

Notice of Proposed Rule Making

NPRM 20-01

Part 91 Performance Based Navigation Regulatory Framework

Docket 21/CAR/3

Background to the Civil Aviation Rules

The Civil Aviation Rules (**the Rules**) establish the minimum regulatory safety boundary for participants to gain entry into, operate within, and exit the New Zealand civil aviation system. The Rules are structured in a manner similar to the Federal Aviation Regulations of the USA.

Rules are divided into Parts and each Part contains a series of individual rules which relate to a particular aviation activity. Some rules empower the use of a CAA notice. Notices contain specific mandatory requirements including detail about the approvals, standards, conditions, procedures and technical specifications that have been approved or determined by the Director as being appropriate in accordance with the corresponding enabling rule.

Advisory Circulars accompany many rule Parts and contain information about standards, practices and procedures that the Director has established to be an Acceptable Means of Compliance (AMC) with the associated rule. An advisory circular may also contain guidance material to facilitate compliance with the rule requirements.

The objective of the Civil Aviation Rules system is to strike a balance of responsibility between, on the one hand, the Crown and regulatory authority (CAA) and, on the other hand, those who provide services and exercise privileges in the civil aviation system. This balance must enable the Crown and regulatory authority to set standards for, and monitor performance of, aviation participants whilst providing the maximum flexibility for the participants to develop their own means of compliance within the safety boundary.

Section 12 of the Civil Aviation Act 1990 prescribes general requirements for participants in the civil aviation system and requires, amongst other things, participants to carry out their activities safely and in accordance with the relevant prescribed safety standards and practices.

Section 28 of the Act allows the Minister to make ordinary rules for any of the following purposes:

- the implementation of New Zealand's obligations under the Convention
- to allow for the mutual recognition of safety certifications in accordance with the ANZA mutual recognition agreements
- the provision of aviation meteorological services, search and rescue services and civil aviation security programmes and services
- assisting aviation safety and security, including (but not limited to) personal security
- assisting economic development
- improving access and mobility
- protecting and promoting public health
- ensuring environmental sustainability
- any matter related or reasonably incidental to any of the following:
 - i. The Minister's objectives under section 14 of the Act;
 - ii. The Minister's functions under section 14A of the Act;
 - iii. The Authority's objectives under section 72AA of the Act;
 - iv. The Authority's functions and duties under section 72B of the Act; and
 - v. The Director's functions and powers under section 72I of the Act
- any other matter contemplated by any provision of the Act.

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1. Purpose of this NPRM

The purpose of this rule-making proposal is to update the Civil Aviation Rules (the Rules) to provide the regulatory framework to support the use of Performance Based Navigation (PBN) by operators. It will also allow operators to realise the full benefits of PBN operations by increasing PBN uptake, facilitating the use of more advanced forms of PBN and reducing mixed-mode operations.

The desired outcome of this proposal is the safe implementation of PBN, in a way that minimises the regulatory burden, provides flexibility to accommodate changes in technology, and that is clear for the CAA and participants.

In particular, this proposal seeks to ensure that –

- PBN specifications and associated requirements (including equipment standards) are defined clearly within the regulatory framework, and are sufficiently performance-based to accommodate changes in navigation technology;
- aircraft and operators hold appropriate operational approvals for defined PBN specifications, where necessary;
- operators only use PBN procedures of the specification for which they hold the appropriate level of training, knowledge and skill;
- appropriate AMC are available to operators to support their use of PBN procedures;
- New Zealand is able to implement any new or existing PBN specification as required now or in future;
- aircraft can be extracted and recovered safely in the event of a GNSS systems failure or other loss of PBN capability; and
- all terminology used in the PBN environment is consistently and clearly understood by regulators and sector participants.

Requirements and processes used to deliver the above outcomes should have a clear legislative basis and be sufficiently flexible to ensure that the future evolution of PBN can be accommodated.

2. Background to the proposal

2.1 General Summary

Since 2009, New Zealand has been implementing PBN across the aviation system.

Since the 1920s, aircraft have navigated at night and in bad weather by flying in a series of straight lines between radio beacons located on the ground. As these beacons have limited range, a flight between two points will often need to plot an indirect and inefficient zigzag course using several different ground-based navigation aids (GBNA).

This type of navigation results in large airspace separation buffers that commercial airplanes must use because of both the inherent inaccuracies of ground-based navigation methods and the need to protect against operational errors.

PBN moves aircraft navigation away from this methodology to a system primarily reliant on satellite-based technologies, utilising Global Navigation Satellite Systems (GNSS) such as the USA's Global Positioning System (GPS). This enables aircraft to fly routes directly between virtual waypoints at set geographical coordinates, rather than between physical beacons. As the number of possible virtual waypoints is effectively infinite, routes using them are able to be much more direct than those using GBNA.

There are two types of PBN: Area Navigation (RNAV) and Required Navigational Performance (RNP). RNAV is essentially simple straight-line waypoint-to-waypoint navigation, whereas RNP is more advanced and can enable curved routing.

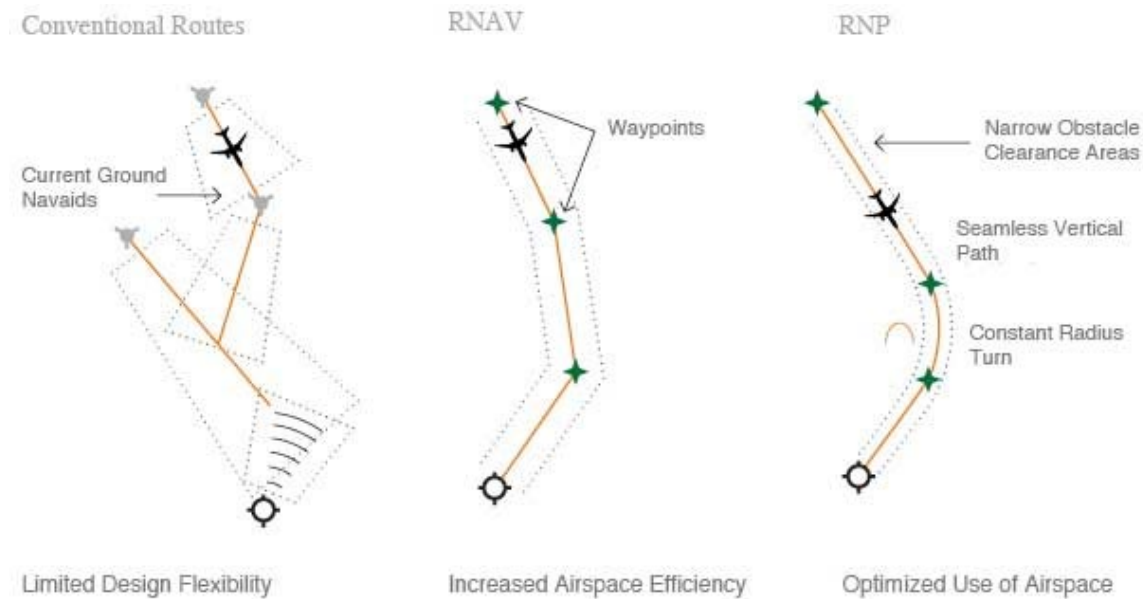


Figure 1: Conventional vs PBN route structure

What are PBN specifications?

Unlike ground-based navigation, which is regulated largely through standards that specify the integrity of navigation equipment, PBN regulation takes into account the capability of the aircraft, operational procedures and how well the whole system performs in terms of its ability to maintain a prescribed level of accuracy. These performance requirements are identified as navigation specifications (referred to in this document as “PBN specifications”).

PBN specifications define the level of navigational precision that must be achieved and are named according to that level of precision. For example, the “RNP 1” specification means that the aircraft must be able to calculate its position to within a circle with a radius of 1 nautical mile. This means that the aircraft is capable of flying along a virtual path 2 nautical miles wide without straying outside its boundaries (these path boundaries are portrayed as dotted lines in Figure 1 above). Likewise, the “RNP 4” specification allows for flight within a path 8 miles wide.

Special RNP approach specifications, designated “RNP-Authorisation Required” (RNP-AR) require a level of navigational precision as high as 0.1 nautical mile. This allows aircraft to follow precise three-dimensional curved flight paths through congested airspace, around noise sensitive areas, or through difficult terrain.

As technology develops and the capability of PBN is increased, newer and more complex PBN specifications have been developed and will continue to be developed. These will enable new types of operation, such as safe low-level helicopter flight through complex terrain.

The Air Navigation Service Provider (ANSP) in each country (in New Zealand, this is Airways) designs and promulgates set routes and procedures that aircraft flying PBN must follow. These can loosely be compared to virtual roads in the sky, ranging from en-route segments for flight at cruising altitude between two points, to complex curved approach procedures to guide an aircraft through hilly terrain to an aerodrome.

These routes are designed to PBN specifications appropriate for their intended use, which depends on factors such as traffic density, terrain proximity and the level of air traffic surveillance. These routes are designated with the PBN specification they are designed to. For example, a departure route from an aerodrome might be designed to the RNP 1 specification and would therefore be designated as an RNP 1 route.

In order to use that RNP 1 route, the aircraft must be properly equipped to the appropriate standard, the pilot must be appropriately trained and there must be appropriate operational procedures in place. This is normally demonstrated through an approval issued by the CAA for the aircraft and operator.

Aircraft and operators will often be approved to a number of PBN specifications, which are needed to carry out a particular flight. A typical flight from Auckland to Queenstown might involve a departure using an RNP1 route, an RNAV 2 en-route segment, an RNP1 arrival procedure and an RNP-AR approach procedure.

The international harmonisation of PBN specifications is achieved by ICAO through the publication of a PBN manual that sets out how States and operators can implement the various specifications.

How PBN is regulated at present

PBN relies on strict adherence to navigational specifications to ensure that separation between aircraft and from terrain is maintained. If there is a reduction in navigational accuracy, an aircraft can deviate outside the boundaries of the route it is flying on, which greatly increases the probability of a collision. Given the high level of safety risk, regulation is needed to ensure the safety of the system.

The current regulatory framework has evolved over time in response to new aircraft navigation methods and technology. The most recent significant change was a transitional Rule Part 19D introduced in 1997 to enable navigation using GPS, but which predated the PBN concept. Additional ad-hoc amendments to the rules have been made since then to enable some, but not all, aspects of PBN.

Under the existing rules, an operational framework has been developed to regulate the use of PBN, and this has been predominantly structured around the approval of equipment on the aircraft that is needed to navigate using GPS. The current rules require that the Director of Civil Aviation must approve aircraft navigation equipment that is used for GPS navigation and for RNP navigation.

Rule Part 19D – IFR Operations: GNSS

Rule Part 19D contains some operational and pilot qualification requirements for GPS navigation that would be applied to PBN. These requirements prescribe some aspects of how navigational equipment is to be used and ensure that basic safe navigational principles are applied by pilots. However, they were not developed with the PBN concept in mind and do not account for the differences between the various PBN specifications in use. In particular, Part 19D does not include provision for the special operational requirements needed for the use of more complex and advanced PBN specifications.

One of the core principles of Part 19D, considered necessary for safe operation, is that IFR flights should not be conducted using GPS as a “sole means” navigation system. This means that flights using GPS navigation should be able to revert to navigation using GBNA in the event that there is a failure with the GPS system on the aircraft or with the GPS network.

A “sole means” GPS flight is one where safe navigation relies entirely on the integrity of the GPS network and related aircraft equipment. This is not presently considered a safe mode of operation in anything other than remote and oceanic airspace where there is little or no risk of collision with other air traffic or with terrain.

The act of reverting from GPS to an alternative navigation method is known as “extraction,” and the process of landing the aircraft safely in this situation is known as “recovery.” Safe extraction and recovery procedures are a key aspect of PBN, and in most cases are dependent on a network of GBNAs.

Part 19D does not permit “sole means” GPS navigation and requires flights to be operated with a back-up navigation system that is appropriate to the route being flown. In practice, this means that the aircraft must be able to revert immediately to a ground-based navigation system. Consequently, there are no provisions for extraction and recovery included in that rule. However, a general exemption, 11/EXE/7, was issued in 2010 to permit limited use of GPS navigation outside of GBNA coverage subject to conditions, which include provisions for extraction and recovery.

A map of the proposed future GBNA reception is provided in figure 2 below. At higher altitudes (e.g. the pink shaded areas at 10,000 feet), there is wider coverage than available at lower altitudes (e.g. the green shaded areas at 3000 feet). An aircraft navigating using GPS *outside* the shaded area applicable to their altitude could not immediately revert to GBNA reception.

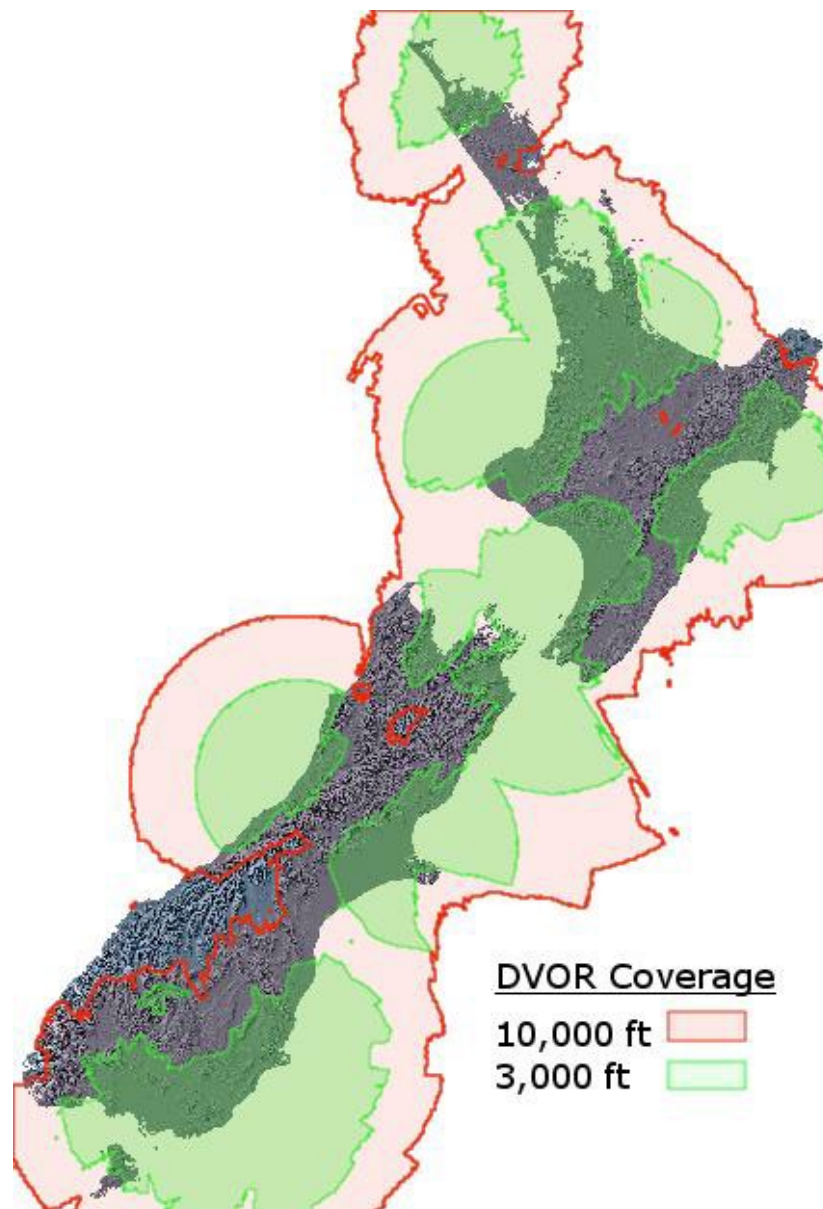


Figure 2: Proposed future GBNA coverage map

The operational implementation of PBN is achieved by the use of Advisory Circulars (ACs), which are documents issued by the CAA detailing acceptable means of complying with the rule requirements. Ideally, rules should prescribe a requirement in terms of the outcome that needs to be achieved, and an AC would set out one (or more) acceptable means of compliance with that requirement. ACs can also be used as general guidance material to help explain rule requirements. The current PBN regulatory framework differs from this ideal structure.

For the operational implementation of PBN specifications, the ACs have been used to promulgate requirements for obtaining CAA approval to conduct PBN operations. They explain the process for obtaining approval and include technical requirements for the aircraft and operator. In doing this, the ACs contain substantive requirements, which is not aligned with good regulatory practice.

The rule requirements that are applicable are focussed on aircraft equipment requirements and do not cover many of the operational aspects of PBN. The operational procedures, aircrew competency and aircraft equipment needed to safely navigate can vary significantly depending on the PBN specification being used. As these variations are not captured within the rule framework, the link between the rules and ACs for the various PBN specifications is often unclear.

In developing ACs, the CAA has referred to ICAO Standards and Recommended Practices (SARPs) for PBN. As a result, there was alignment between ACs and the ICAO SARPs in place at the time they were drafted. However, there has been some degree of divergence since then as ICAO SARPs have been updated.

Not all PBN specifications in use in New Zealand have associated ACs. RNP-AR in particular is an example of this, with the CAA relying on an overseas national regulator's AC to promulgate requirements.

The basis for PBN ACs is rule 91.519(c), which states:

An aircraft and aircraft navigation system operating in accordance with RNP performance requirements must be approved by the Director for operation on the applicable RNP routes and in RNP designated airspace.

As described above, RNP refers to "Required Navigation Performance" and is one of two forms of PBN, with the other being Area Navigation (known as RNAV). This requirement only refers to the aircraft and aircraft navigation systems used for RNP, with no mention of operational requirements. The "RNP performance requirements" referred to in rule 91.519(c) are not defined anywhere in the rules.

The only rule criteria against which aircraft navigation systems can be assessed for the purposes of RNP approval is set out in rule 91.519(b), which requires that the navigation system must meet one of the standards prescribed in Appendix A.9 to Part 91.

There are no references to RNAV within Part 91, despite RNAV routes and procedures being in use in New Zealand. Rule 19.207(1) requires that GPS equipment must be approved on a specified CAA Airworthiness approval form (CAA 2129). This provides a general basis for the equipment aspect of an RNAV PBN approval, with standards accepted on the same basis as described for RNP equipment above.

Rule 91.246 applies exclusively to airspace that is designated as "RNP Airspace," which means airspace where aircraft must operate to RNP specifications. This differs from RNP routes and procedures used in airspace that is not designated as RNP Airspace. This results in differing rule requirements depending on whether the RNP route the aircraft is operating on is in RNP Airspace or not.

The policy problem

The current regulatory framework does not provide a comprehensive framework for PBN

Although PBN continues to be successfully implemented in New Zealand, the current regulatory framework is not comprehensive and is not structured in a way that is appropriate for PBN. This creates an unnecessary regulatory burden that affects operators in terms of their understanding of requirements and their ability to maximise the benefits of PBN operations, and the CAA in terms of the additional resource needed to administer the requirements.

There is a disconnect between the framework that has been used to operationalise PBN, and the rules that underpin it due to PBN not having been anticipated when the rules were put in place. This impairs the ability of the CAA and stakeholders to implement new PBN specifications, and to realise the full benefits of existing ones while maintaining safety.

Existing rules relating to navigation are outdated, not well structured for PBN, and do not provide an adequate level of safety assurance for some aspects of PBN operations. Some are also quite prescriptive and do not provide sufficient flexibility to accommodate future changes in technology. The rules framework has evolved through a series of piecemeal amendments, which were made reactively to enable PBN operations.

Regulatory burden on the sector

This presents a barrier to the uptake of PBN by smaller operators.

Without a supportive regulatory framework, it will also be difficult to realise the potential efficiency benefits that PBN can bring, in particular the ability to fly more efficient procedures based on newer and more advanced PBN specifications.

Safety assurance

A lack of regulatory clarity means that there is less confidence that all users of the aviation system are operating to the same set of safety requirements. If regulatory requirements are clear and unambiguous, there is a lower risk of operators adopting differing interpretations from one another.

The current regulatory framework is not sufficiently clear to provide assurance that all PBN operations are carried out with adequate extraction and recovery processes in place to ensure that aircraft can navigate and land safely in the event of a loss of PBN capability.

If such extraction and recovery procedures were not in place at the time a loss of PBN situation occurred, there would be a high risk to safety resulting from a lack of planning and coordination. This may manifest as a loss of safe altitude or traffic separation margins, or an inability to reach and carry out a safe landing at an alternate aerodrome.

Who is affected and how?

The purpose of the proposed change is to support the increased uptake and ongoing use of PBN by operators. This will primarily affect aircraft operators, Airways (as the designer and publisher of PBN routes), and the CAA (as the regulator). The change is expected to bring about several key behaviour changes:

- the CAA will provide clearer, more consistent and efficient processes to stakeholders seeking to use PBN;
- operators will be more likely to use PBN, make greater use of more advanced PBN specifications, and be more knowledgeable about what is expected of them with respect to PBN operational requirements; and
- Airways will have greater clarity around the process for implementing new PBN specifications, which will enable a greater shared understanding of how those specifications can be used.

There is general support from stakeholders for the modernisation of the regulatory framework, with any reservations being limited to specific details of proposals.

What are the objectives?

The desired outcome is the safe deployment and operation of PBN, in a way that minimises the regulatory burden, provides flexibility to accommodate changes in technology, and that is clear for the CAA and aviation sector participants. The purpose of this is to realise the full benefits of PBN operations by increasing PBN uptake, facilitating the use of more advanced forms of PBN and reducing mixed-mode operations. More specifically the proposed rule changes seek to ensure that:

- PBN specifications and associated requirements (including equipment standards) are defined clearly within the regulatory framework, and are sufficiently performance-based to accommodate changes in navigation technology.
- Aircraft and operators hold appropriate operational approvals for defined PBN specifications, where necessary.
- Operators only use PBN procedures of the specification for which they hold the appropriate level of training, knowledge and skill.
- Appropriate AMC are available to operators to support their use of PBN procedures.
- New Zealand is able to implement any new or existing PBN specification as required now or in future.
- Aircraft can be extracted and recovered safely in the event of a GNSS systems failure or other loss of PBN capability.
- All terminology used in the PBN environment is consistently and clearly understood by regulators and sector participants.

Requirements and processes used to deliver the above outcomes should have a clear legislative basis and be sufficiently flexible to ensure that the future evolution of PBN can be accommodated.

Achieving the desired outcome will be highly dependent on the structure of the regulatory framework. There is a need to define technical requirements in a way that is robust, clear and is able to accommodate change brought about by external factors, such as revisions to international standards and practices.

2.2 NPRM Development

Technical experts from the operational groups within the CAA and stakeholders of the New Southern Sky Programme contributed to the development of the policy and this NPRM. Airways contributed to the development of this proposal from a surveillance infrastructure perspective. The development of the NPRM reflects comments and feedback received from industry in response to targeted engagement that took place in November 2019.

In September 2020, Cabinet approved the Minister of Transport's proposal to update the Rules to provide full regulatory support for the increased uptake and ongoing use of Performance Based Navigation (PBN) by operators.

Consultation

There has been consistent engagement with the sector on the decision to provide full regulatory support for PBN operations following the approval of the National Airspace and Air Navigation Plan (NAANP) in 2014. The NSS Programme has engaged with the aviation sector continuously for the past four years and signalled the planned move to support PBN operations from the outset.

Whilst robust engagement with the sector has occurred over the past four years, the project has now reached the formal consultation phase. Members of the aviation community and any affected persons are encouraged to take this opportunity to provide formal feedback on the proposal.

2.3 Key Stakeholders

The following are identified by the Civil Aviation Authority as key stakeholders in the proposed rule amendments contained in this NPRM:

- The Civil Aviation Authority;
- The Minister of Transport;
- The Ministry of Transport
- Airways
- Part 119 and 129 certificate holders
- Part 91 operators

3. Issues addressed during development

Unclear and outdated regulatory framework for PBN operations, reliance on ACs

The existing rules do not clearly permit or set appropriate standards for the navigation equipment necessary for PBN operations. Current operational processes rely on ACs to prescribe requirements, and there is no clear mechanism to enable the use of new equipment standards. The framework is simply not sufficiently flexible to appropriately respond to future technical developments in PBN operations.

The application of RNP navigation equipment requirements exclusively to areas designated as RNP airspace, but not RNP routes outside RNP airspace, means that requirements are not consistent across all RNP operations. This combined with the use of outdated terminology and standards, means that operators are unable to determine what is required to conduct PBN operations without reference to guidance material.

Key terminology that is used, or to be used in the future, in New Zealand's PBN environment is not currently defined in the rules.

Benefits

PBN is delivering a range of operational and other benefits in New Zealand. These include:

- Improved safety of departure, en-route, terminal and approach operations brought about by improved navigational accuracy. Increased accuracy means that there is more reliable separation from terrain and other traffic, and hence a lower risk of collision with either. The risks on the approach to landing are reduced by flying a more stable flight profile, increased use of automation and reducing the pilot workload, providing pilots with more resources to handle events that may arise.
- Improved operational efficiency achieved by more direct routes with more flexibility (e.g. avoiding inclement weather). In New Zealand, most routes between cities are already relatively direct, however the implementation of PBN is delivering benefits by designing shorter more efficient approaches to landing and improving flight schedule reliability while ensuring safe operations at airports surrounded by complex terrain (e.g. Queenstown or Wellington).
- Reduced infrastructure costs as fewer GBNA are needed to enable day-to-day operations (although there is a need to maintain a minimum GBNA network for contingency purposes).

- Increased airspace and airport capacity, which can be achieved through more efficient design of routes in controlled airspace. More efficient approach and departure procedures can mean that more aircraft can take off and land per hour.
- Reduced environmental impact and fuel costs per flight due to reduced fuel burn and efficiency improvements from shorter routes and more efficient climb and descent paths. Reduced fuel burn equates to reduced CO2 emissions.
- Reduced community exposure to noise in some cases, where the design of routes can be tailored to minimise the frequency and proximity of aircraft flights over communities.

In summary, the broader benefits for participants are set out below:

- *For regulated parties* – greater clarity of requirements and improved processes for obtaining PBN approval, leading to easier access to the benefits of PBN and a lower regulatory burden.
- *For regulators* - greater clarity of requirements allowing for better allocation of resources.
- *For wider government* – increased use of PBN, and the adoption of more advanced PBN procedures, by emergency medical service helicopters can lead to better health outcomes due to faster and more reliable patient transfers.
- *Other parties* – greater safety assurance for the travelling public through wider uptake of PBN and clear requirements for the safe extraction and recovery of aircraft in the event of system failure.

Furthermore, New Zealand has committed to supporting the International Civil Aviation Organization (ICAO) PBN Initiative, which is aimed at improving global aviation safety, efficiency and reducing environmental impact through wider implementation of PBN. This is achieved through global harmonisation of navigation specifications permitting greater interoperability between regional Air Traffic Management systems and reduced administrative requirements.

Costs

Impact on operators

It is not proposed to mandate the use of PBN in New Zealand. As a result, there are no direct costs imposed on operators by the proposed PBN regulatory framework, or any action required to continue operating. However, in order to enjoy the benefits of PBN, operators would need to upgrade their aircraft with PBN navigation equipment if they have not already done so.

Lower priority access to airspace

Those who choose not to upgrade their equipment are likely to experience lower priority access to airspace than PBN operators. This is because most air traffic will use PBN procedures, with aircraft using legacy procedures being the exception, and requiring special handling by air traffic controllers. This in itself carries a cost in terms of additional time and fuel burnt where aircraft are held back by air traffic control (for example, an aircraft using a legacy approach procedure may be sequenced in a landing queue behind other aircraft using PBN approach procedures, which the air traffic controller can accommodate more easily). In order to avoid this, operators would need to upgrade their aircraft equipment to PBN, which may cost in the order of \$15,000-\$30,000 per aircraft.

This cost is not directly related to the regulatory changes proposed in this document, but is included for completeness and context on the wider PBN implementation.

Changes to ground-based navigation infrastructure

There is a need for a network of GBNAs to support the extraction and recovery of aircraft in the event of PBN system failure. As the aviation system has transitioned from GBNA navigation to PBN, Airways has reduced and rationalised the GBNA network, as some equipment is no longer used for routine operations. However, there is a need to retain a Minimum Operating Network (MON) for extraction and recovery purposes.

A design for a MON was developed and agreed by a stakeholder panel led by the Ministry of Transport, prior to the development of the proposals outlined in this document. The proposed requirements for extraction and recovery will have some impact on whether that MON design is fit for purpose.

The MON as currently planned would be adequate to enable extraction and recovery for most aircraft in most locations. However, although the proposed extraction and recovery requirements reflect what operators should be doing at present, the process for developing that proposal has highlighted potential gaps in the MON that were not noted when the MON was designed.

For example, an Emergency Medical Service (EMS) helicopter operating in the Otago Basin may not have ready access to the MON and therefore no means of extraction and recovery using normal standard procedures. This may prevent EMS operations from occurring in some circumstances, which would have a negative impact on health and search and rescue outcomes. To ensure services can operate, additional GBNA infrastructure may be needed above what is currently planned for and funded by Airways. This would impose both capital costs and ongoing running costs.

Whether the need for additional GBNA infrastructure arises will depend, to a large extent, on whether operators are able to develop alternative special extraction and recovery procedures that do not rely on GBNA infrastructure. If additional infrastructure is required, further work would be required to determine its extent, cost and funding mechanism. As an indication, the cost of a ground-based navigation aid is in the order of \$1,300,000 capital and \$20,000 annual operating cost.

The MON is currently being reviewed in light of these proposals to determine whether changes are required.

Other costs

Costs to the regulator would be limited to the development of appropriate guidance material to communicate requirements to regulated parties. These would fall within existing baselines.

3.1 ICAO Standards and Recommended Practices (SARPS)

The proposed rule amendments are intended to align with International Civil Aviation Organization (ICAO) annexes and are written in consultation with the following annexes:

- Annex 1 – Personnel Licensing
- Annex 2 – Rules of the Air
- Annex 6 – Operation of Aircraft
- Annex 8 – Airworthiness of Aircraft
- Annex 10 – Aeronautical Telecommunications
- Annex 11 – Air Traffic Services
- Annex 12 – Search and Rescue
- Annex 15 – Aeronautical Information Services
- Document 9613: Performance Based Navigation Manual

3.2 Level of Risk to NZ Aviation Safety

Safety is a key driver for this proposal. Rules that are unclear or out of date create safety risks as they are less able to be applied consistently. By improving the clarity of requirements, participants will be more knowledgeable of what is required of them to operate safely.

Modernising the rules for PBN will ensure that they are suitable for PBN operations now and into the future, and that they are sufficiently flexible to adapt to changes in technology while maintaining the overall safety of the aviation system. Aligning requirements with international standards and recommended practices where appropriate, while also tailoring them for New Zealand's operational environment, will enable the widespread use of PBN to conduct operations in New Zealand.

It is envisaged that the level of risk to the New Zealand aviation safety as a result of this proposal is low.

3.3 Compliance Costs

Costs for operators

The cost of upgrading aircraft with PBN navigation equipment is approximately \$15,000 to \$30,000 per aircraft. The costs differ from one aircraft to another depending on various factors such as the existing aircraft avionics systems. As noted above, incurring these equipment costs is not *required* under this proposal, as legacy procedures remain acceptable under the proposed regulatory framework.

Capital costs for changes to ground-based navigation structure

Stakeholders have identified geographical areas where the proposed rationalisation of GBNA infrastructure may result in operational restrictions under both the existing and proposed regulatory framework. In order to maintain existing operational capabilities, there may be a need for additional GBNA. The cost of a suitable ground-based navigation aid is approximately \$1,300,000 capital and \$20,000 annual operating cost.

Other costs

Costs to the regulator would be limited to the development of appropriate guidance material to communicate what the requirements are to regulated parties. These costs would fall within existing baselines.

4. Summary of changes

Part 91 amendments

Rule 91.246 (*Operations in designated airspace*) is to be revoked as the rule is considered redundant. The requirements specified in the existing rule 91.246 mirror those that would be applicable to an operator conducting a flight to RNP10 or RNP4 navigation specifications. Under this proposal, these requirements would be specified in a notice¹, and operators would be required to meet these requirements. This proposed framework removes the need to specify detailed requirements in the rules. It is anticipated that these requirements would be updated regularly due to technological developments over time, thus it would be more appropriate to place them in a notice.

New draft rule 91.261 is inserted to specify the requirements for navigation specification. The proposed rule prohibits a person from operating an aircraft using a navigation specification unless all of the requirements specified in the rule are met. These requirements include having the aircraft meet the airworthiness and performance requirements determined by the Director as specified in a notice. In addition, the person must be suitably trained and qualified for the navigation specification applicable to the planned route and airspace, as specified in a notice.

New draft rule 91.263 is inserted to allow the Director to determine navigation specifications and certain requirements to be specified in a notice. For instance, these relate to the operational requirements and limitations associated with the navigation specifications, the airworthiness and performance requirements for an aircraft, and the requirements for demonstrating compliance with the navigation specifications.

Notices would specify whether operational approval by the Director is required for each navigation specification. This would enable operational approval requirements to be easily amended in future if it were determined that they were no longer necessary.

New rule 91.263B is inserted so that the procedures for issuing ADS-B notices will also apply to the making, amending or revoking of a navigation specification notice. When following the procedures, a reference to *ADS-B* or *ADS-B systems* is to be read as *PBN* or *navigation specifications*. Similarly, a reference to *surveillance* or *surveillance systems* is to be read as *navigation* or *navigation systems*. This is to ensure that the same procedures are followed for making, amending or revoking notices, and avoids having a duplicate set of similar procedural rules.

New rule 91.263D is inserted to provide for the expiry of transition provisions to be specified by the Director in a notice. It is intended that the draft legacy Non RNAV RNP notice expire 2 years from the date that the new rules come into force. However, this does not negate the Minister's ability to specify transition provisions in the rules. This is indicated in the

¹ Section 28(5) of the Civil Aviation Act permits the Minister of Transport to make ordinary rules and to specify terms and conditions that require a matter to be determined by the Authority, the Director, or any other person. This also includes imposing requirements or conditions as to the performance of any activity. Since July 2018, the Director has made such determinations in the form of notices. An example of a notice can be viewed here - <https://www.aviation.govt.nz/assets/rules/notices/notice-ntc-091-258.pdf>

draft rule where it states – “*Unless otherwise provided for in the rules, the expiry of any transitional provision for a matter determined by the Director in a notice, may be specified by the Director in the notice.*”

New rule 91.263F is inserted to provide for a Savings provision. This proposed provision is to allow certain approvals and operations currently in place to continue under the new PBN rules regime. In this regard, an RNP operations procedures manual and any amendments that were approved by the Director under current rule 91.246 will continue to be valid and can be used by the operator. For a person currently approved by the Director to operate an aircraft under IFR using GPS equipment as primary means navigation system, the person may conduct IFR operations using the applicable navigation specification to be specified in a notice. However, the person must comply with all the requirements that apply to the applicable navigation specification. The intent is that the use of GPS equipment as primary means navigation system is to be phased out within the next 2 years. In this regard, a transitional expiry date of 2 years is provided.

Rule 91.403 is amended to prohibit a pilot-in-command from operating an aircraft under IFR unless the aircraft carries sufficient fuel to complete the flight using an alternative means of navigation if the primary means of navigation fails at any point during the flight. This proposed prohibition is in addition to other restrictions currently placed on the pilot-in-command, as specified in the rule. However, there are no additional prescriptive requirements for the volume fuel that must be carried.

Rule 91.519(b)(1) is amended to add an exception for an aircraft operating under a PBN navigation specification from the requirement to be equipped with IFR navigation equipment that meets a standard specified in Appendix A.9. Instead, the applicable equipment requirements would be those specified by the Director in the notice for the relevant navigation specification. This is achieved by prohibiting a PBN operation from being carried out using a navigation specification unless the aircraft is equipped with the necessary operable navigation equipment for the navigation specification applicable to the route, airspace or instrument flight procedure planned or flown.

Paragraph (b)(2)(ii) of rule 91.519 is to be revoked. The requirement for an aircraft to be equipped for operation in RNP airspace is effectively covered in this proposal. It is proposed that a PBN operation must not be carried out unless the aircraft is equipped with the necessary operable navigation equipment for the navigation specification applicable to the route, airspace or instrument flight procedure planned or flown.

Paragraph (c) of rule 91.519 is to be revoked. The paragraph only refers to the aircraft and aircraft navigation systems used for RNP, with no mention of operational requirements. The “RNP performance requirements” referred to in this paragraph are not defined anywhere in the rules.

Editorial amendments (such as replacing ‘flight crew’ with the defined term ‘flight crew member’), are made to paragraphs (e), (f) and (g) of rule 91.519.

Consequential amendments

Part 19 amendments:

Rule 19.203 which defines *primary means navigation system* is to be revoked.

Rule 19.205 (Pilot qualification) is to be revoked. However, the intent is to allow pilots who had been certified competent in the use of a GPS receiver under this rule, to continue using the GPS receiver when the new rules come into force.

Rule 19.207(9) (Alternate Aerodrome requirements for GPS operations) is to be revoked. The proposed new rule in Part 91 would achieve the same safety outcome as provided for by the existing rule 19.207(9).

Rule 19.209 (Sole Means of GPS Operations) is to be revoked. By requiring an alternate means of navigation, the proposal effectively replaces rule 19.209(a) prohibition on sole means GPS navigation in the NZ FIR.

Rule 19.211 which provides for supplemental means GPS operations, is to be revoked.

Part 1 amendments:

Definitions of **alternative means of navigation**, **area navigation specification**, **navigation specification**, **performance based navigation** and **primary-means navigation system** are to be inserted, to give full effect to the use of PBN.

These new definitions which adopt the corresponding ICAO definitions where applicable, are to be used in the proposed rules. The defined terms will help ensure that requirements are applied consistently.

Part 61 amendments:

Draft rule 61.809 is inserted to provide for a pilot-in-command who had been certified competent in the use of a GPS receiver under rule 19.205, immediately before the date that the new rules come into force, to be deemed to have met the instrument ratings requirements. The pilot-in-command may carry out an instrument approach procedures under IFR using the GPS receiver. However, the pilot must comply with the applicable limitations and current requirements under Part 61.

Out of scope matters

The following matters are outside the scope of this proposal, but will be considered in a subsequent project:

- Rule Part 173 (Instrument Flight Procedures – Registration);
- Rule Part 65 (Air Traffic Service Personnel Licences and Ratings);
- remainder of Part 19D that is not covered in this proposal; and
- Other notices to provide full regulatory support that are not covered in this proposal.

5. Legislative analysis**5.1 Power to make rules**

The Minister may make ordinary rules under sections 28, 29, 29A, 29B and 30 of the Civil Aviation Act 1990, for various purposes including implementing New Zealand's obligations under the Convention, assisting aviation safety and security, and any matter contemplated under the Act.

These proposed rules are made pursuant to:

- (a) Section 30(a) which allows the Minister to make rules for the designation, classification, and certification of all or any of the following:
 - i. aircraft:
 - ii. aircraft pilots:
 - iii. flight crew members:
 - viii. air traffic services:
 - xiii. aeronautical procedures:
 - xvii. any other person who provides services in the civil aviation system, and any aircraft, aeronautical products, aviation related services, facilities, and equipment operated in support of the civil aviation system, or classes of such persons, aircraft, aeronautical products, aviation related services, facilities, and equipment operated in support of the civil aviation system:
- (b) Section 30(b) which allows the Minister to make rules for the setting of standards, specifications, restrictions, and licensing requirements for all or any of those persons or things specified in paragraph 30(a) including:
 - i. the specification of the privileges, limitations, and ratings, associated with licences or other forms of approvals:
 - ii. the setting of standards for training systems and techniques, including recurrent training requirements:
 - v. the specifications of standards of design, construction, manufacture, processing, testing, supply, approval, and identification of aircraft and aeronautical products.
- (c) Section 30(d) which allows the Minister to make rules for the definitions, abbreviations, and units of measurement to apply within the civil aviation system.

- (d) Section 28(5) which allows the Minister to make rules that provide for matters to be determined or approved by the Authority, the Director, or any other person or empower the Authority, the Director or any other person to impose requirements, or conditions on the performance of any activity including but not limited to procedures to be followed.

5.2 Matters to be taken into account

The development of this NPRM and the proposed rule changes take into account the matters under section 33 of the Act that the Minister must take into account when making ordinary rules including the following:

ICAO Standards and Recommended Practices

The proposed rule amendments comply with applicable sections of the following International Civil Aviation Organization (ICAO) Annexes:

- Annex 1 – Personnel Licensing
- Annex 2 – Rules of the Air
- Annex 6 – Operation of Aircraft
- Annex 8 – Airworthiness of Aircraft
- Annex 10 – Aeronautical Telecommunications
- Annex 11 – Air Traffic Services
- Annex 14 – Aerodromes
- Annex 15 – Aeronautical Information Services

Assisting economic development

This proposal will assist economic development by improving access to the operational benefits of PBN by supporting increased uptake of PBN by more operators. These benefits include more direct routes with more flexibility, that improve flight schedule reliability while ensuring safe operations at airports surrounded by complex terrain (e.g. Queenstown or Wellington).

Increased used of PBN, as supported by the proposed regulatory framework, would allow for increased airspace and airport capacity, which can be achieved through more efficient design of routes in controlled airspace. More efficient approach and departure procedures can mean that more aircraft can take off and land per hour.

Assisting safety and personal security

The navigation specifications required under this proposal, relating to the airworthiness of the aircraft, the operator's competency to operate the aircraft, and the associated operational procedures, will improve safety by increasing regulatory clarity.

Improving access and mobility

Increased uptake of PBN will improve access and mobility by allowing for more direct routes (therefore shorter travelling distances) with greater flexibility. However, only those operators who meet the prescribed requirements to operate an aircraft under IFR and using a navigation specification may enjoy the benefit of more direct routes.

Protecting and promoting public health

This proposal will not have a detrimental impact on protecting and promoting public health.

Ensuring environmental sustainability

Increased uptake of PBN will improve environmental sustainability by reducing the environmental impact of each flight, due to reduced fuel burn and efficiency improvements from shorter routes and more efficient climb and descent paths. However, by increasing capacity at airports, greater use of PBN could allow an increased number of flights, which could be environmentally detrimental.

5.3 Incorporation by reference/CAA notices

The proposed rules will require material to be incorporated by reference in the draft CAA notices which can be accessed via links as set out in Appendix 1 to this NPRM.

5.4 Civil Aviation (Offences) Regulations

Schedule 1 of the Civil Aviation (Offences) Regulations is made by the Governor General pursuant to section 100 of the Civil Aviation Act 1990 and contains a list of summary and infringement penalties associated with offences against various civil aviation rules.

The proposed rules will require amendments to the Civil Aviation (Offences) Regulations as set out in the Table in Appendix 2 to this NPRM.

6. Submissions on the NPRM

6.1 Submissions are invited

Interested persons are invited to participate in the making of the proposed rules by submitting written data, views, or comments. All submissions will be considered before final action on the proposed rulemaking is taken. If there is a need to make any significant change to the rule requirements in this proposal as a result of the submissions received, then interested persons may be invited to make further submissions.

6.2 Examination of submissions

All submissions will be available for examination by interested persons both before and after the closing date for submissions. A consultation summary will be published on the CAA web site and provided to each person who submits a written submission on this NPRM.

Submissions may be examined by appointment with the Docket Clerk at the Civil Aviation Authority Level 15, Asteron Centre, 55 Featherston Street, Wellington 6011 between 8:30 am and 4:30 pm on weekdays, except statutory holidays. Appointments to examine submissions are to be arranged by phone or email docket@caa.govt.nz.

6.3 Official Information Act

Submitters should note that subject to the Official Information Act 1982 any information attached to submissions will become part of the docket file and will be available to the public for examination.

Submitters should state clearly if there is any information in their submission that is commercially sensitive or for some other reason the submitter does not want the information to be released to other interested parties. The CAA will consider this in making a decision in respect of any Official Information Act requests. It should be noted that the CAA cannot guarantee confidentiality in respect of any specific submissions.

6.4 How to make a submission

6.4.1 Submission response sheet

A submission response sheet may also be downloaded from our website and sent by the following methods:

e-mail: consultation@caa.govt.nz and marked NPRM 20-01

by mail: Docket Clerk (NPRM 21/CAR/3)
Civil Aviation Authority
PO Box 3555
Wellington 6140
New Zealand

delivered: Docket Clerk (NPRM 20-01)
Civil Aviation Authority
Asteron House
Level 15
55 Featherston Street
Wellington 6011

6.5 Final date for submissions

Comments must be received by 19 February 2021.

6.6 Availability of the NPRM:

Any person may obtain a copy of this NPRM from–

CAA web site: www.aviation.govt.nz;

or from:

Docket Clerk

Civil Aviation Authority

Asteron House

Level 15

55 Featherston Street

Wellington 6011

Phone: 64–4–830 3996 (PBN NPRM 20-01)

6.7 Further information

For further information, contact:

Salote Raiwalui

Rules Drafter

Salote.Raiwalui@caa.govt.nz

Part 91 – General and Operating Rules

[Proposed amendments are ~~struck through and shaded grey~~ if deleted, or ~~shaded grey~~ for new insertions.]

91.246 Operations in RNP designated airspace

- (a) ~~A person must not operate an aircraft in RNP designated airspace in a New Zealand registered aircraft unless —~~
- ~~(1) — there is available in the aircraft a RNP operations procedures manual, incorporating all amendments, approved in accordance with this rule for that aircraft and aircraft navigation system; and~~
 - ~~(2) — the operations in RNP designated airspace are performed in accordance with the procedures, instructions, and limitations in the approved manual; and~~
 - ~~(3) — the instruments and equipment required by rule 91.519 for a particular RNP operation have been inspected and maintained in accordance with an approved maintenance programme; and~~
 - ~~(4) each flight crew member has adequate knowledge of, and familiarity with —~~
 - ~~(i) the aircraft; and~~
 - ~~(ii) the aircraft navigation system; and~~
 - ~~(iii) the procedures to be used, including the applicable contingency procedures; and~~
 - ~~(5) each pilot in command ensures that the aircraft and aircraft navigation system are both approved by the Director for RNP operations and that the RNP performance can be met for the planned route and any alternate routes; and~~
 - ~~(6) a flight plan is submitted to the appropriate ATS unit that includes in item 10 of the flight plan —~~
 - ~~(i) — the letter ‘R’ when indicating an aircraft approved for RNP operations; and~~
 - ~~(ii) — the letter ‘G’ when indicating an aircraft equipped with an approved GNSS capability.~~
- (c) Each operator of an aircraft performing RNP operations must keep a current copy of the RNP operation procedures manual at its principal base of operation and must make it available for inspection upon request by the Director.
- (f) Each applicant for the approval of a RNP operation procedures manual, or an amendment to an approved RNP operation procedures manual, must submit the proposed manual or amendment to the Director.
- (g) The Director may approve a RNP operation procedures manual and any amendment to a RNP operation procedures manual.
- (h) Each RNP operation procedures manual must contain —
- ~~(1) the name of the operator; and~~
 - ~~(2) the registration, make, and model of the aircraft to which it applies; and~~
 - ~~(3) the type, manufacturer, and model of the aircraft navigation system to which it applies; and~~
 - ~~(4) a maintenance programme including procedures for the —~~
 - ~~(i) test and inspection of each instrument and item of equipment required by rule 91.519 for RNP operations at intervals that ensure the RNP performance required for the particular operation is maintained; and~~
 - ~~(ii) recording in the maintenance records the date, departure aerodrome, destination airport, and reasons for each RNP operation discontinued because of instrument or equipment malfunction; and~~
 - ~~(5) procedures and instructions related to —~~
 - ~~(i) the mitigation of large navigational errors due to equipment malfunction or operational error; and~~

- (ii) ~~in flight drills that include cross-checking procedures to identify navigation errors in sufficient time to prevent inadvertent deviation from ATC cleared routes; and~~
 - (iii) ~~updating the navigation system to ensure that the required RNP performance is maintained during operations in RNP designated airspace; and~~
 - (iv) ~~the maximum permissible deviations of the RNP system within the RNP designated airspace; and~~
 - (v) ~~the calculation of time limits to meet RNP criteria; and~~
 - (vi) ~~instrument and equipment failure warning systems; and~~
 - (vii) ~~system failure; and~~
 - (viii) ~~system monitoring and the collection of reliability and performance data; and~~
 - (ix) ~~other procedures, instructions, and limitations that may be found necessary by the Director.~~
- (i) ~~The procedures manual required by paragraphs (a), (b), (c), and (e) may be incorporated in the operations procedures required of the holder of an air operator certificate issued under the Act and Part 119.~~
- (j) ~~Each A pilot in command must –~~
- (1) ~~unless authorised by ATC, ensure that 2 independent LRNS are serviceable and accurate –~~
 - (i) ~~30 minutes before entry to RNP designated airspace; and~~
 - (ii) ~~on entry to RNP designated airspace; and~~
 - (2) ~~when operating in, or within 30 minutes before entry of, RNP designated airspace –~~
 - (i) ~~notify ATC whenever the aircraft cannot meet RNP criteria; and~~
 - (ii) ~~notify ATC whenever the aircraft is operating with a single LRNS; and~~
 - (iii) ~~if unable to communicate with ATC, proceed in accordance with the contingency procedures in ICAO Regional Supplementary Procedures, Document 7030.~~

91.261 Requirements for navigation specification

- (a) A person must not operate an aircraft using a navigation specification referred to in rule 91.263 unless all of the following requirements are met –
- (1) the aircraft meets the airworthiness and performance requirements determined by the Director as specified in a notice referred to in rule 91.263;
 - (2) the person –
 - (i) is suitably trained and qualified for the navigation specification applicable to the planned route and airspace as specified in a notice;
 - (ii) complies with the operational procedures and any limitations applicable to the navigation specification, route, or airspace as specified by the Director in a notice;
 - (iii) has an alternative means of navigation if the primary means of navigation fails at any point on the planned route;
 - (3) the fuel requirements of rule 91.403 are met; and
 - (4) the Director approves the operation as specified in a notice.
- (b) For the purposes of paragraph (a)(2)(i), **suitably trained and qualified** means the person meets all the applicable training requirements specified in a notice, and under Part 61.

91.263 Director may determine navigation specifications and requirements in a notice

- (a) After complying with rule 91.263B, the Director may determine the following as specified in a notice –
- (1) the navigation specifications applicable to PBN routes and designated airspaces;
 - (2) the operational requirements and limitations associated with the navigation specifications;
 - (3) the airworthiness and performance requirements for an aircraft operating under IFR and using a navigation specification; and
 - (4) requirements for demonstrating compliance with the navigation specification.
- (b) A person must comply with any requirement specified in a notice referred to in paragraph (a) if the requirement applies to the person.

91.263B Procedures for ADS-B notice apply to navigation specification notice

- (a) The procedures relating to the making, amending and revoking of an ADS-B notice referred to in rules 91.258A to 91.258E apply to a navigation specification notice referred to in rule 91.263.
- (b) When following the procedures, a reference to –
- (1) **ADS-B, ADS-B system or ADS-B systems** is to be read as **PBN or navigation specifications**; and
 - (2) **surveillance or surveillance systems** is to be read as **navigation or navigation systems**.

91.263D Expiry of transition provisions to be specified in notice

- (a) Unless otherwise provided for in the rules, the expiry of any transitional provision for a matter determined by the Director in a notice, may be specified by the Director in the notice.
- (b) Before determining the expiry date of any transitional provision, the Director is to be satisfied that the date is reasonable after having consulted publicly on the CAA website.

91.263F Savings Provision

- (a) A RNP operation procedures manual and any amendments to the manual that was approved by the Director under rule 91.246(d) immediately before [date new rules come into force], continue to be valid and may be used for conducting IFR operations referred to in paragraph (b)(2).
- (b) A person operating an aircraft and using an aircraft navigation system in accordance with RNP performance requirements approved by the Director, on the applicable RNP routes and in RNP designated airspace under rule 91.519(c), immediately before [date new rules come into force], –
- (1) is deemed to have been approved by the Director to carry out a navigation specification under rule 91.261(4);
 - (2) may conduct IFR operations using the applicable navigation specification specified in a notice referred to in rule 91.263(a)(1); and
 - (3) must comply with all the requirements that apply to the applicable navigation specification specified in a notice referred to in rule 91.263(a)(2).

91.403 Fuel requirements for flights under IFR

A pilot-in-command ~~shall~~ **must** not operate an aircraft under IFR unless the aircraft carries sufficient fuel, taking into account weather reports and forecasts and weather conditions, to complete the flight to the aerodrome of intended landing and—

- (1) when an alternate aerodrome is not required—
 - (i) for non-turbine-powered aeroplanes, fly after that for 45 minutes at holding speed at a height of 1500 feet above the aerodrome; or
 - (ii) for turbine-powered aeroplanes and helicopters, fly after that for 30 minutes at holding speed at a height of 1500 feet above the aerodrome.

- (2) when an alternate is required by rule 91.405, fly from the aerodrome of intended landing to the alternate aerodrome and—
 - (i) for non-turbine-powered aeroplanes, fly after that for 45 minutes at holding speed at a height of 1500 feet above the aerodrome; or
 - (ii) for turbine-powered aeroplanes and helicopters, fly after that for 30 minutes at holding speed at a height of 1500 feet above the aerodrome; or
- (3) when using a navigation specification under this Part, complete the flight using an alternative means of navigation.

91.519 IFR communication and navigation equipment

- (a) An aircraft operating under IFR must be equipped with communication equipment that—
 - (1) meets level 1 standards specified in Appendix A, A.9; and
 - (2) is capable of providing continuous two-way communications with an appropriate ATS unit or aeronautical telecommunications facility.
- (b) Except as provided in paragraph (bb), an aircraft operating under IFR must be equipped with a navigation system that—
 - (1) meets level 1 standards specified in Appendix A, A.9; and
 - (2) will enable the aircraft to proceed in accordance with—
 - (i) the flight plan required under rule 91.407; and
 - (ii) the designated RNP airspace where applicable; and
 - (iii) the requirements of ATC.
- (bb) Paragraph (b)(1) does not apply to an aircraft operating under IFR using a navigation specification.

(Paragraph reference (ii) will be reserved to preserve existing reference (iii).)

~~(c) An aircraft and aircraft navigation system operating in accordance with RNP performance requirements must be approved by the Director for operation on the applicable RNP routes and in RNP designated airspace.~~

(Paragraph reference (c) to be reserved, to preserve subsequent numbering sequence)

- (d) An aircraft operating in airspace with an MNPS designated under ICAO Doc 7030 must—
 - (1) be equipped with navigation equipment capable of continuously indicating to the flight crew adherence to or departure from track, in accordance with the MNPS, at any point along that track; and
 - (2) be approved by the Director for MNPS operations.
- (e) An aircraft operating in airspace where a RVSM of 1000 feet is applied by ATC above flight level 290 must be—
 - (1) approved by the Director for operation in the airspace concerned; and
 - (2) equipped with equipment capable of—
 - (i) indicating to the flight crew member the flight level being flown; and
 - (ii) automatically maintaining a selected flight level; and
 - (iii) for aircraft first issued with a type certificate before 1 January 1997, providing an aural and visual alert to the flight crew member when a deviation of 300 feet from the selected flight level occurs; and
 - (iv) for aircraft first issued with a type certificate after 31 December 1996, providing an aural and visual alert to the flight crew member when a deviation of 200 feet from the selected flight level occurs; and

- (v) automatically reporting pressure altitude with the capability for switching to operate from either altitude measurement system referred to in paragraph (f).
- (f) The equipment required in paragraph (e)(2)(i) must consist of at least ~~two~~ 2 altitude measurement systems.
- (g) ~~In the event of the failure of~~ If any independent system for either communication or navigation purposes ~~fails~~, an aircraft operating in ~~RNP or~~ MNPS airspace must have the equipment required by paragraphs (a), (b), and (d)(1) installed in such number as to ensure that the remaining equipment will enable the aircraft to continue the flight in compliance with paragraphs (a), (b), and (d).

Appendix A — Instrument and equipment specifications

A.10 ~~RNP, MNPS, and VSM equipment~~

Navigation systems and equipment installed for operation in ~~RNP, MNPS,~~ or VSM airspace must—

- (1) meet the performance requirements of ICAO Regional Supplementary Procedures Doc 7030 applicable to the airspace and routes being flown; and
- (2) ~~for RNP operations, consist of two independent LRNS comprising INS, IRS/FMS, or GPS; and~~
- (3) meet the equipment and functional requirements—
 - (i) ~~for operation in RNP airspace, contained in the ICAO Manual on Required Navigation Performance (RNP) Doc 9613; or~~
 - (ii) for operation in airspace designated with a VSM of 1000 feet above flight level 290, contained in the ICAO Manual on Implementation of a 300m (1000ft) Vertical Separation Minimum Between FL 290 and FL 410 Inclusive Doc 9574.

Note - Paragraph reference '(2)' to be reserved, to preserve existing reference '(3)'. Paragraph reference '(i)' to be reserved, to preserve existing reference '(ii)'.

Consequential amendments

19.203 Glossary

Primary means navigation system: ~~a navigation system approved for a given operation or phase of flight that must meet accuracy and integrity requirements, but need not meet full availability and continuity of service requirements. Safety is achieved by limiting flights to specific time periods, and through appropriate procedural restrictions;~~

19.205 Pilot qualification

(a) ~~A pilot in command shall not carry out an instrument approach procedure under IFR using a GPS receiver unless they have had certified in their pilot's logbook by a flight examiner that they have satisfactorily demonstrated competency in the use of that make and model of GPS receiver, including any flight management system used for a GPS instrument approach.~~

(b) ~~A flight examiner shall endorse a pilot's log book for a make and model of GPS receiver or flight management system if the pilot has satisfactorily completed a flight test demonstrating that pilot's knowledge and competency, to a standard acceptable to the Director, using that GPS receiver or flight management system.~~

19.207 Primary means GPS operations

- (1) ~~Each A person operating an aircraft under IFR using GPS equipment as a primary means navigation system shall must ensure that—~~
 - (ii) ~~the GPS equipment is approved to Level 1 on form CAA 2129; and~~
 - (iii) ~~the aircraft's form CAA 2129 has been endorsed, approving the GPS equipment for use on the intended IFR operation as a primary means navigation system; and~~
- (2) ~~operate the GPS equipment in accordance with the aircraft flight manual or aircraft flight manual supplement; and~~

- ~~(3) ensure, if the aircraft is operating within the New Zealand flight information region, that the aircraft is equipped —~~
- ~~(i) for air transport operations, with at least 2 operable sole means navigation systems other than GPS receivers. The sole means navigation systems must be appropriate for the route being flown; and~~
 - ~~(ii) for operations other than air transport operations, with at least 1 operable sole means navigation system other than GPS receiver. The sole means navigation system must be appropriate for the route being flown; and~~
- ~~(4) if intending to use a GPS based instrument approach procedure, obtain a RAIM prediction prior to departure for the expected time of arrival at the destination —~~
- ~~(i) using the onboard GPS receiver; or~~
 - ~~(ii) from the holder of an air traffic service organisation certificate issued under Part 172; and~~
- ~~(5) ensure that en route and terminal navigation is conducted —~~
- ~~(i) using a GPS database containing data that is current with respect to the current en route and area charts applicable to the route being flown; and~~
 - ~~(ii) by cross-checking each GPS database selected track and distance between reporting points, for accuracy and reasonableness by reference to current en route and area charts; and~~
- ~~(6) ensure all GPS instrument approaches are accomplished in accordance with approved instrument approach procedures using a GPS database containing data that is current with respect to the current published Instrument Approach Chart for the approach procedure being flown; and~~
- ~~(7) if, when operating in the en route phase, a RAIM warning has been displayed for more than ten minutes, or the GPS equipment has operated in the DR mode for more than one minute —~~
- ~~(i) advise the appropriate controlling ATC service; and~~
 - ~~(ii) verify the aircraft position every 10 minutes using another IFR approved navigation system; and~~
- ~~(8) not commence an instrument approach while a RAIM warning is displayed; and.~~
- ~~(9) if an alternate aerodrome is required by 91.405, ensure that —~~
- ~~(i) the alternate is served by a fully operational radio navigation aid with a promulgated instrument approach procedure based on other than GPS navigation; and~~
 - ~~(ii) the aircraft is equipped with navigation equipment capable of using that radio navigation aid.~~

19.209 Sole means GPS operations

- ~~(a) — A person shall must not operate an aircraft under IFR using a sole means navigation system, which uses only GPS sensors, within the New Zealand Flight Information Region.~~
- ~~(b) Each person operating a New Zealand registered aircraft under IFR using a sole means navigation system which uses only GPS sensors, in the Auckland Oceanic Flight Information Region, shall —~~
- ~~(1) ensure that —~~
 - ~~(i) the GPS equipment is approved to Level 1 on form CAA 2129; and~~
 - ~~(ii) the aircraft's form CAA 2129 has been endorsed, approving the GPS equipment for use on the intended IFR operation as a sole means navigation system; and~~
 - ~~(2) operate the GPS equipment in accordance with the aircraft flight manual or aircraft flight manual supplement; and~~
 - ~~(3) ensure that en route navigation is conducted —~~

- (i) using a GPS database containing data that is current with respect to the current published en route and area charts applicable to the route being flown; and
 - (ii) by cross checking each GPS database selected track and distance between reporting points used for accuracy and reasonableness by reference to current en route charts; and
- (4) if a RAIM warning has been displayed for more than ten 10 minutes, or the GPS equipment has operated in the DR mode for more than one 1 minute advise the appropriate controlling ATC service.

19.211 Supplemental means GPS operations

(a) No person shall operate an aircraft using a GPS receiver that does not comply with the requirements of rules 19.207(1) or 19.209(b)(1) for navigation under IFR.

(b) When operating under IFR, a person may only use a GPS receiver that does not comply with the requirements of rules 19.207(1) or 19.209(b)(1) for providing supplementary information.

Part 61 Pilot Licences and Ratings

61.809 Savings provision

A pilot-in-command who had been certified competent in the use of GPS receiver under rule 19.205, immediately before [date rule comes into force] –

- (1) is deemed to have met the requirements of rule 61.805(a)(3);
- (2) may carry out an instrument approach procedure under IFR using the GPS receiver; and
- (3) must comply with the limitations referred to in rule 61.805; and
- (4) must meet the currency requirements referred to in rule 61.807.

Part 1 Definitions

Alternative means of navigation means a navigational system that, for a given operation or phase of flight, will enable the continued safe navigation and landing of the aircraft if the primary means of navigation fails.

Area navigation specification means a navigation specification based on area navigation that does not include the requirement for performance monitoring and alerting, designated by the prefix RNAV, e.g. RNAV 5, RNAV 1.

Navigation specification means a set of aircraft, operator and flight crew requirements needed to support performance-based navigation operations, such as required navigation performance specification or an area navigation specification, within a defined airspace:

Performance-Based Navigation means an area navigation based on performance requirements for aircraft operating along an ATS route, on an instrument approach procedure or in a designated airspace, and **PBN route** or **PBN operations** has a similar meaning:

Primary-means navigation system means a navigation system approved for a given navigation specification, or for a phase of flight, that is used to navigate safely on the planned route or procedure.

Appendix 1

Notices

RNP1 - <https://www.aviation.govt.nz/assets/rules/nprms-and-summaries/PBN-regulatory-framework/PBN-Specification-Notice-RNP1-FINAL.pdf>

RNP4 - <https://www.aviation.govt.nz/assets/rules/nprms-and-summaries/PBN-regulatory-framework/PBN-Specification-Notice-RNP4-FINAL.pdf>

Legacy GNSS Navigation - <https://www.aviation.govt.nz/assets/rules/nprms-and-summaries/PBN-regulatory-framework/Notice-of-Requirement-Non-RNAV-RNP-GPS-procedures-and-PBN-operations-19D-FINAL.pdf>

Appendix 2

Table of Amendments to Civil Aviation (Offences) Regulations

The following amendments are proposed to the Civil Aviation (Offences) Regulations as a consequence of the proposed amendments Parts 91 and 19:

Provision	Brief Description	Fines and Fees (\$)			
		Summary Conviction		Infringement Fees	
		Individual	Body Corporate	Individual	Body Corporate
Part 91	General Operating and Flight Rules				
Rule 91.246(a)	Responsibilities of aircraft operator for operations in RNP designated airspace. <i>Current offence and penalties to be revoked, as rule is to be revoked.</i>	1,250	7,500	500	3,500
Rule 91.246(b)	Responsibilities of aircraft operator: keeping current copy of RNP operations manual. <i>Current offence and penalties to be revoked, as rule is to be revoked.</i>	1,250	7,500	500	3,500
Rule 91.246(g)	Responsibilities of pilot in command: operating aircraft in or entering RNP designated airspace. <i>Current offence and penalties to be revoked, as rule is to be revoked.</i>	1,250		500	
Rule 91.261	Person must not operate aircraft using a navigation specification	5,000	30,000	2,000	12,000

	<p>unless all the prescribed requirements are met.</p> <p><i>Proposed new offence and penalties</i></p>				
Part 19	Transition Rules				
Rule 19.205	<p>Qualifications required by pilot in command carrying out instrument approach under IFR using GPS receiver.</p> <p><i>Current offence and penalties to be revoked, as rule is to be revoked.</i></p>	5,000		2,000	
19.207(1)	<p>Person operating aircraft under IFR using GPS equipment must ensure that equipment approved and form endorsed.</p>	5,000	30,000	2,000	12,000
19.207(2)	<p>Person operating aircraft under IFR using GPS equipment must operate equipment in accordance with manual.</p>	5,000	30,000	2,000	12,000
Rule 19.207(3)	<p>Person operating aircraft under IFR using GPS equipment within NZ flight information region must ensure aircraft equipped with other navigation systems.</p>	5,000	30,000	2,000	12,000
Rule 19.207(4)	<p>Person operating aircraft under IFR using GPS equipment intending GPS based instrument approach must obtain RAIM prediction.</p>	5,000	30,000	2,000	12,000
Rule 19.207(5)	<p>Person operating aircraft under IFR using GPS equipment must ensure en route and terminal navigation conducted in prescribed way.</p>	5,000	30,000	2,000	12,000
Rule 19.207(6)	<p>Person operating aircraft under IFR using GPS equipment</p>	5,000	30,000	2,000	12,000

	must ensure all GPS instrument approaches accomplished with approved procedures.				
Rule 19.207(7)	Person operating aircraft under IFR using GPS equipment must take prescribed actions if RAIM warning displayed or GPS equipment has operated in DR mode for more than stipulated time. Current offence and penalties to be revoked, as rule is to be revoked.	5,000	30,000	2,000	12,000
Rule 19.207(8)	Person operating aircraft under IFR using GPS equipment may not commence instrument approach while RAIM warning displayed. Current offence and penalties to be revoked, as rule is to be revoked.	5,000	30,000	2,000	12,000
Rule 19.207(9)	Person operating aircraft under IFR using GPS equipment and using alternate aerodrome must ensure radio navigation aid can be used. Current offence and penalties to be revoked, as rule is to be revoked.	5,000	30,000	2,000	12,000
Rule 19.209(a)	Person may not operate aircraft under IFR using sole means GPS within NZ FIR Current offence and penalties to be revoked, as the rule is to be revoked.	5,000	30,000	2,000	12,000
Rule 19.209(b)(1)	Person operating NZ registered aircraft under IFR using sole means GPS in Auckland Oceanic Flight Information Region must ensure equipment	5,000	30,000	2,000	12,000

	<p>approved and form endorsed.</p> <p><i>Current offence and penalties to be revoked, as rule is to be revoked.</i></p>				
Rule 19.209(b)(2)	<p>Person operating NZ registered aircraft under IFR using sole means GPS in Auckland Oceanic Flight Information Region must operate equipment approved and form endorsed.</p> <p><i>Current offence and penalties to be revoked, as rule is to be revoked.</i></p>	5,000	30,000	2,000	12,000
Rule 19.209(b)(3)	<p>Person operating NZ registered aircraft under IFR using sole means GPS in Auckland Oceanic Flight Information Region must use and cross check current data.</p> <p><i>Current offence and penalties to be revoked, as rule is to be revoked.</i></p>	5,000	30,000	2,000	12,000
Rule 19.209(b)(4)	<p>Person operating NZ registered aircraft under IFR using sole means GPS in Auckland Oceanic Flight Information Region must advise ATC if RAIM warning displayed or GPS equipment has operated in DR mode for more than stipulated time.</p> <p><i>Current offence and penalties to be revoked, as rule is to be revoked.</i></p>	5,000	30,000	2,000	12,000
Rule 19.211(a)	<p>No person may operate aircraft using GPS receiver that does not comply with prescribed requirements.</p>	5,000	30,000	2,000	12,000

	<i>Current offence and penalties to be revoked, as rule is to be revoked.</i>				
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