the tracks, coding and flyability are checked in the simulator it is not necessary to validate these items again in the aircraft.

CASA's Validation process

Simulator validation:

Allows:

- Testing in adverse weather conditions,
 - Temperature limits
 - Tail winds (RF)
 - Minimum visibility
- Performance checks,
 - Steep climb gradients
 - FMS capability
 - Maximum bank angle
 - Ground proximity warnings
 - Runway & on-slope alignment
- Data verification,
- Test different scenarios.



CASA's Validation process

Simulator validation:

- Time efficient and cost effective.
 - Several procedures can be checked for one location, no ATC impact
 - Several procedures can be validated per hour
 - Different locations can be checked with no transit time costs
 - Actual weather conditions at location do not impact operations
 - Navigation database can be checked in flight-freeze
 - Procedures can be easily re-flown if issues are found
 - Aircraft manoeuvring with no risk to crew and aircraft safety
 - Allows the Regulator's pilots to gain valuable experience flying new types of approaches

CASA's Validation process

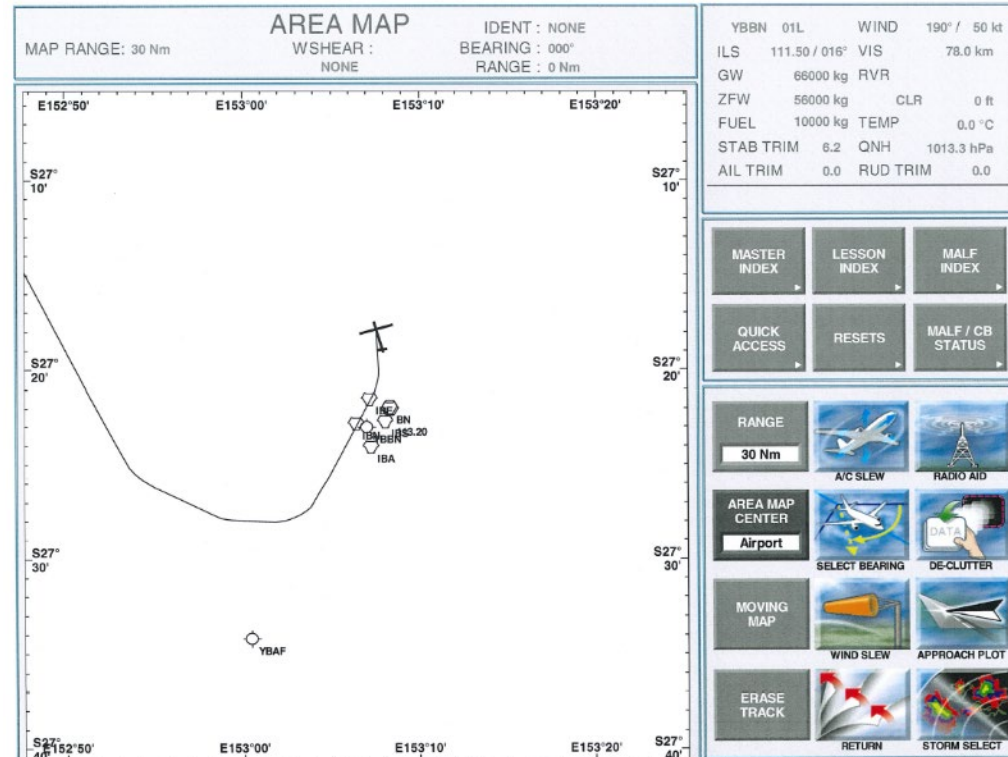


Boeing 737-800 Simulator

CASA's Validation process

Simulator validation:

- FMS data comparison
- Tracks/distances/courses
- Temperate limits (location dep.)
- Wind/bank angle in RF turns
- TAWS alerts
- Flyability
- Approach plot recorded
- Simulator evaluation report completed

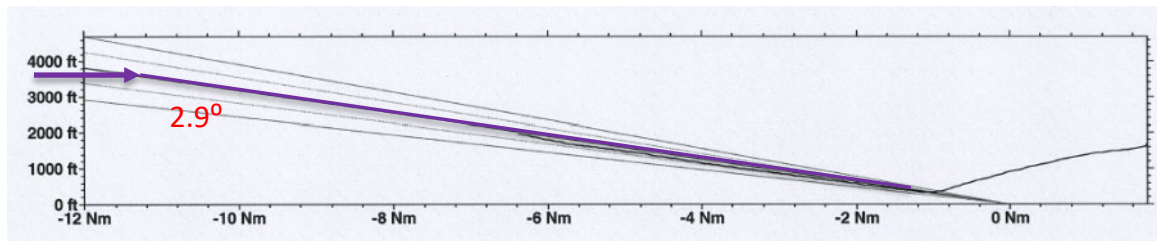


CASA's Validation process

Simulator validation: Vertical Profile

Brisbane – YBBN 2.9° VPA, Temp limits 0°C to +59 °C

APPROACH PLOT	AIRPORT	YBBN	RWY	01L	GUST	8 kt		
	ILS			111.50 / 016°	WIND	190° / 50 kt	GS DEV	0.0 dot
	ELEVATION			11 ft	TEMP	0.0 °C	LOC DEV	0.0 dot
	CONTAM	DRY/NORMAL	Vis:	Dry	GW	66000 kg		



Aerodrome model for the simulator

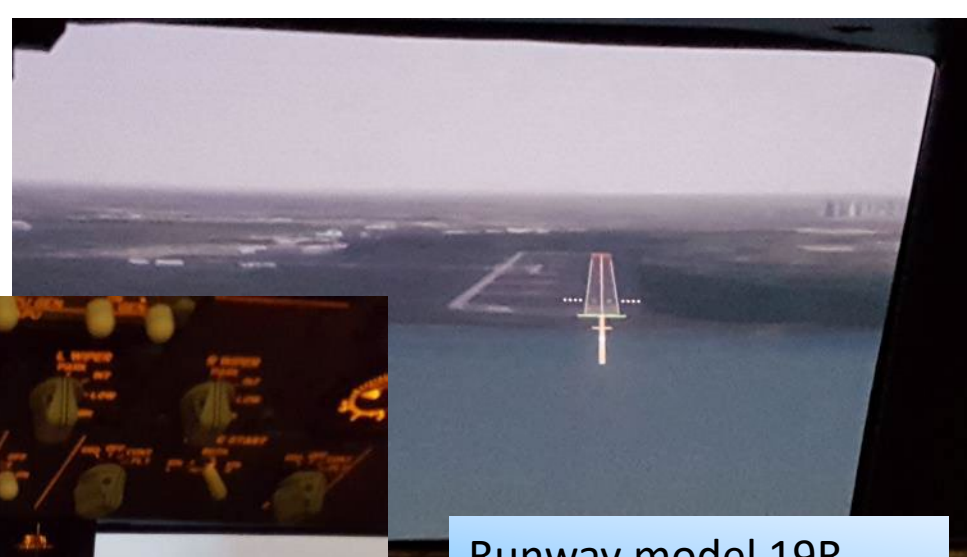
Simulator manufacturers' timeframes to update aerodrome models between 45 – 90 days after airport changes are made (FAA)

Building an accurate model takes time!

Data should include anything that helps to recreate the new runway and taxiways as accurately as possible, including:

- Dimensions
- Geographical location, elevation etc. of critical elements – thresholds, intersections, lighting, navigation aids
- Markings
- Signage
- Lighting: Runway, taxiway, approach, centreline, signage
- Buildings and other structures near runways and taxiways e.g. glide path huts

Simulator Validation



Runway model 19R



Runway model for RW 01L

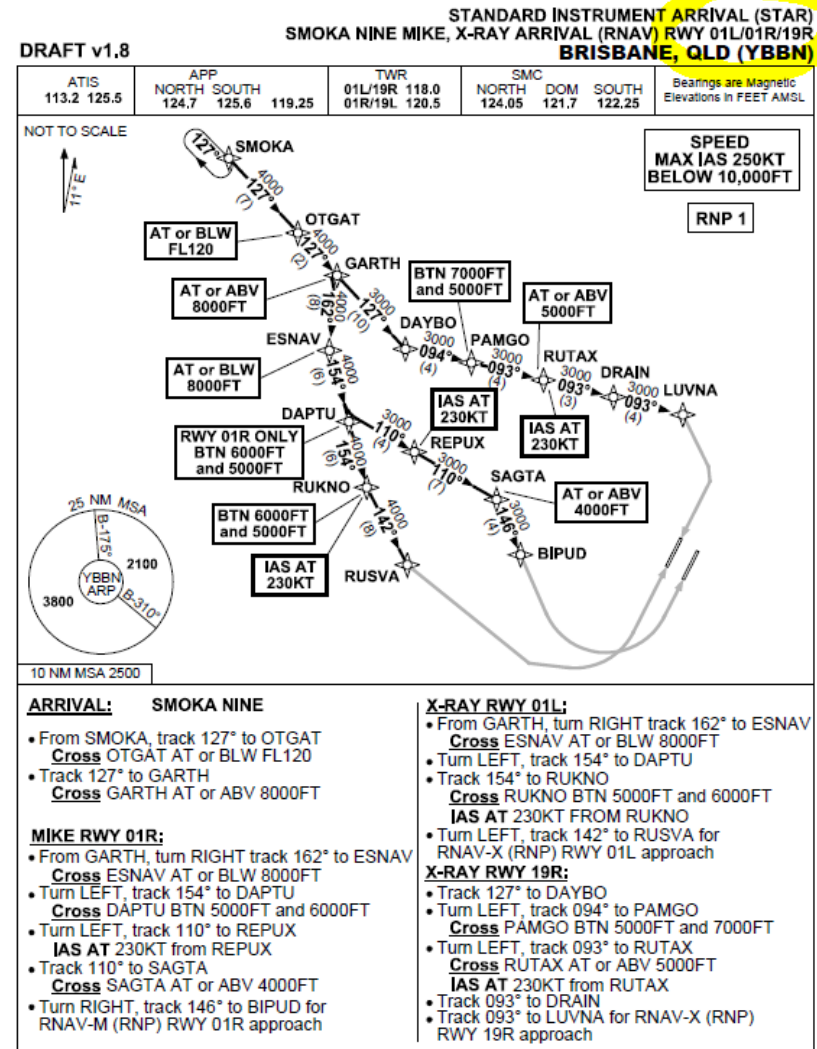


STARs

CASA selected 3 representative STARs to check during the simulator session. The three examples were the most complex in terms of speed restrictions and height requirements.

Validation findings:

- Complexity resolved by having fewer STARs on each plate
- Restricting speeds affecting flyability
- Legacy procedures were carried over



RNAV

Legacy runway:

Amendments to align with ILS waypoints

Missed approach turns 30° away from parallel runway

Baro-VNAV added

Flight validation required (Baro-VNAV)

New runway:

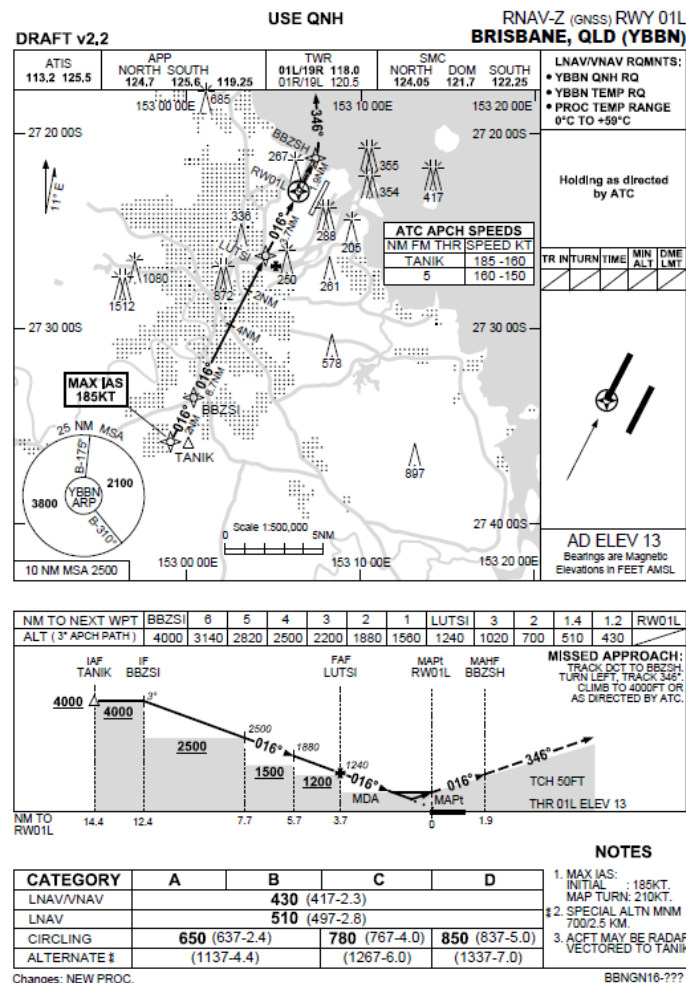
New procedures

Baro-VNAV included

Missed approach turns 30° away from parallel runway

Validation findings:

VM leg used for coding the missed approach legs – not the best choice for parallel runway operations as pilot must input wind correction. Implications for ATC (are they expecting this result?)

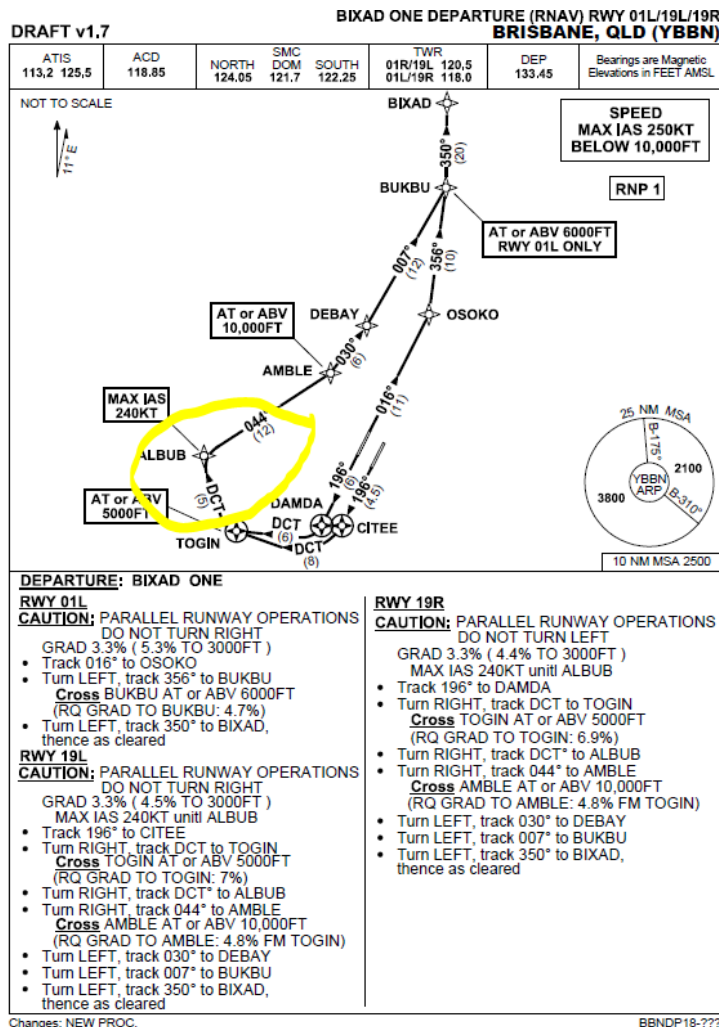


SIDs

CASA selected two representative SIDs to check during the simulator session. The two examples were the most complex in terms of climb gradients and height requirements.

Validation findings:

- Inconsistent charting between legacy and new procedures
- High climb gradients consulted with airlines
- Issues with legacy procedures were retained with the new SIDs



RNP-AR

Legacy runway:

Waypoints re-named

Missed approach adds RF leg, turns 30° away from parallel runway

Flight validation required (new RF leg)

Final vertical path 2.9° due high average temps

New runway:

New procedures

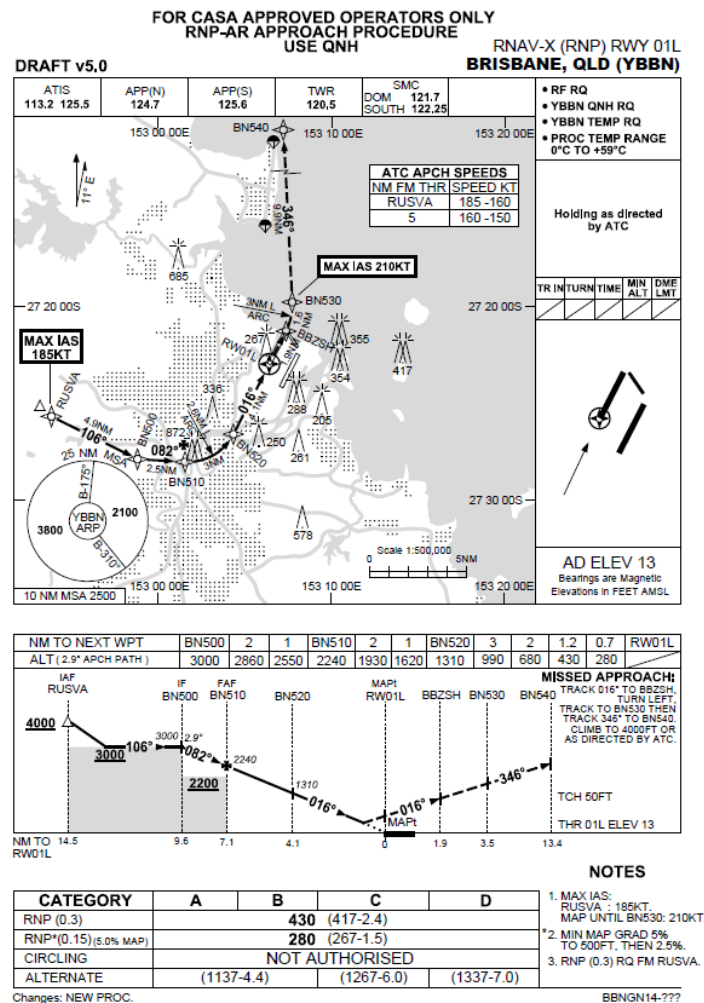
Missed approach includes RF leg, turns 30° away from parallel runway

RNP 0.15 option with 5% climb gradient due ATC tower

Final vertical path 2.9° due high average temps

Validation findings:

Flyability issues with 185kt speed restriction – requires early flap extension and speed brake. Not operationally desirable and adds extra noise and emissions



Flight validation timelines

Procedure data must be provided to CASA for review which is then sent for custom database coding for the simulator no later than 6 weeks before the AIRAC effective date of the next navigation database cycle.

CASA cut-off for BN NPR simulator navigation database	
<ul style="list-style-type: none">• Charts and coding simulator session 1• Charts and coding simulator session 2	29 August 2019 30 September 2019
Simulator runway model completed	20 October 2019
Simulator validation (booking 3 months ahead)	
<ul style="list-style-type: none">• Session 1 - SIDs, Baro-VNAVs, RNP-ARs• Session 2 – STARs, amended RNP-ARs	24 October 2019 4 December 2019
On-site flight validation	Sunday 17 November 2019
Procedure validation certification for AIP cut-off PROVISO THAT ILS FLIGHT VALIDATION MUST BE SUCCESSFUL	30 January 2020



CASA's Validation process

On site flight validation:

- Conducted by CASA validation pilot.
- Specially equipped flight inspection aircraft not required.
- On site validation:
 - Critical navigational data such as runway ends validated (lat/lon)
 - Obstacles:
 - Verify identified controlling, charted & other obstacles
 - Vegetation allowance is suitable
 - Absence of obstacles extending through the floor of the MOCA (unforeseen obstacles)
 - No penetrations of the FAS or missed approach obstacle surfaces
 - Confirmation Visual Segment Surface (VSS) is not penetrated
 - Critical navigational data such as runway ends validated
 - Aerodrome facilities support procedure
 - Local airspace arrangements – flyability/workload

CASA's Validation process

On site flight validation Day VMC only.

Aerodrome lighting commissioning conducted separately

Equipment & Crew

Aircraft:

- Usually twin engine
- Cessna Conquest/Beechcraft Baron
- Helicopter where required

Equipment and information:

- iPad (EFB)
- External GPS receiver
- GPS tracker
- Go-Pro
- Maps/charts
- Obstacle data

Crew:

- Validation pilot(s)
- Procedure designer – new procedures
- Trained observer



CASA's Validation process

On site flight validation: Equipment – iPad EFB Application

- CASR Part 175 (Aeronautical Information Management) certified Data Service Provider – refer CASA website
- Access to current maps/charts
- Current GPS aircraft position
- PANS-OPS protection areas and obstacle surface overlays (example, .kmz file)
- Obstacle and boundary overlays
- Different background maps
- Situational awareness – airspace boundaries, aircraft traffic
- Allows complex surfaces/turns to be efficiently assessed (including):
 - Baro-VNAV Final Approach Surface (FAS)
 - Missed approach surface
 - RF turns

Flight validation timelines

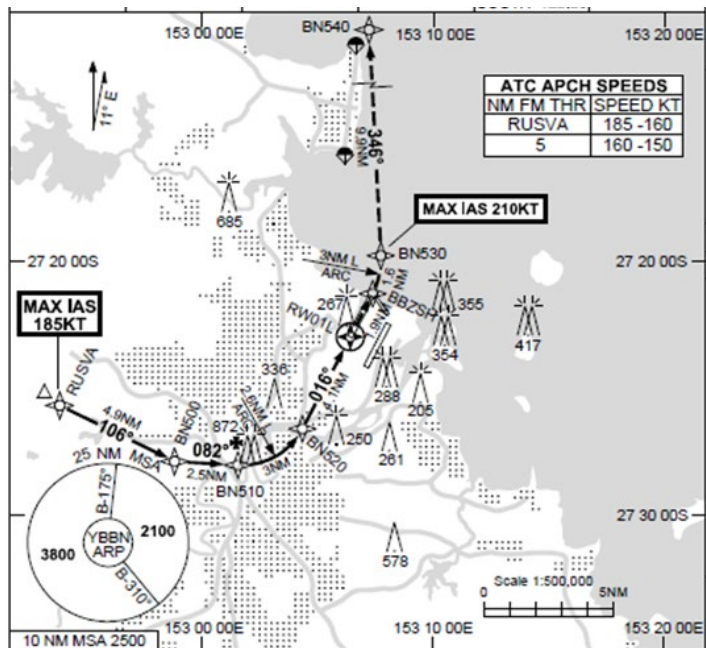
ILS/LOC commissioning	5 April 2020
Aerodrome lighting commissioning	23 May 2020 am
ILS/LOC flight validation <ul style="list-style-type: none">• ILS frequency• Radiating, not on 'TEST' (NOTAM N/A)	23 May 2020 pm
AIP publication, aircraft navigation databases updated	21 May 2020
NOTAM – new IFPs <u>unavailable</u>	21 May 2020 – 12 July 2020

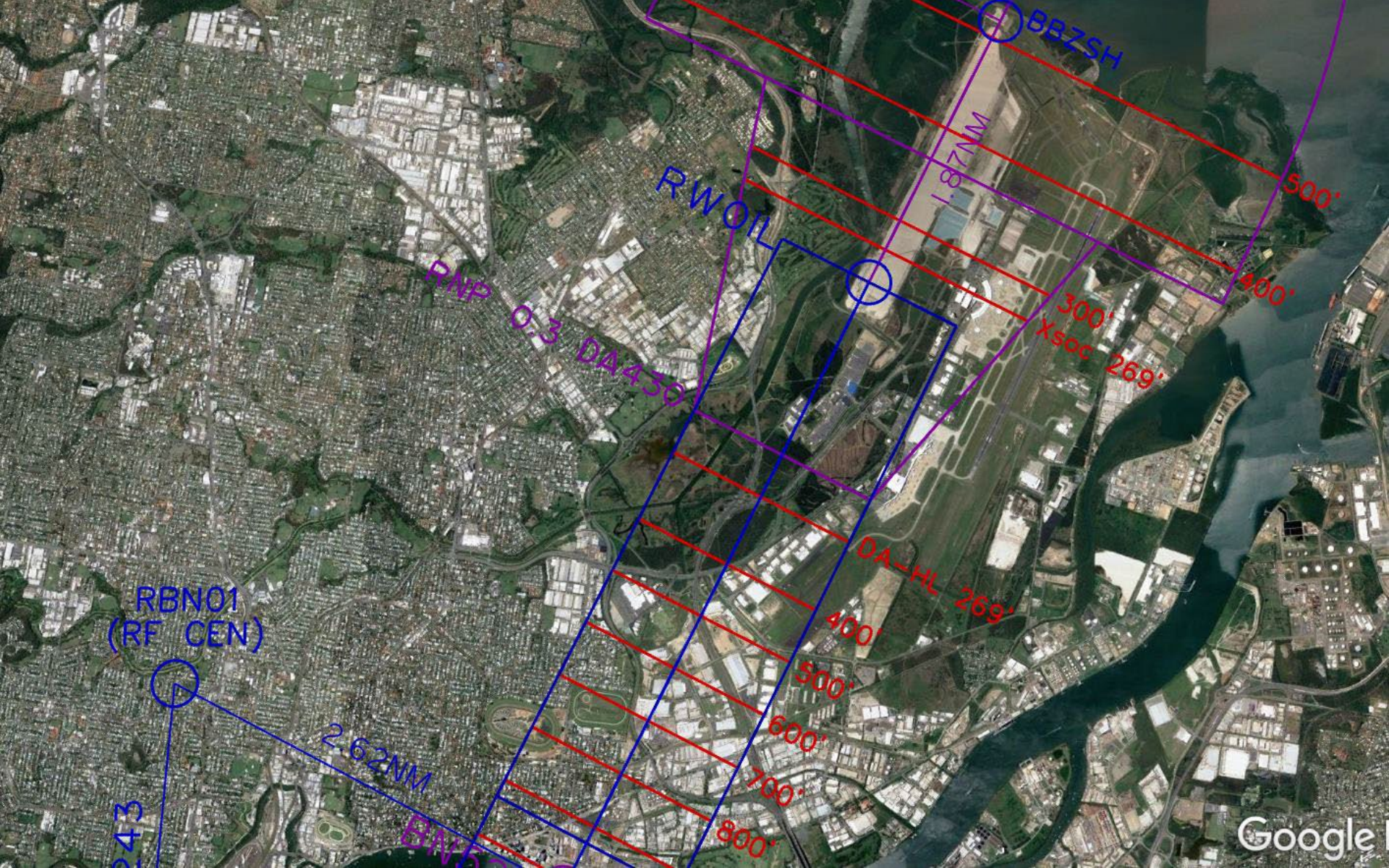
Note that over this period COVID-19 travel restrictions impacted operations: planning was difficult, staff needed to be flexible.



All workmen cleared off the runway for the aircraft fly past
Runway closure lighting and markings
NOTAM runway not available
NOTAM flight validation activities

Obstacle Validation





RBN01
(RF CEN)

243

2.62NM

R41P
0.3 DA430

RW011

DA-HL
269'

1.87NM

300'
Xsoc 269'

400'
500'
600'
700'
800'

Google

Critical Obstacles

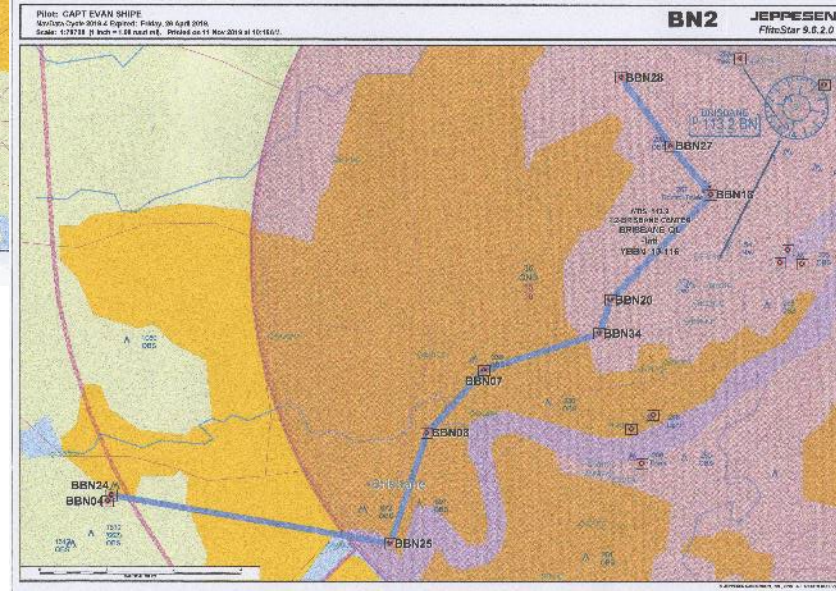
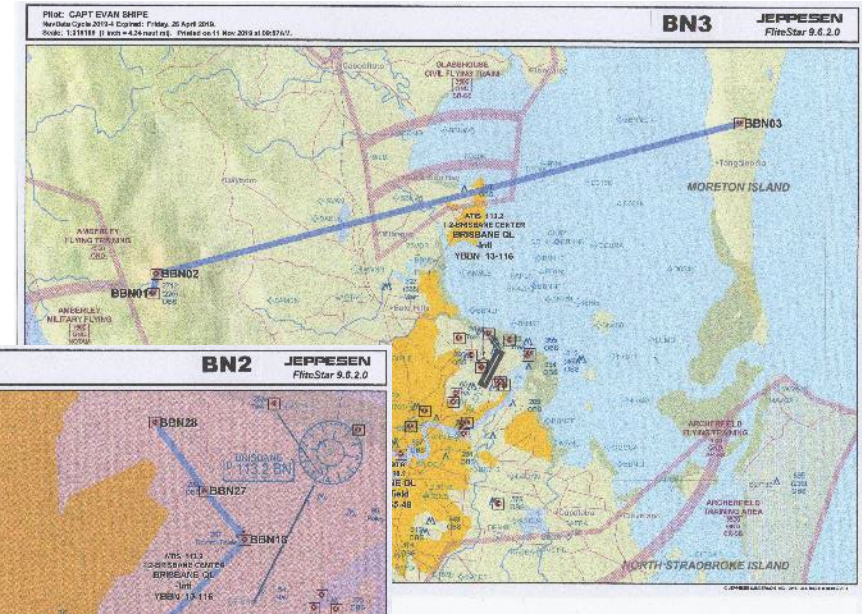
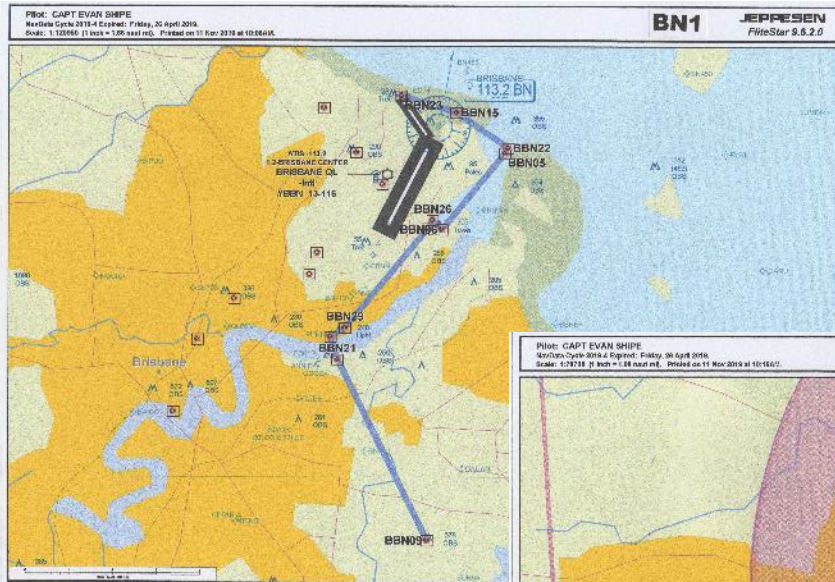
YBBN NPR OBSTACLES

Serial	Segment	Description	BRG °T ARP	Dist (KM)	Dist (NM)	Elev (ft)	MOC	Nominal Alt (ft)	OIS / Fit Alt (ft)	Approximate Position	
BBN09	RNAV-X RNP 01R INIT	160m Contour	174°	15.6	8.4	724	984	2000	1020	27 31.46	153 08.09
BBN15	LOC/RNAV/RNP 19L FINAL	0m Contour (coastline)	048°	3.9	2.1	183	246	430	190	27 21.62	153 08.82
BBN18	ILS 01L/R M/A ILS 19L/R M/A RNAV 01L/R RNAV 19L/R RNP 01L FINAL RNP 01R, 19L/R M/A	Control Tower	207°	0.5	0.2	270	161	430	270	27 23.27	153 06.93
BBN20	LOC 01L FINAL	Type B Survey TWR	222°	4.5	2.4	165	246	430	190	27 24.85	153 05.25
BBN21	LOC/LNAV 01R FINAL	Type A Survey Tower	195°	8.1	4.4	268	246	520	280	27 27.30	153 05.78
BBN22	LOC/VNAV 01R M/A SID 01R AREA 3	Wharf Crane	077°	5.3	2.8	355	164	575	420	27 22.43	153 10.16
BBN23	LOC/RNAV/RNP 19R FINAL	0m Contour (coastline)	010°	3.4	1.8	183	246	430	190	27 21.23	153 07.41
BBN24	ILS/LOC 19R M/A SID 19L/R AREA 3	Type B Survey Tower	242°	18.9	10.2	1516	472	1992	1520	27 27.78	152 56.90
BBN25	RNAV 01L/R INTER RNP 01L RF LEG	Building (Type-B)	222°	13.5	7.3	876	492	1500	1010	27 28.50	153 01.56
BBN26	VNAV 01R FINAL LNAV 19L M/A RNP 01R FLAT SFC	Type B TWR (Chimney Flare*)	135°	3.3	1.8	260	90	350	260	27 24.10	153 08.22
*CAUTION: Obstacle is gas flare. It should be inactive - but avoid overflight. Please confirm this obstacle still exists.											
BBN27	RNP 01L 0.15 FINAL	Electrical Pylon	305°	1.6	0.9	113	161	280	120	27 22.54	153 06.25
BBN28	RNP 01L M/A	Type B TWR	315°	4.0	2.1	160	0	210	210	27 21.52	153 05.42
BBN29	RNAV-M RNP 01R RF	Bridge Pole	195°	6.7	3.6	202	-	-	480	27 26.57	153 05.97
BBN30	RNP 01R FINAL	Antenna	143°	2.9	1.5	195	161	390	230	27 24.29	153 08.09
BBN31	SID RWY 01R	FV POINT AT END OF AREA 2 - OIS GRAD 2.5%							354	27 19.87	153 09.55
BBN32	SID RWY 19L	FV POINT AT END OF AREA 2 - OIS GRAD 2.5%							354	27 26.78	153 05.60
BBN33	SID RWY 01L	FV POINT AT END OF AREA 2 - OIS GRAD 2.5%							354	27 18.82	153 08.79
BBN34	SID RWY 19R	FV POINT AT END OF AREA 2 - OIS GRAD 2.8%							354	27 25.35	153 05.06

Procedure designer provides a list of the critical obstacles identified for each IFP segment.

The obstacles are marked on the geo-referenced charts and verified during flight validation.

Obstacle Validation Runs



Run charts for pilot
and ATC planning

Flight Validation

Two passes conducted

1. Check obstacle protection surfaces
2. Fly the procedure as published to confirm lateral alignment with runway, and vertical alignment against PAPI



Survey Accuracy



Threshold coordinates were provided in GDA94 not in WGS84. Threshold was about 2m out of position

PANS-AIM Accuracy requirements:

- Location < 1m
- Elevation
 - <.5m non-precision runway
 - <.25m precision runway

CASA's Validation Certification



Post validation

- Validation reports: Completed flight validation and simulator validation reports. Evaluate collected data and collate evaluation comments.
- Procedure designer: Update procedures where required.
- Procedure Validation Certificate: CASA approval to publish.

Publication timelines

CASA cut-off to procedure designer: <ul style="list-style-type: none">• Review of any remaining flight validation issues• Procedure Validation Certifications	15 January 2020
AIP cut-off <ul style="list-style-type: none">• Approved charts and coding sent for publication	30 January 2020
AIP effective date	21 May 2020
New airspace promulgated	21 May 2020
NOTAM – NPR Runways unavailable	21 May – 12 July 2020
NOTAM – new IFPs unavailable	21 May – 12 July 2020
NPR opens	12 July (not AIRAC date)

For operationally significant changes information is published 56 days (double AIRAC cycle) in advance. These changes are received well in advance so that users of the aeronautical data can update their flight management systems (FMS).

Pilot awareness of changes
provided through Aeronautical
Information Circulars

AUSTRALIA	AERONAUTICAL INFORMATION CIRCULAR (AIC)	AIRAC	H32/20
	AERONAUTICAL INFORMATION SERVICE, AIRSERVICES AUSTRALIA, GPO BOX 367, CANBERRA ACT 2601	Effective: 202005201600 UTC	
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BRISBANE AIRPORT (YBBN) NEW PARALLEL RUNWAY AIRSPACE AND OPERATIONS

1. INTRODUCTION

- 1.1 This AIC provides information for pilots and other airspace users regarding changes to operations in airspace around Brisbane Airport as a result of the New Parallel Runway (NPR).
- 1.2 Pilots should refer to AIC H29/20 for a summary of airspace, route, waypoint, VNC and VTC chart changes.
- 1.3 Delays and restrictions may apply to air work flights such as NAVAID training and survey flights in CTA within 30NM of YBBN.



Aircraft parked on the decommissioned runway during COVID-19

Terrain Awareness & Warning System (TAWS)

- The TAWS in certain aircraft types including B787, some A320 fleets and other types did not contain the runway data for the new runways, even though their databases were current.
- The omission meant that the system on the affected aircraft did not recognize that it was approaching a runway.
- The TAWS assessed the aircraft to be operating unsafely and triggered a warning to flight crews.
- This was applicable for both departure and arrival phases of flight.
- Operators were advised of the issue, and also advised that they should notify ATC if unable to operate on the new parallel runway. (NOTAMs issued)
- Operators had to contact their TAWS database suppliers to make an out-of-cycle update

Lessons Learned

Long projects will likely have many staff and management changes, ensure agreements and sign-off at each stage

Single point of contact at the Regulator to coordinate each different regulatory service teams (Parts 139, 171, 172, 173, 175)

Track readiness for each regulatory part

The aerodrome and ANSP should engage with the Regulator from the start, considering the evolving design

Imperative that ATC is fully consulted on all IFPs

Take account of long publication cut-off dates and AIRAC dates

Confirm all survey data after construction

Advise airline operators to update TAWS terrain databases

Avoid last minute changes requiring complex NOTAMs

Thank you

Questions?