AUSTRALIAN CATHOLIC UNIVERSITY STRATHFIELD CAMPUS

167-169 & 179 ALBERT ROAD, STRATHFIELD

CONCEPT PLAN ACOUSTIC ASSESSMENT

Issued

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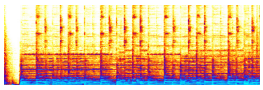

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Executive Summary

A noise assessment has been carried out on the proposed redevelopment of the Strathfield campus of the Australian Catholic University. This assessment covered:

- Noise resulting from demolition and construction operations.
- Noise resulting from general operations of the redeveloped campus.
- Noise resulting from any increases in traffic using the streets surrounding the campus.

A survey of existing noise levels has been carried out at key residential locations around and adjacent to the campus. The data from these surveys has been used to establish noise criteria for each type of noise assessed in this report.

Noise levels from demolition and construction activities will be controlled to comply with the criteria. A demolition and construction noise management plan to achieve this has been included in this report, and no noise impact is anticipated with the implementation of this plan.

The day-to-day activities on the existing campus include indoor teaching, and general tertiary academic pursuits. External noise events are limited to conversations between people walking through the campus grounds, and as such are not significant noise sources.

The noise survey and monitoring of noise levels at the nearest residential properties around the campus established that noise levels generated by day-to-day activities on the campus are currently inaudible at the nearest residences and residential boundaries. It is anticipated that there will be little difference between teaching and non-teaching periods as the nature of the external activities on campus is such that changes in student numbers will not result in any increase in the overall noise levels at the nearest residences.

Similarly, whilst the increase in student numbers will increase the activity on campus, this is not expected to result in any change in the existing day-to-day noise levels around the site, nor lead to any increase in the noise impact at the nearest residences.

Noise from the mechanical services associated with the new buildings has been quantified and assessed against acceptability criteria derived from the NSW Industrial Noise Policy. The predicted noise levels from all plant and equipment associated with the building services comply with the criteria and no impact is anticipated. Notwithstanding this, all plant will include noise controls as required (to be determined during the design and documentation stages of the project). The types of noise controls that may be used are listed in this report.

Traffic noise criteria have been set based on the NSW Road Noise Policy. This policy was implemented on 1 July 2011 and represents the most up-to-date methodology for assessing road traffic noise in NSW.

Based on predicted traffic increases nominated in the traffic study carried out by Arup Pty Ltd, an increase of 0.5 $dBL_{Aeq,1\ hour}$ is predicted for residences located along Barker Road. This increase is regarded as insignificant, and meets the criterion of a maximum increase of 2 $dBL_{Aeq,1\ hour}$.

Other than for Barker Road, no increases in existing traffic numbers, and consequently traffic noise levels, are expected for any other local roads around the campus.

1 Introduction

The Australian Catholic University has been investigating opportunities to consolidate activities between its two Sydney campuses at Strathfield and North Sydney. This process has involved consideration of projected student numbers and distribution of activities between the two campuses.

Part of this process has involved the preparation of a master plan for the Strathfield campus based on projected growth rates.

In summary, the key features of the master plan are:

- Four new development precincts within the campus to provide new library and education buildings.
- New underground parking area in the north west of the Campus and two basement parking areas with a total minimum of 674 spaces.
- Consolidation of main site access and egress into four gates along Barker Road. Staff only access off Edgar Street.
- New access point from Barker Road at the south eastern corner of the campus involving relocating existing traffic signals to form a new intersection with South Street (opposite).
- Refined internal circulation within the main Campus providing clear separation between service vehicle access, short term parking spaces, internal bus stop and set-down locations and car parking access.
- Improved site landscaping and public domain including new pedestrian corridors, open space and landscape improvements.
- New pedestrian links throughout the campus to improve internal site linkages to the north eastern campus and preserve opportunities for further consolidation of the campus in the future.

A request made to the NSW Department of Planning for authorisation to proceed with a Concept Plan pursuant to Part 3A of the EP&A Act for the Strathfield Campus of the Australian Catholic University has been granted, and the Director General's Environmental Assessment Requirements ("DGRs") have been formulated, including a requirement to carry out a noise impact assessment of both construction noise and noise levels resulting from changes in traffic that are likely to result from the implementation of the Concept Plan.

Acoustic Studio Pty Ltd has carried out the noise impact assessment in accordance with the relevant DGR and this assessment is presented in this report.

2 Director General's Environmental Assessment Requirements – Noise

The Director General's Environmental Assessment Requirements (DGRs) for noise are as follows:

Provide a quantitative assessment of the potential demolition, construction, operation and traffic noise impacts of the project.

This DGR covers the following potential noise impacts:

- Noise from any demolition associated with the development.
- Noise from construction of the new facilities proposed for the development.
- Noise from the operation of the development.
- Noise from traffic movements on the surrounding streets resulting from changes in traffic levels associated with the development.

Each of these noise impacts are assessed in this study and included in this report.

3 Project Description

3.1 The existing campus

The Strathfield campus is located on two sites – 179 Albert Street, which is accessed via Barker Road, and the Clancy Building, 167-169 Albert Street, which is accessed via Albert Road. Two residential lots currently separate the sites. These two sites are shown below in Figure 1.

Figure 1: Site plan

The campus is distinctly split into two components. On the northern half is a vast expanse of open space that is assigned to sporting activity. The south side contains all the built form.

There are various car-parking facilities across the campus. The main car parks are at the east and west ends of the Barker Road site. These car parks currently fall short of the university's requirements. This results in overspill into the streets nearby.

3.2 Proposed development zones

The Master Plan identifies three distinct zones that can be developed in stages to suit the University growth requirements. New buildings will be constructed within these zones. These zones are shown in Figure 2.

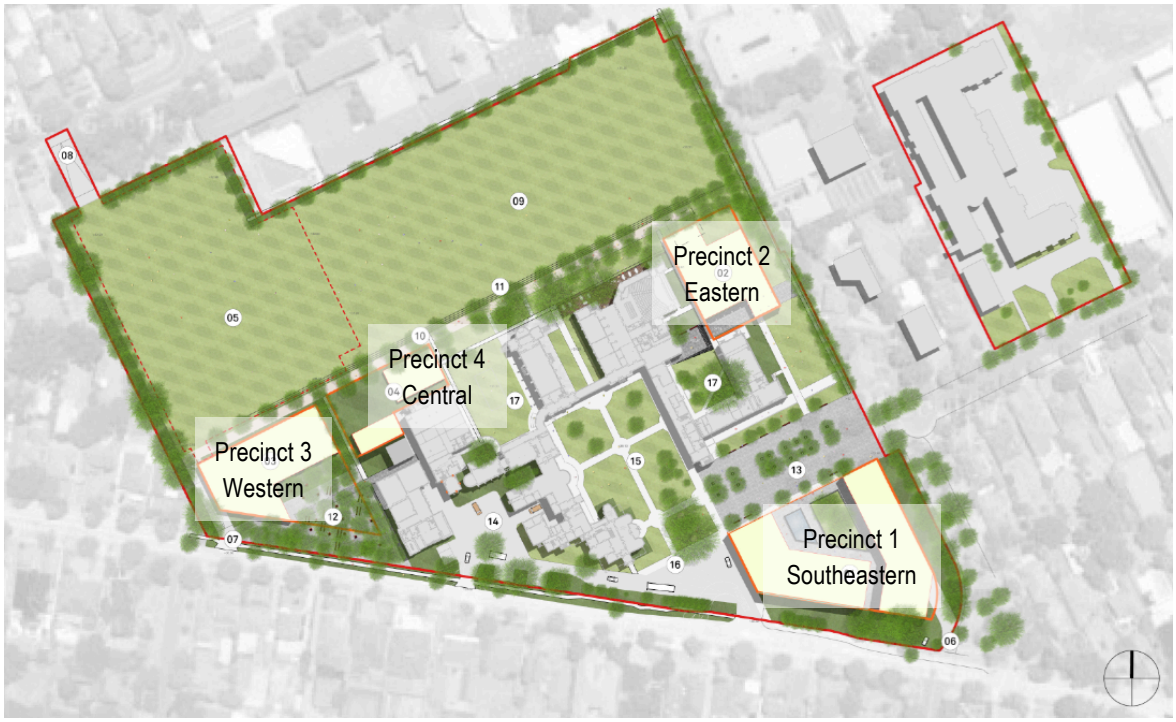

Figure 2: Proposed development zones

The precincts include the following:

- Precinct 1: Southeastern (library and learnings common).
- Precinct 2: Eastern (educational uses, lecture theatres & research space).
- Precinct 3: Western (educational uses, laboratories & arts studio).
- Precinct 4: Central (reuse of existing library, storage, campus facilities and educational uses).

3.3 Car parking

It is proposed to accommodate the car parking needs of the campus as follows:

- North western main car park (underground) – 282 spaces.
- South eastern precinct (underground to library and learnings common) – 174 spaces.
- Main accessway (in between gates 2 and 3) – 19 spaces.
- Western precinct (underground to arts and sciences building) – 158 spaces.
- Clancy building – 41 spaces.

3.4 Hours of operation

The hours of operation of the campus will be as follows:

- 7:30 am - 9.30 pm Monday to Friday.
- 8 am - 5 pm Saturday and Sunday.
- The library will operate on a 24 hour/day basis with swipe card access.

4 Existing Noise Environment

4.1 General survey information

A survey of the existing noise environment around the campus was carried out on 12 July 2011. Whilst this was outside the normal teaching period, it is anticipated that there will be little difference between teaching and non-teaching periods as the nature of the external activities on campus is such that changes in student numbers will not result in any increase in the overall noise levels at the nearest residences. The campus was operating during the survey and it has been assumed that all mechanical plant associated with the campus was operating normally.

The noise monitoring locations are shown in shown Figure 4

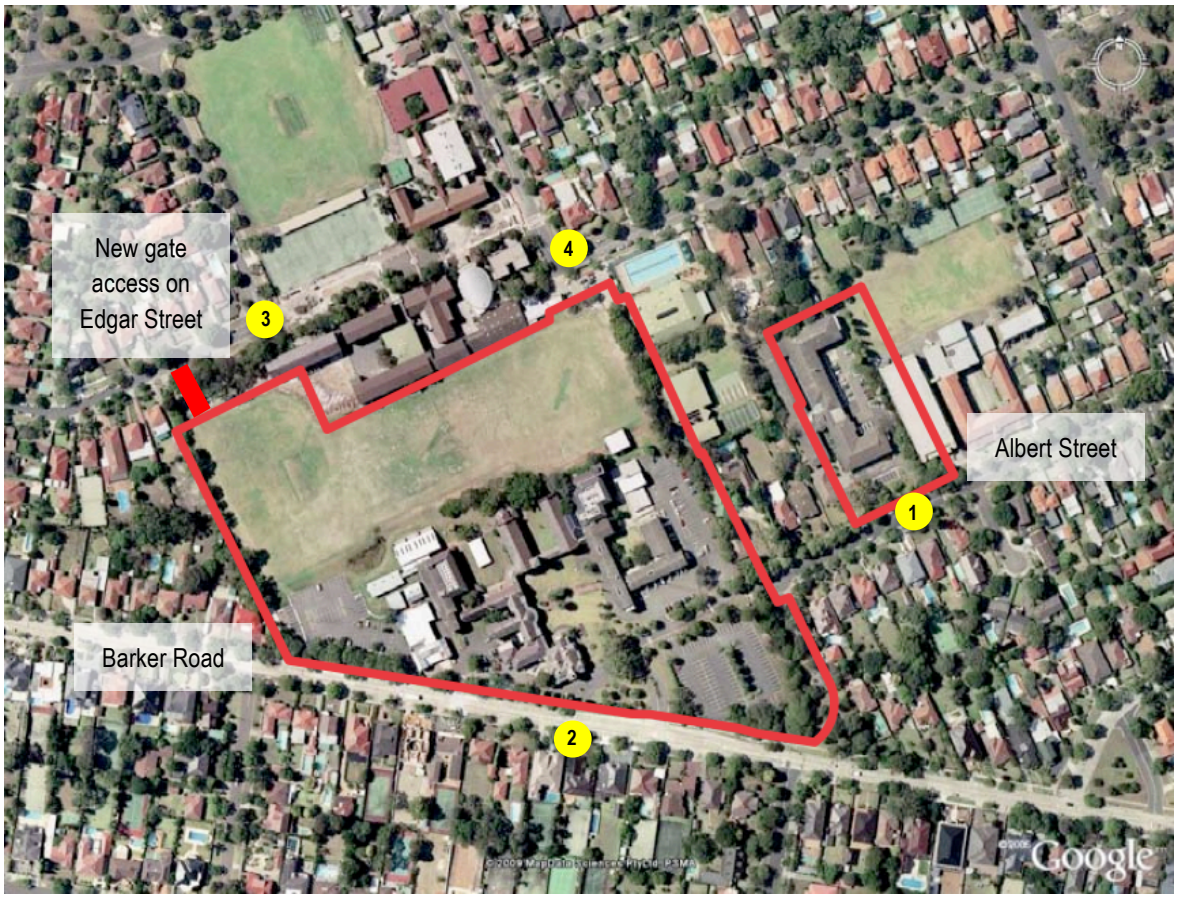

Figure 4: Ambient noise measurement locations

These locations are identified in Table 1.

Measurement location	Address	Dominant noise sources
1	167-169 Albert Street	Distant traffic
2	76 Barker Road	Barker Road traffic
3	Corner Edgar & Fraser Streets	Distant traffic
4	Corner Francis Street & Merley Road	Distant traffic

Table 1: Ambient noise measurement locations and addresses

Operator attended short term monitoring was carried out between 12:00 pm and 9.00 pm in order to establish the typical daytime and evening noise levels on the site and the octave band spectra of the levels. Short-term measurements were made with a Brüel & Kjær Hand-held Analyser Type 2250 (Serial Number 2446899). The calibration of the analyser was checked before and after the survey and no variation in level occurred.

A windshield was used to protect the microphone of both the analyser. Weather conditions were calm and dry during the attended noise survey. Peter Griffiths of Acoustic Studio Pty Ltd carried out the survey.

4.2 Ambient noise monitoring results

The results of the background and ambient noise monitoring are shown in Table 2. The reported levels are the L_{Aeq} (the A-weighted equivalent continuous sound level), the L_{A10} (the A-weighted sound level exceeded 10 % of the time) and the L_{A90} (the A-weighted sound level exceeded 90 % of the time, which is the defined background sound level).

Measurement location	Time	Measured noise level, dB re 20 µPa			Dominant noise sources
		L_{Aeq}	L_{A10}	L_{A90}	
1	12:00 – 12:30 pm	47.3	50.5	40.4	Distant traffic, aircraft, pedestrians
	7:00 – 7:15 pm	46.2	49.4	39.9	Distant traffic, aircraft
2	1:00 – 1:15 pm	61.5	65.2	47.6	Barker Road traffic, aircraft
	7:30 – 7:50 pm	58.7	63.1	46.1	Barker Road traffic, aircraft

3	2:15 – 2:45 pm	46.8	51.2	39.7	Distant traffic, aircraft
	8:00 – 8:20 pm	45.3	48.6	39.1	Distant traffic, aircraft
4	3:30 – 4:00 pm	47.1	50.6	40.1	Distant traffic, aircraft
	8:40 – 9:00 pm	45.2	47.9	38.8	Distant traffic, aircraft

Table 2: Ambient noise measurement results

The octave band spectra of the measured daytime Leq levels are shown below in Figure 5.

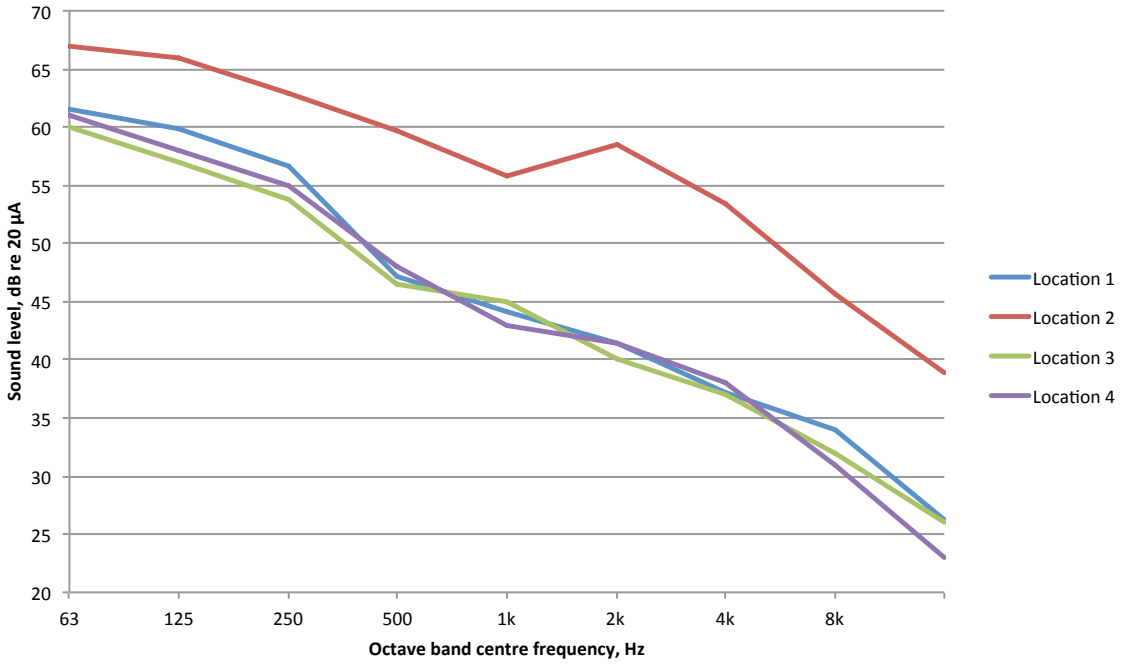

Figure 5: Octave band spectra of existing ambient L_{eq} noise levels

The existing ambient noise levels around the campus are dominated by distant traffic noise from the surrounding streets. Apart from Barker Road, the surrounding streets are lightly trafficked experiencing only occasional vehicle movements. No heavy goods vehicles were observed on these roads during our surveys.

Barker Road is more heavily used, with many more vehicle movements including heavy goods vehicles. Accordingly, the measured noise levels are correspondingly higher along this road.

Occasional aircraft noise was also evident at all locations.

5 Noise Control for Demolition and Construction

5.1 General discussion

Any noise from demolition and construction activities carried out on the site must not result in the transmission of "offensive noise", as defined in the Protection of the Environment Operations Act 1997, to any place of different occupancy. To this end, the Contractor employed to undertake the construction works is responsible for ensuring that any site noise and, in particular, any complaints regarding such, are monitored, investigated, managed and controlled.

5.2 Relevant Codes and Standards

In preparing this construction noise assessment, the following legislation, codes and standards are considered relevant for the project:

- The Department of Environment, Climate Change and Water (DECCW) *Interim Construction Noise Guideline*, 2009
- Environment Protection Authority (EPA, currently DECCW) *Environmental Noise Control Manual*, 1994
- Standards Association of Australia, *AS 2436-198: Guide to Noise Control on Construction, Maintenance & Demolition Sites*, 1981
- Protection of the Environment Operations Act 1997

5.3 Definitions

Contractor
Refers to the Contractor employed to undertake the construction works in accordance with the contract requirements.

Acoustic Consultant
Refers to a suitably qualified acoustic consultant appointed by the Contractor to measure and assess noise impacts in accordance with the statutory requirements.

Background Noise Level
Refers to the L_{A90} sound pressure level (equivalent to the average minimum, $L_{A\ av\ min,\ T}$). When used in assessing the nuisance level, the background noise level is the 8-hour background L_{Aeq} noise level.

$L_{A\ av.\ max,\ T}$
Refers to the average maximum sound pressure level, measured in dB(A) on fast response during the stated measurement period, generated by a machine when operating in a normal operational duty cycle.

For the purpose of this assessment, the duration interval (T) shall be 1 minute when considering noise at a distance of 7 m from an appliance.

$L_{A10,\ T}$
Refers to the sound pressure level, measured in dB(A), exceeded for 10 percent of the stated measurement period, T.

For the purpose of assessment of compliance with this procedure the duration interval (T) should be 1 minute when considering noise at a distance of 7 m from an appliance. L_{A10} is deemed to be equivalent to $L_{A\ av.\ max}$.

5.4 Noise sensitive receivers

The nearest noise sensitive receivers include the following:

- Residences located along Barker Road, opposite the Campus.
- Residences located along Albert Street, adjacent the Campus sites.
- Residences adjacent to the Campus boundaries to the north and west.

5.5 Control elements

As a general rule, prevention should be applied as a universal work practice at any time of day, but especially if any construction works are to be undertaken at critical times outside normal daytime/weekday periods. It is noted that the reduction of the noise at the source and the control of transmission path between the construction site and the receiver are the preferred options for noise minimisation. Providing treatments at the affected residences or other sensitive land uses should only be used as a last resort.

Construction noise shall be managed by implementing the strategies listed below:

- Plant and equipment
  - Use quieter methods.
  - Use quieter equipment.
  - Operate plant in a quiet and effective manner.
  - Maintain equipment regularly.
- On site noise management
  - Strategically locate equipment and plant.
  - Avoid the use of reversing alarms or provide for alternative systems.
  - Maximise shielding in the form of existing structures or temporary barriers.
  - Schedule the construction of barriers and structures so they can be used as early as possible.
- Consultation, notification and complaints handling
  - Provide information to neighbours before and during construction.
  - Maintain good communication between the community and project staff.
  - Have a documented complaints process and keep register of any complaints.
  - Give complaints a fair hearing and provide for a quick response.
  - Implement all feasible and reasonable measures to address the source of complaint.
- Work scheduling
  - Schedule activities to minimise noise impacts.
  - Ensure periods of respite are provided in the case of unavoidable maximum noise levels events.
  - Keep truck drivers informed of designated routes, parking locations and delivery hours.

5.6 Working hours

Working hours should be limited as the recommended standard hours of work in the DECCW *Interim Construction Noise Guideline* as follows:

- Monday to Friday — 7 am to 6 pm
- Saturday — 8 am to 1 pm
- Sundays and Public Holidays — No demolition or construction work

5.7 Noise criteria/site operational noise level limits

The noise criteria and operational levels presented in this section are for guidance only and do not form part of any legal obligation on the part of the project proponent. However, compliance with these criteria/limits is considered best practice.

The *Interim Construction Noise Guideline* published by the DECCW recommends maximum demolition and construction noise management levels to minimise the likelihood of annoyance being caused to neighbouring residents. Two operational scenarios (time periods) are considered as follows:

- Demolition and construction operations carried out during the recommended standard hours (refer Section 5.6 above).
- Demolition and construction operations carried out outside the recommended standard hours (refer Section 5.6 above).

Operations within the recommended standard hours

The $L_{Aeq,15min}$ level measured at the most exposed boundary of any affected residential receiver when the construction site is in operation should not exceed the background level by more than 10 dB(A). This noise level represents the point above which there may be some community reaction to noise.

However, in the case of a highly noise affected area, the construction noise level at the most exposed boundary of any affected residential receiver when the construction site is in operation should not exceed 75 dB(A). This level represents the point above which there may be strong community reaction to noise.

Operations outside the recommended standard hours

The $L_{Aeq,15min}$ level measured at the most exposed boundary of any affected residential receiver when the construction site is in operation should not exceed the background level by more than 5 dB(A).

It is noted that a strong justification would be required for works outside the recommended standard hours.

Table 3 below summarises airborne demolition and construction noise criteria for the residential receivers surrounding the project site.

Sensitive Residential Receivers	Measured background sound level, dBL_{A90}	Airborne Construction Noise Criteria, maximum dBL_{Aeq}	
		Within Standard Hours	Outside Standard Hours
Residences along Barker Road	48	48 + 10 = **58 dB(A)**	48 + 5 = **53 dB(A)**
All other residences adjacent the campus sites	40	40 + 10 = **50 dB(A)**	40 + 5 = **45 dB(A)**

Table 3: Demolition and construction noise criteria for residential receivers surrounding the project sites

Apart from the external construction noise management levels presented above, the DECCW guideline also recommends internal ground-borne noise maximum levels at residences affected by nearby construction activities. Ground-borne noise is noise generated by vibration transmitted through the ground into a structure. The ground-borne noise levels presented below are for evening and night-time periods only, as the objectives are to protect the amenity and sleep of people when they are at home. However, it is not anticipated that any demolition or construction will take place outside the standard daytime hours.

- Evening $L_{Aeq,15min}$ 40 dB(A) (internal)
- Night $L_{Aeq,15min}$ 35 dB(A) (internal)

The internal noise levels are to be assessed at the centre of the most affected habitable room. It is noted that a strong justification would be required for works outside the recommended standard hours.

5.8 Plant noise levels

The Contractor will be required to test all plant/equipment and trucks for compliance in accordance with the Flow Chart in Appendix A.

The exit ramps and all internal haul roads shall be at the lowest grade practicable.

The number of trucks on site at the commencement of site activities shall be kept to the minimum required by the loading facilities on site.

5.9 Noise Monitoring

The Contractor shall implement environmental noise monitoring if required at locations nominated by the University.

5.10 Reporting

The Contractor will be required to prepare noise-monitoring reports for review by the Project Manager. The reports shall summarise and interpret the results of the noise monitoring carried out during the past month.

5.11 Communication and complaints

The Contractor will be required to establish a communications register for recording incoming complaints. The registration of a particular item will remain open until the complaint has been appropriately dealt with.

In addition the following procedures shall be adopted specifically for complaints relating to noise.

Upon receipt of a complaint The Contractor shall:

- Try to ascertain from the complaint which appliance is causing the problem i.e. inside or outside the site and in what position.
- Establish from the monitoring equipment if the allowable noise levels have been complied with.
- Establish if the appliance positioning has previously been highlighted as a problem area. If not and the noise levels are above the allowable limit, then the equipment and its position shall be noted.
- Move machinery if the allowable levels have been exceeded or take other acoustic remedial action.

If the activity is occurring outside normal working hours, the General Foreman shall immediately stop the activity. Where stopping the activity would create a safety issue the activity shall be permitted to continue only as long as is necessary to make the area safe. The activity shall then be directed to cease.

Any activity which is directed to cease due to excessive noise may not recommence until the Project Manager is satisfied that the noise limits can be met and has given permission to recommence the activity.

The Site Supervisor shall ensure that a report of any incident is provided to the Project Manager.

The Project Manager shall provide a report on the incident to the relevant stakeholders.

The Contractor shall will provide a 24 hour telephone contact number and this number will be prominently displayed on the site.

5.12 Non-compliances

Non-compliance reports shall be used as appropriate to deal with failures to meet the requirements of the Noise Management Plan.

6 Operational Noise

6.1 Operational noise sources

The general operations of the campus are typical of those for any tertiary educational institution. Teaching activities take place within designated spaces, with the only external activities being the pedestrian movement of students and staff between buildings and facilities, and the congregation of people into small groups as they study/read/socialise, etc. It is anticipated that the noise levels that will result from the normal teaching and educational activities of students and staff will be inaudible above the existing background sound levels at all neighbouring residential boundaries and that consequently there will be no corresponding noise impact from these activities.

The new buildings will be air-conditioned, and the plant associated with these systems, particularly externally located plant and plant located in plant rooms with façade air intake and discharge grilles and louvres, represents noise sources that will potentially impact on the neighbouring residential premises adjacent to the site. It is the potential noise impact of this plant that must be assessed as the general operational noise levels from the development.

6.2 Assessment methodology

Environmental noise is generally assessed by comparing the new, intrusive noise against an acceptance criterion based on the pre-existing background noise level. Where the intrusive noise is greater than the pre-existing background noise level, the potential exists for disturbance and annoyance. However, the noise impact can be considered marginal if the difference between the pre-existing background noise level and the intrusive noise is 5dB or less. This concept has resulted in the commonly used criterion of background noise level + 5dB.

The NSW Industrial Noise Policy 2000 of the NSW Department of Environment and Conservation is specifically aimed at assessing noise from industrial noise sources scheduled under the *Protection of the Environment Operations Act 1997*. The Policy is designed for large and complex industrial sources, and is not necessarily relevant to the assessment of time-varying noise such as that generated by typical campus activities. However, this Policy can be used as the basis for the assessment of noise from mechanical plant associated with the development.

The NSW Industrial Noise Policy sets two separate noise criteria to meet environmental noise objectives: one to account for intrusive noise and the other to protect the amenity of particular land uses.

Assessing intrusiveness

The intrusiveness criterion essentially means that the equivalent continuous noise level of the source should not be more than 5dB above the measured background noise level.

Assessing amenity

The amenity assessment is based on noise criteria specific to land use and associated activities.

Project specific noise level

The project specific noise level is the most stringent of the intrusive and the amenity criterion sets.

Accounting for annoying noise characteristics

An adjustment is applied to the source noise level before comparison with the project specific noise level if it exhibits any particularly annoying characteristics (tones, impulses, low frequency noise, and intermittency).

Accounting for meteorological effects

Under certain meteorological conditions (temperature inversions and downwind conditions) noise levels can increase at receiver locations, compared to calm and/or non-inversion conditions. Therefore it is necessary to establish whether or not these adverse meteorological conditions will effect the noise impact assessment and to compare the predicted noise level under these conditions to the project specific noise level.

6.3 Intrusiveness criterion

The intrusiveness of noise from the development will generally be considered acceptable if the equivalent continuous A-weighted operational noise level, measured over a 15-minute period, does not exceed the background noise level (measured in the absence of noise from the development) by more than 5dB(A).

The intrusiveness criterion has been determined from the measured background sound levels as shown below in Table 4. Two periods are considered: daytime (7 am to 6 pm) and evening (6 pm to 10 pm). There is no requirement to assess the nighttime period as there are no proposed activities during this period.

Location	Period	Background sound level, dBL_{A90}	Intrusiveness criterion, $dBL_{Aeq, 15\ mins}$
1	Day	40	45
	Evening	40	45
2	Day	48	53
	Evening	46	51
3	Day	40	45
	Evening	39	44
4	Day	40	45
	Evening	39	44

Table 4: Intrusiveness criteria for operational noise levels

6.4 Amenity criterion

To limit any continuing increases in noise levels, the maximum ambient noise levels from the mechanical services plant associated with the development should not exceed the acceptable noise levels appropriate for a suburban area.

The nearest residential receivers to the project are considered to be in a Noise Amenity Area characterised by the NSW Industrial Noise Policy as Suburban. For such an area, the Policy recommends the following acceptable L_{Aeq} noise levels as follows:

- Day 55dB(A)
- Evening 45dB(A)
- Night 40dB(A)

The amenity criteria for each period for each location are shown below in Table 5.

Location	Period	Existing L_{Aeq} sound level, dB	Amenity criterion, $dBL_{Aeq,}$
1	Day	47	55
	Evening	46	37
2	Day	62	53
	Evening	59	49
3	Day	47	55
	Evening	45	37
4	Day	47	55
	Evening	45	37

Table 5: Amenity criteria for operational noise levels

6.5 Project specific noise level

The Project Specific Noise Level is defined as the lower of the intrusiveness and the amenity criteria. On this basis, the Project Specific Noise Levels for each location are shown in Table 6.

Location	Limiting period	Intrusiveness criterion, $dBL_{Aeq, 15\ mins}$	Amenity criterion, $dBL_{Aeq,}$	Project specific noise level, $dBL_{Aeq,}$
1	Evening	45	37	37
2	Evening	51	49	49
3	Evening	44	37	37
4	Evening	44	37	37

Table 6: Project specific noise levels

6.6 Predicted operational noise levels from mechanical services plant

It is not possible to calculate the noise levels from the mechanical services plant, because of the early stage of the project, the services have not yet been designed or the plant specified. However, it is possible to estimate the noise levels likely to occur at the nearest residential boundaries based on typical noise emission levels that can be expected, and the distances between the new buildings and the nearest residential boundaries.

Mechanical services noise is generally the result of externally located plant (such as external condenser units) and/or noise egress from plantroom louvres and grilles in the facades of buildings. These noise levels can vary greatly, depending on the selection of the plant, the arrangement and location within the building, and the noise controls that might be included in the design of the plant and systems (such as noise barriers, lined ductwork and plenums, in-duct attenuators, etc.). For the purposes of this assessment, a worst case external noise level from plant of 65 dB(A) has been assumed in the immediate vicinity of the buildings.

The distances between the new buildings/facilities and the nearest residential boundaries are as follows:

- 30 m between the Arts Precinct building and the nearest residences to the west. These residences are exposed to the existing Barker Street noise levels.
- 44 m between the General Education facility and the nearest residences to the east. These residences are exposed to the existing Albert Road noise levels.
- 45 m between the Learning Commons facility and the nearest residences to the east and south. These residences are exposed to the existing Barker Street noise levels.

On this basis, the predicted noise levels at these nearest residential boundaries are as follows:

- 30 m from the Arts Precinct building 35 dBL_{Aeq}
- 44 m from the General Education facility 32 dBL_{Aeq}
- 45 m between the Learning Commons facility 32 dBL_{Aeq}

These estimated worst-case boundary noise levels are assessed by comparing them to the operational noise criteria (the Project Specific Noise Level) established above in Section 6.5. This assessment is shown below in Table 7.

Facility	Distance to nearest residential boundary, m	Operating noise level, dBL_{Aeq}	Criterion (Project Specific Noise Level), dBL_{Aeq}	Meets criterion?
Arts Precinct Facility	30	35	49	Yes
General Education Facility	44	32	37	Yes
Learning Commons	45	32	49	Yes

Table 7: Comparison and assessment of estimated operational noise levels (mechanical services plant) with residential boundary criteria

In any event, noise levels generated by all mechanical plant and air conditioning equipment will be limited to a maximum $L_{Aeq,\ 15\ minutes}$ not exceeding the relevant Project Specific Noise Levels established in this assessment when measured at the nearest residential boundary. Treatment of the mechanical services will include any or all of the following as required:

- Selection of appropriate quiet equipment.
- Noise barriers or shielding.
- In-duct attenuation.
- Acoustic enclosures.

This will ensure that the operation of the facilities included in this development will not cause any noise impact to the neighbouring residents during both the daytime and nighttime periods.

7 Traffic Noise Assessment

The increase in student population following the development of the campus will potentially increase the number of vehicles on the surrounding roads, with a potential increase in traffic noise exposure for the residences located along these roads. This report presents an analysis of the existing road traffic noise levels, and estimates the likely increase in road traffic noise levels resulting from the development. These estimated noise levels are assessed against acceptability criteria set by the NSW Road Traffic Noise Policy.

7.1 Relevant standards and guidelines

The *NSW Road Traffic Noise Policy* is published by the NSW Department of Environment, Climate Change & Water. The Policy was adopted on 1 July 2011, and replaces the *Environmental Criteria for Road Traffic Noise*, which was published in 1999 by the NSW Environment Protection Authority. As such, the *NSW Road Traffic Noise Policy* represents the latest Government policy document relevant to the assessment of road traffic noise resulting from this project.

The new policy identifies “assessment” criteria and a “relative increase” criterion for road traffic noise. The criteria can be used to assess:

- New road projects.
- Road development projects.
- Traffic generating developments.

It is the last of these that relates to this project.

7.2 Criteria

The *NSW Road Traffic Noise Policy* sets the following assessment criteria for existing residences affected by additional traffic on existing roads generated by land use developments. For this project Barker Road is considered as a sub-arterial road, whilst all other streets in the vicinity of the campus are considered as local roads.

Sub-arterial roads (Barker Road)

- Day (7 am – 10 pm) - $L_{Aeq,1\ hour}$ 60 dB
- Night (10 pm – 7 am) - $L_{Aeq,1\ hour}$ 55 dB

Local roads (all other streets around the campus)

- Day (7 am – 10 pm) - $L_{Aeq,1\ hour}$ 55 dB
- Night (10 pm – 7 am) - $L_{Aeq,1\ hour}$ 50 dB

For this project, only the daytime criteria are applicable, as the development will not result in any additional traffic movements during the nighttime period.

It should be noted that for residences located adjacent Barker Road, the existing L_{Aeq} is 62 dB(A), 2 dB above the recommended criterion. In such cases, it is usually regarded that traffic arising from the development should not lead to an increase in existing (traffic) noise levels of more than 2 dB. In other words, for this development, any increase in traffic noise levels along Barker Street should be limited to 64 dB$L_{Aeq,1\ hour}$.

7.3 Predicted changes in traffic numbers

Arup Pty Ltd has carried out a traffic and accessibility study for the proposed development of the campus. The study findings regarding the impact of the development on the road network are summarised below.

Barker Road

The daily traffic volume on Barker Road is estimated about 7,500 vehicles. Due to the full development of the masterplan, Barker Road will carry approximately additional 10% vehicles, increasing the daily traffic volume to 8250 vehicles.

Albert Road

There will be no change in the car parking provision of Edward Clancy Campus, and no new access from Albert Road is proposed. Therefore, there will be no increase of traffic on Albert Road.

Edgar Street

It is understood that the new Edgar Street access driveway will not result in any increase in traffic on Edgar Street.

The Arup report describes how the Edgar Street access driveway will be limited to St Patricks College staff who are currently using Edgar Street.

The new underground car park in the north western corner of the campus will have a major access driveway from Barker Road to provide access for Australian Catholic University staff and students. A secondary access driveway is proposed from Edgar Street to provide access to 30 car spaces to be used by St Patricks College staff members. Access to these spaces will be controlled by a boom gate control system. Whilst St Patricks College is not increasing staff numbers, it currently has an undersupply of staff parking spaces on their campus leading to double parking on-site and overflow parking on-street. The 30 staff spaces will improve parking conditions for St Patricks but will generate no new vehicle trips on the local street system.

7.4 Predicted increase in traffic noise levels

Based on this data, and the calculation methodology set out in *Calculation of Road Traffic Noise* published by the UK Department of Transport, Welsh Office, the predicted increase in $L_{Aeq,1\ hour}$ will be approximately 0.5 dB along Barker Road.

This increase in existing traffic noise along Barker Road is less than the maximum allowable increase of 2 dB and will be inaudible and imperceptible. It is not considered significant, and will not cause annoyance or disturbance to the residents along Barker Road.

There will be no increase in traffic noise ($L_{Aeq,1\ hour}$) along Albert Street, Edgar Street, or any of the other local roads surrounding the campus due to the changes in traffic movements resulting from this development.

8 Conclusion

A noise assessment has been carried out on the proposed redevelopment of the Strathfield campus of the Australian Catholic University. This assessment covered:

- Noise resulting from demolition and construction operations.
- Noise resulting from general operations of the redeveloped campus.
- Noise resulting from any increases in traffic using the streets surrounding the campus.

A survey of existing noise levels has been carried out at key residential locations around and adjacent to the campus. The data from these surveys has been used to establish noise criteria for each type of noise assessed in this report.

Noise levels from demolition and construction activities will be controlled to comply with the criteria. A demolition and construction noise management plan to achieve this has been included in this report.

Operational noise levels generated by day-to-day student activities are currently inaudible at the nearest residences and residential boundaries. These noise levels are not expected to increase as a result of the redevelopment and no impact is anticipated.

Noise from the mechanical services associated with the new building has been quantified and assessed against acceptability criteria derived from the NSW Industrial Noise Policy. The predicted noise levels from all plant and equipment associated with the building services comply with the criteria and no impact is anticipated. Notwithstanding this, all plant will include noise controls as required (to be determined during the design and documentation stages of the project). The types of noise controls that may be used are listed in this report.

Traffic noise criteria have been set based on the NSW Road Noise Policy. This policy was implemented on 1 July 2011 and represents the most up-to-date methodology for assessing road traffic noise in NSW.

Based on predicted traffic increases nominated in the traffic study carried out by Arup Pty Ltd, an increase of 0.5 $dBL_{Aeq,1\ hour}$ is predicted for residences located along Barker Road. This increase is regarded as insignificant, and meets the criterion of a maximum increase of 2 $dBL_{Aeq,1\ hour}$. No increases in existing traffic numbers, and consequently traffic noise levels, are expected for any other local roads around the campus.