WILKINSON MURRAY

12 July 2011

WM Project Number: 00558
Our Ref: GCAPL IR120711 Ltr AB
Email: irigby@bigpond.net.au

Ian Rigby
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PO Box 328
COOLANGATTA QLD 4225

Dear Ian

**Re: Commercial Development, Boyds Bay - Review of Noise Assessment**

## INTRODUCTION

Gold Coast Airport Pty Ltd (GCAPL) has engaged Wilkinson Murray to undertake a desktop review of the Aircraft Noise Impact Assessment (Carter Rytenskild Group, 29 March 2011) for a proposed commercial development off Parkes Street at Boyd's Bay, Tweed Heads.

Specifically GCAPL has requested Wilkinson Murray to review the potential for the proposal to be impacted by aircraft noise, with reference to Australian Standard AS2021 *Acoustics—Aircraft noise intrusion – Building siting and construction*.

## SITE ACCEPTIBILITY

The Aircraft Noise Impact Assessment (NIA) presents Australian Noise Exposure Forecast (ANEF) contours for Gold Coast Airport in Appendix A of the report. These contours appear to be derived from the 2001 Gold Coast Airport Master Plan, which is now superseded. ANEF contours shown in the current Gold Coast Airport 2006 Master Plan show the development site as being almost wholly contained within the ANEF 25 contour.

AS2021 classifies commercial development sites with an ANEF greater than 25 as "conditionally acceptable". In such cases AS2021 requires that developments be designed to meet internal noise levels prescribed by Table 3.3 of AS2021.

The NIA correctly identifies that Clause 32(5) of Council's LEP also applies.

## INTERNAL DESIGN AIRCRAFT NOISE LEVELS

The NIA identifies that cafes or takeaway food shops, private offices, open plan offices and bulky goods warehousing will likely occupy the development. The internal noise levels for these appear to have been determined correctly from AS2021 Table 3.3. GCAPL has advised Wilkinson Murray that the spaces described as "bulky goods warehousing" in the NIA are clearly described as "bulky goods retail" in the proponent's description of the development. In this case, an internal design sound level

of 75 dBA is considered more appropriate than the 85 dBA design level detailed in the NIA for these spaces.

## AIRCRAFT NOISE LEVELS

Noise measurements were not undertaken for the NIA. Noise measurements are not expressly required by AS2021, though Wilkinson Murray considers that actual noise measurements of aircraft noise at the site are advisable wherever practical.

AS2021 Clause 3.1 details a method for estimating the aircraft noise level expected to be experienced at a building site. The NIA identifies distance coordinates for the site, relative to the main runway, as follows:

- DT = 3,385m
- DL = 925m
- DS = 304m

The DT and DL appear have to have been determined correctly. The DS determined in the NIA appears to relate to a position in the middle of the site. Given the development site is in excess of 300m in this dimension, determining DS from a single position in the middle of the site is considered inappropriate and would lead to an under-estimation of aircraft noise levels at the parts of the site nearer to the runway centreline. From aerial photography we have determined that the minimum DS to the development site is nearer 200m. It would be advisable to use this DS for the entire site, thus incorporating some conservatism into the approach. Splitting the site into two and using different DS values for each portion would also be considered acceptable.

Using Tables 3.12, 3.13, 3.15 and 3.16 of AS2021 we have determined that the aircraft noise level predictions below are appropriate for Boeing 767, Boeing 737 and Airbus A320 aircraft. These aircraft are typical of the common highest noise emitting aircraft to use the airport.

| Aircraft | NIA Predicted - dBA | | Wilkinson Murray Predicted - dBA | |
|---|---|---|---|---|
| | Take-off | Landing | Take-off | Landing |
| Boeing 737, Airbus A320 | 84 | 75 | 85-86 | 81 |
| Boeing 767 – Short Range | 80 | 78 | 85-87 | 82 |

The NIA identifies the design aircraft level as 84 dBA resulting from a Boeing 767, though this is not represented in the NIA Table 2, which details predicted aircraft noise levels.

Based upon our predicted maximum aircraft noise level (87 dBA) and the design noise levels detailed in AS2021 we calculate that the following aircraft noise reductions (ANR) are required for each use within the development.

- Private Offices 32 dB
- Open Plan Offices 22 dB
- Shops (Takeaway, Cafes, Bulky Goods Retail) 12 dB

With regard to the required ANR for private offices, we note that Clause 3.2 of AS2021 states:

"*For building sites that require an ANR in excess of 30 it is recommended that for the purpose of noise control the assessment be evaluated in terms of the spectral components of the aircraft noise rather than a dB(A) value, so as to take account of low frequency components of the aircraft overflight that may influence the internal dB(A) level.*"

It is not indicated in the NIA whether spectral components of the aircraft flyover noise level have been considered in defining the required noise reduction to achieve internal noise objectives.

**BUILDING CONSTRUCTION REQUIREMENTS**

The NIA presents indicative acoustic treatments based on assumed room dimensions. We note that the development approval being sought does not detail any buildings to be constructed on the site and that it is instead for the site itself. This fact is acknowledged in the NIA and as such the NIA recommends that an acoustical review of the proposed design should be undertaken prior to Building Approval, to ensure that correct specifications are made specific to the proposed design. We consider that this is appropriate, though we note that the aircraft noise levels shown in the NIA should not be relied upon in any subsequent assessments.

With regard to the ANR required for private offices we note Clause E2.3 of AS2021, which states:

"*Jet aircraft noise in proximity to an airport tends to be dominated by low frequency components. As a result, Rw ratings alone are not a reliable guide to the attenuation properties of building components. It is possible for components with lesser Rw values to perform better at the critical low frequencies than components with higher Rw values. The full spectrum information for the building component should be consulted where an ANR in excess of 30 is required.*"

Additionally, care must be taken in using reported transmission loss values due to the difference between laboratory and in situ performance. Clause E2.2 of AS2021 requires that allowances be made for degradation in sound attenuation due to imperfections in the actual installation, the importance of which is increased when trying to achieve greater ANRs. The NIA does not indicate whether such allowances have been made.

**POSSIBLE CONSTRUCTIONS**

The NIA details a number of possible constructions. With regard to these we note that no evidence is presented to suggest that spectral aircraft noise and transmission data have been used. It is therefore likely that noise level calculations of the Aircraft Noise Attenuation ($ANA_c$ – defined in Appendix F of AS2021) have been based upon the Rw values of components using the relationships described in Appendix F of AS2021. Though this is sufficient for many applications we caution that care should be taken in using this approach and that the use of spectral data is far more reliable and should be preferred. Notwithstanding this, the use of Rw could be considered sufficient given the preliminary nature of the NIA, though AS2021 explicitly requires the use of spectral data where an ANR greater than 30 is required as is the case for private offices in this development.

**Private Offices**

- **Roof-ceiling** – The prescribed construction may be appropriate, depending on the final dimensions and finishes within the room. Consideration should be given to any penetrations for services etc. that would compromise the acoustic performance of the ceiling. It may be appropriate that the "sound barrier" ceiling be installed independently of the ceiling to the rooms.

This way, the "sound barrier" would not have any penetrations that could compromise the acoustic effectiveness.

- **Walls** – The wall constructions detailed should perform adequately. If lightweight external walls are used it may be necessary to ensure that internal plasterboard is not rigidly attached to the studs in order to achieve the quoted Rw 46.
- **Glazing** – The suggested double glazing system should perform adequately. Care should be taken to ensure that the window frames are correctly sealed into the wall and that operable windows are fitted with adequate acoustic seals to not compromise the acoustic performance of the system.

**Open Plan Offices**

- **Roof-ceiling** – The prescribed construction may be appropriate, depending on the final dimensions and finishes within the room. Consideration should be given to any penetrations for services etc. that would compromise the acoustic performance of the ceiling. It may be appropriate that the "sound barrier" ceiling be installed independently of the ceiling to the rooms. This way, the "sound barrier" would not have any penetrations that could compromise the acoustic effectiveness.
- **Walls** – The wall constructions detailed should perform adequately. If lightweight external walls are used it may be necessary to ensure that internal plasterboard is not rigidly attached to the studs. This would achieve an Rw value of approximately 46, which is adequate for this purpose. (The NIA identifies the Rw as 49, although the same constructions are nominated as Rw 46 for private offices.)
- **Glazing** – The suggested single laminated glazing should perform adequately, pending the actual room dimensions and finishes.

**Shops**

The standard constructions detailed would achieve the necessary ANR. This construction should be adopted for the “bulky goods retail” spaces also. We note the requirement for sealed ventilation, as open windows would likely yield unacceptable noise levels in most spaces.

## SUGGESTED APPROVAL CONDITIONS

Approval conditions should be performance based, rather than prescriptive of any construction elements. We recommend that acoustic assessments specific to proposed buildings be required before Building Approval is granted. These assessments should address the issues discussed in this review and also all other requirements of AS2021.

Approval conditions should include a requirement for compliance testing prior to occupation of offices (both private and open plan) in order to demonstrate that the required ANR and internal noise levels have been achieved. Compliance measurements should be undertaken by an acoustic specialist and in accordance with the method described in Appendix C of AS2021. Given the ANR required in this case it is advisable that absolute internal noise levels from aircraft noise, and not solely the ANR, be considered in determining compliance.

**CONCLUSION**

Wilkinson Murray has undertaken a review of the NIA for the development of a site off Parkes Street at Boyd's Bay, Tweed Heads.

This letter details inadequacies determined in the NIA and makes recommendations to remedy these. Of critical importance and immediate relevance to the scope of our review, we consider that the predicted aircraft noise levels are not representative of the most-affected locations on the site, and this has an impact on the subsequent recommendations of the NIA. In principle the NIA is intended at this stage to demonstrate that acoustic treatments can be incorporated into buildings on the site to permit the intended final uses of the development. We consider that, whilst there are issues with the NIA that we have identified, for the purpose of the development application in question, the NIA effectively demonstrates that acceptable noise levels can be achieved.

We recommend that:

- any approval granted to the development should detail the acoustic performance requirements to be met by the end use, to ensure that internal noise levels are acceptable;
- approval conditions require that further acoustic assessments be performed for specific building proposals before Building Approval is granted. This is not possible at this stage as no specific buildings are proposed for the subject site. Any such acoustic assessment should address AS2021 in full and give consideration to the issues identified in this review; and
- compliance testing should be conducted prior to occupation of offices in order to demonstrate that the required ANR and internal noise levels have been achieved. Compliance measurements should be undertaken by an acoustic specialist and in accordance with the method described in Appendix C of AS2021.

I trust this information is sufficient. Please contact us if you have any further queries.

Yours faithfully
**WILKINSON MURRAY**

**Adam Bioletti**
Senior Engineer

**Note**

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**Quality Assurance**

We are committed to and have implemented AS/NZS ISO 9001:2008 "Quality Management Systems – Requirements". This management system has been externally certified and Licence No. QEC 13457 has been issued.

**AAAC**

This firm is a member firm of the Association of Australian Acoustical Consultants and the work here reported has been carried out in accordance with the terms of that membership.

| Status | Date | Prepared by | Checked by |
|---|---|---|---|
| Final | 13 July 2011 | Adam Bioletti | Rob Bullen |