

AIRWAYS



Ryans Road

Industrial Development

Fast Track Application

Airways Submission



Contents

1. Executive Summary	3
2. Decision Sought	4
2.1 Requested decision	4
3. Interest in the Proposal	5
3.1 Role of Airways Corporation of New Zealand	5
4. Brief Technical Assessment of Effects on Aviation	6
4.1 Methodology	6
4.2 Affected CNS Facilities - DVOR	7
4.3 Affected CNS Facilities – ILS	8
4.4 Affected CNS Facilities – Radar	9
5. Proposed Conditions (if Consent Granted)	10
6. Conclusion	11
Appendix A: ICAO EUR Doc 015	13
Appendix B: DVOR Building Restricted Area	13
Appendix C: Radar Building Restricted Area	14



1. Executive Summary

Airways Corporation of New Zealand (Airways) is the airspace manager providing Air Traffic Control services to all aircraft throughout New Zealand and adjacent international oceanic airspace.

The Ryans Road Industrial Fast Track Application (Application) proposes to enable industrial development at 104 Ryans Road and 20 Grays Road (the Site) by delivering 126 freehold industrial lots with infrastructure and a 'permitted baseline' for industrial development. The Site adjoins the boundary of Christchurch Airport and the proposed industrial development at the Site would likely impinge within the safe boundaries of some of those services and could have a significant impact on the safety of aircraft flying within the Canterbury region.

The principal concerns Airways has relate to the impact of the development on the provision of navigational and surveillance equipment and services used by aircraft to navigate and be tracked by Radar through the region. The affected aviation services are as follows:

- ▶ Doppler VHF Omnidirectional Range (DVOR) – used by aircraft to navigate through the wider region and for instrument approaches to Christchurch Airport.
- ▶ Instrument Landing System (ILS) – used to precisely guide aircraft onto the runway during the final stage of approach and landing.
- ▶ Primary and Secondary Surveillance Radar (PSR/SSR) – used to accurately locate and identify aircraft within the wider region.

In addition, under the Ground-Based Navigation Aid Panel (GBNA), the Civil Aviation Authority (CAA) and the New Southern Sky programme identified the Christchurch ILS and DVOR as essential elements of the national aviation infrastructure.

The International Civil Aviation Organisation (ICAO) publishes guidance on building restricted areas (BRA) where development and buildings can compromise the operation of navigational and surveillance equipment and services. The Application would enable development of buildings on the Site that would penetrate the BRA for each of the above services.

Due to the limited timeline available for this submission, it was not possible to categorically determine the effect of the development on these services and further analysis is needed.



Typically for development in proximity to airports such as that proposed by the Application, Airways would expect an aeronautical safeguarding study be required to examine the risk introduced of the development on impacting the safe operation of all navigational and surveillance equipment and services. Airways does not accept the Applicant's submitted assessment adequately addresses safety concerns for all navigational and surveillance equipment and services at Christchurch Airport.

Airways opposes the Application due to the unknown risk to aviation safety for aircraft both at Christchurch Airport and the wider Canterbury region. Rigorous assessment and analysis to aviation industry standards, which has not been provided by the Applicant, is required to determine the actual and potential risks to aviation safety.

2. Decision Sought

2.1 Requested decision

Airways requests that the Panel decline the Application due to the actual and potential risks to aviation safety that have not been adequately assessed or addressed by the Application.

Should the Panel be minded to approve the Application, Airways requests that the following relief:

Summary of Information Requirements Requested	
1.	Prior to any decision on the Application, the Applicant must prepare and submit, as part of the Application, an aeronautical safeguarding study - conducted to provide assurance the facilities still meet EUROCONTROL Specification for ATM Surveillance System Performance (ESASSP) v1.3 - to properly assess the risk to aviation safety of the proposed development. This study should examine the effects to navigational and surveillance equipment and services under multiple likely scenarios for the Site such as: ➤ The area zoned and populated for intensified rural. ➤ The area zoned for and filled with industrial buildings (steel reinforced concrete construction). ➤ The area filled with shopping centre (mix of building construction types).



	The study must be prepared by a suitably qualified and experienced professional and provided for review and comment by all parties invited to comment on the Application.
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	Summary of Conditions Requested
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1.	An appropriately worded condition of consent is included on the approval requiring the results of the aeronautical study are made public and supplied to any prospective lot buyers of the development in perpetuity.
2.	An appropriately worded condition of consent is included on the approval requiring covenants to be put in place on the proposed lots to prevent future buyers from impinging on aviation services. This will include (but is not limited to) the number of buildings, building construction type, height limitations, crane use, glint and glare assessments, power cable layout and Electromagnetic Interference (EMI) assessment for RF-emitting equipment. Given the short period of time Airways has had to respond to the proposal and that the Application has not provided a sufficient aeronautical safeguarding study to accurately determine the aviation safety risks of the Application, details of the condition would need to be finalised once said study has been prepared and reviewed.

3. Interest in the Proposal

3.1 Role of Airways Corporation of New Zealand

Airways is New Zealand's airspace manager. As a State Owned Enterprise, it provides Air Traffic Control (ATC) services to all aircraft operators utilising airspace throughout the country, as well as a large area over international oceanic airspace (approximately 30,000,000 square/km). With oversight from the CAA Airways maintains and operates a range of Communications, Navigation and Surveillance equipment nationally in order carry out this role.

New Zealand has a significant number of aviation operators who regularly utilise or have an interest in our airspace. This includes airlines, defence forces, emergency services, flight training, airports, aeroclubs and landowners among others. These stakeholders require aviation services to operate safely and



effectively at an acceptable cost. Operating under New Zealand's Part 171 and 172 Civil Aviation Rules (Air Navigation Service Provider), Airways must ensure safety standards are met for all flights within the airspace.

Airways has an interest in the proposal because any development in this area will likely impinge (directly or indirectly) on the signal paths emitted from equipment currently used for navigation and surveillance of aircraft within the Canterbury region. The services affected are:

- ▶ Doppler VHF Omnidirectional Range (DVOR) – used by aircraft to navigate through the wider region and for instrument approaches to Christchurch Airport.
- ▶ Instrument Landing System (ILS) – used to precisely guide aircraft onto the runway during the final stage of approach and landing.
- ▶ Primary and Secondary Surveillance Radar (PSR/SSR) – used to accurately locate and identify aircraft within the wider region.
- ▶ Individually and combined, this infrastructure is critical to the safe management of airspace at Christchurch Airport and surrounding areas).

A formal aeronautical safeguarding study to the required standard, which has not been undertaken by the Applicant, is needed to fully assess the potential effects of the development on the operation of the above services against ESASSP v1.3. This paper provides an overview of Airways concerns and to advise the Panel of the potential risk to aviation safety that the proposed Ryans Road development may introduce.

4. Brief Technical Assessment of Effects on CNS Facilities

4.1 Methodology

This brief assessment takes into account the guidance published by ICAO (ICAO EUR DOC 015, see Appendix A) regarding Building Restricted Areas (BRA's) surrounding aviation related Communication, Navigation and Surveillance (CNS) facilities. This guidance document is the globally accepted industry best practice process by which the BRA's are to be established. A proposed installation or development will penetrate the BRA's a safeguarding study must be conducted to assure minimum sensor performance is met.



Specific effects on other significant stakeholders such as Christchurch International Airport Limited (CIAL) and aircraft operators should also be considered by the Panel.

4.2 Affected CNS Facilities - DVOR

Under the Ground-Based Navigation Aid Panel (GBNA), the CAA and the New Southern Sky programme have identified the Christchurch DVOR as an essential element of the national aviation infrastructure. It is currently used in instrument approach procedures at Christchurch Airport. Its removal from service or reduction in effectiveness would result in adverse operational and safety outcomes that would impact the safety, capacity and efficiency of approach procedures at Christchurch Airport. Industrial development on the Site could compromise Radio Frequency tolerances due to proximity to the DVOR system, height and density of future buildings, and the cumulative absorption and interference effects of the materials used.

Airways notes that the applicant has lodged drawing number RC-PG122 (Airways Restriction Plan), however Airways believes that this does not sufficiently mitigate the risks involved.

The standard two-step process contained within the ICAO document for assessing potential development sites or installations does not appear to have been followed, nor is there mitigation of the cumulative effect of buildings within the zone (meaning, it may be found that some buildings have a negligible effect, whereas the addition of more buildings of similar or even more conservative type/construction may exceed tolerances even though they are outside of the prescribed BRA, see Appendix B). The Application proposes to enable highly dense industrial development on the Site through the proposed permitted baseline. Regardless of building type or construction, an increased risk to the safe operation of the DVOR remains where denser development is proposed.

If the operation of the DVOR is sufficiently compromised and can no longer be relied upon, aircraft operating under CAA Rule Part 119 (Commercial Air Operators such as airlines) are required to carry additional fuel for potential diversions. The extra fuel needing to be carried on the aircraft displaces cargo weight and increases fuel consumption per passenger. This would lead to higher carbon emissions overall and may place limitations on flights into Christchurch by compromising the viability of longer distance flight routes.

Christchurch Airport is also listed in Schedule 1, Part A of the Civil Defence Emergency Management Act 2002 and it's DVOR is part of New Zealand's Minimum Operating Network (MON), a list of required navigational facilities



designed to provide aircraft with an alternate means to navigate. In the event of a Global Position System (GPS) outage—such as one caused by space weather or jamming—Christchurch Airport would be unable to meet this emergency management function effectively without the DVOR as a backup navigation aid. Low-cost jammers are increasingly available to the public resulting in, local GPS interference becoming increasingly widespread both internationally and within New Zealand with events noted by Air Traffic Control in the last 18 months at Auckland and Wellington.

For the above reasons, Airways opposes the Application as the proposed development would potentially reduce navigation coverage to aircraft in the region.

4.3 Affected CNS Facilities – ILS

The ILS is used to guide aircraft onto the runway in all weather conditions. It consists of glidepath (provides correct angle of descent) and localiser (provides lateral guidance onto the runway) components, each of which have multiple RF beams. These beams are received by systems onboard the aircraft guiding it down to land at the correct area on the runway.

As they are designed to land an aircraft accurately whilst at speed, the progressive nature of the ILS beams require extremely precise calibration by specially equipped flight inspection aircraft for each specific installation. The surrounding environment must be taken into account as the beams are sensitive to local changes.

The northwestern end of the Site cuts into the BRA for the reverse area of the localiser beam. development within this area is likely to impinge on the ILS operation given how the changes in RF reflections affect the way the complex beam structure is developed. The ILS relies on multiple reflections to correctly construct the beam several hundred meters out in space, meaning that the proposed development could interfere with the main signal even at some distance. This would impact the ability of the ILS to meet its certification requirements as a navigational aid for landing aircraft.

If the ILS is no longer able to meet certification, this will have a major impact on a majority of aircraft using the airport such as military (Antarctic Support Operations), air ambulance, freight and general public travelling on domestic and international flights. A number of airlines require this navigational aid to be in operation and will have no choice but to restrict their operations into Christchurch Airport. Some procedures used by aircraft operators link the ILS and DVOR together. Compromise of the DVOR renders the ILS inoperative because



missed approach procedures requires the aircraft to use navigational information from the DVOR.

For the above reasons, Airways opposes the Application as the proposed development enabled by the Application would potentially cause the ILS to be removed from service affecting aircraft landing at Christchurch Airport.

4.4 Affected CNS Facilities – Radar

There are two types of radar services at Christchurch Airport:

- ▶ Primary Surveillance Radar (PSR) sends out a signal and receives returns of echo's which are plotted on a screen. Its
- ▶ Secondary Surveillance Radar (SSR) sends out a signal and receives the return triggered from a transponder on the aircraft. It is able to identify the aircraft and its altitude from this additional information to maintain mandated safe separation limits of 2 nautical miles horizontally and 1000ft vertically.

Radar is the most sensitive of the affected CNS facilities and is a crucial navigational and surveillance asset for the airport as it is the only service that can 'see' non-cooperative aircraft. Its minimum performance limits are set by ESASSP v1.3 which is a Eurocontrol standard for aviation radar facilities.

The radar services have the most stringent BRA geometry which indicates the proposed development would heavily impact its operation. Radar returns received from aircraft at a distance are extremely weak, much weaker than the reflections also being received from everything around it – trees, buildings, vehicles, ground surfaces etc. These unwanted reflections or 'clutter' raise the background noise level reducing sensitivity. The more clutter the radar receives the harder it is to measure and process valid signals from aircraft and effectively track them. The proposed development of the Site would have the potential to drastically increase the clutter to the radar systems.

Following the ICAO guidance, the BRA for the PSR/SSR is a 500m radius from the antenna centre at ground level and a cone (from the same centre) out to 15km with a slope of 0.25° (refer to Airways drawing 33402, PSR3D / MSSR Building Restricted Area, see Appendix C). Restrictions on the maximum building heights on the Site would range from 3.4m to 6.9m depending on where they are in relation to the radar in order to remain under this cone. Even with proposed buildings complying with this BRA, cumulative effects from multiple buildings increase radar interference and would still need to be assessed with a formal aeronautical study.



The Application proposes to enable a permitted baseline of industrial development of the Site with a height limit of 20m, with some additional height restrictions, and of a significant density with industrial zone building coverages. Airways considers that any development of this height and or/density on the Site will almost certainly have detrimental effects on the radar system causing it to fail its minimum safe limits. As such, Airways opposes the Application.

5. Requested Relief

In the first instance, Airways opposes the Application, as outlined above, and requests the Application be refused.

However, if the Panel is minded to approve the Application, Airways requests the following relief.

5.1 Further Information Requirement

Prior to granting of any approval, the Applicant must commission an independent aeronautical safeguarding study prepared by a suitably qualified and experienced professional quantifying effects on DVOR, ILS and PSR/SSR including RF interference/EMC risk in accordance with ESASSP v1.3 by the proposed industrial development permitted baseline of development including the individual and cumulative effects of buildings (based on the above 2.1 Summary of Information Requirements Requested).

The safeguarding study must be made available for review and comment by all parties invited to comment on the Application.

Section 4 of this report has outlined the potential effects of the development on CNS facilities. Airways considers provision of this report is therefore required in order to meet ESASSP v1.3.

Without this study Airways considers it is not possible for the effects of the development on the risks to aviation safety to be effectively and sufficiently assessed.

5.2 Conditions of Consent

Should the Applicant provide the study requested under 5.1, and make necessary amendments to the Application highlighted by the study and further comments, Airways would request conditions to the following effect be included in any approval:

1. A condition requiring the Applicant to publish the study on a public website and for the study to be supplied to all future prospective



purchasers/tenants of the created lots. The study must include a summary of the risks, height caps by lot, EMI/lighting obligations, crane rules and other relevant provisions. These provisions would be detailed once the formal safeguarding study has been completed.

2. A condition registering binding land covenants and/or consent notices on every new title within the Ryan/Grays precinct to prevent activities that impinge on aviation. Covenants must, at minimum, control:
 - a. number of buildings and site coverage;
 - b. construction types/materials;
 - c. height limits (RL) incl. all rooftop plant/signage;
 - d. crane/temporary obstacle use and notification;
 - e. glint & glare (incl. PV spec/orientation);
 - f. power distribution & cable layout
 - g. EMI assessment for RF-emitting equipment;
 - h. Cumulative development check

6. Conclusion

The proposed development under the Ryans Road Fast Track Application sits within Building Restricted Areas for critical Communications, Navigation and Surveillance infrastructure serving Christchurch Airport and the wider Canterbury region. On the evidence available and the timeframe for this submission, the proposal cannot be shown to avoid, remedy or mitigate the risks to the:

- DVOR – due to potential signal distortion and bearing errors from future buildings, with material consequences for existing approach procedures and the resilience provided by the MON back-up network.
- ILS (localiser and glidepath) – due to potential beam distortion from future structures altering the certified signal in space and threatening procedure integrity and minima.
- PSR/SSR radar – due to the proposed permitted baseline of development significantly exceeding the low building height limits and clutter/reflection sensitivity of the radar.

The applicant's material to date (including plan RC-PG122) does not apply the full two-step ICAO BRA methodology nor address cumulative effects (multiple



buildings, differing construction types, rooftop plant and future accretions) or EMI from modern electrical installations.

Without a robust, formal and independent aeronautical safeguarding study assessing the proposed permitted baseline of industrial development on the Site against ESASSP v1.3, there is a credible risk to the safe operation of the airport and aircraft in the area, increased diversions, reduced service regularity, and a loss of regional resilience (including the airport's Civil Defence/EM function).

Applying a precautionary, ALARP (as-low-as-reasonably-practicable) approach, Airways is not satisfied that the effects have been shown to be acceptable or that practicable, enforceable mitigation exists at this stage. On that basis:

- Decision sought: Decline the Application.
- If, despite this, the Panel is minded to approve the Application, Airways requests that the Panel impose the minimum relief set out in Section 5, namely:
 1. Prior to any approval, preparation and submission as part of the Application of an independent aeronautical safeguarding study testing realistic development scenarios (residential; industrial/SRC; retail/mixed) with BRA/EMI modelling and cumulative effects. This study must be made available for review and comment by all invited commenters to the Application;
 2. public disclosure of results and a condition of consent requiring provision of the study to all purchasers/tenants; and
 3. a condition of consent requiring registered covenants/consent notices controlling building numbers and materials, height caps, cranes/temporary obstacles, glint & glare, power/cable layouts, and EMI controls, with ongoing compliance and change-management obligations. Details of the controls would be informed by the aeronautical safeguarding study.

Regardless of the above, Airways reserves the right to request further relief in light of new information being made available.

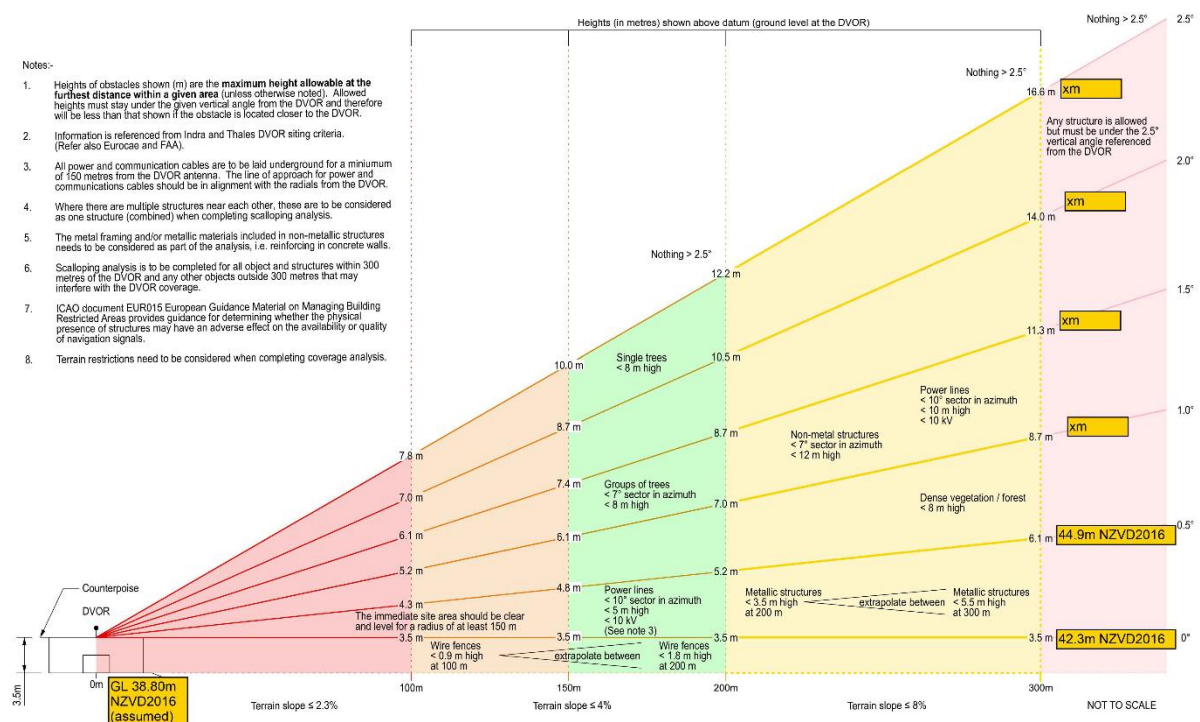
Airways remains available to work with the Panel, the Applicant, CIAL and the CAA on a properly scoped study and to refine enforceable controls. Until such work demonstrates that the development can proceed without compromising the safety, regularity or resilience of aviation services, the Application should be declined.

Appendix A: ICAO EUR Doc 015



ICAO EUR Doc 015
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Appendix B: DVOR Building Restricted Area





Appendix C: Radar Building Restricted Area



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