

# Noise Impact Assessment

## Proposed Place of Worship (Church)

### 18 Nyanza Street, Woodridge

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Macedonian Orthodox Church


Project No.: ATP140306


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# Executive Summary

ATP Consulting Engineers was engaged by the Macedonian Orthodox Church to carry out noise impact assessment (NIA) for a proposed place of worship (church and associated facilities) at Lot 3 on RP209064, 18-26 Nyanza Street in Woodridge, within the Logan City Council local area.

This report presents the results of the site specific noise measurements and noise impact assessment considering typical activities at the proposed church.

The results of the site specific noise measurements, indicate that the major roads in the area (Campton Road and Acacia Road) and the Brisbane to Gold Coast railway corridor (located at approximately 150 m to the south-west) do not influence the noise amenity at the surroundings of the proposed church.

Queensland Environmental Protection (Noise) Policy has established environmental noise criteria in the form of acoustic quality objectives and control of background noise creep. Considering the proposed church will provide day-time (after 9:30am) and evening services (starting at 6:00pm), the background creep criteria is the most stringent criteria that the proposed development has to comply with.

Noise propagation modelling was carried out with a 3D model representative of the church site as well as the nearest dwellings on the allotments to the north, south and west. Receptors (calculation points) were located on the ground most exposed façade on the ground and the upper floors of each house. The results of the noise propagation modelling, considering conservative assumptions about sound power levels and hours of operation of noise sources, indicate compliance with the controlling criteria (LAeq,adj,T) for 'background noise creep' of 45 dB(A) for day-time and 44 dB(A) for evening.

Typical church activities, at Lot 3 on RP209064, 18-26 Nyanza Street in Woodridge, with services during day-time (after 9:30am) and evening (after 6:00pm), are unlikely to generate noise emissions which may exceed the acceptable noise levels specified in the Environmental Protection (Noise) Policy 2008.

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## 1. Introduction

### 1.1 Project Background

ATP Consulting Engineers was engaged by the Macedonian Orthodox Church to carry out noise impact assessment (NIA) for a proposed place of worship (church and associated facilities) at Lot 3 on RP209064, 18-26 Nyanza Street in Woodridge, within the Logan City Council local area.

This report presents the results of the site specific noise measurements and noise impact assessment considering typical activities at the proposed church.

### 1.2 Study Objectives

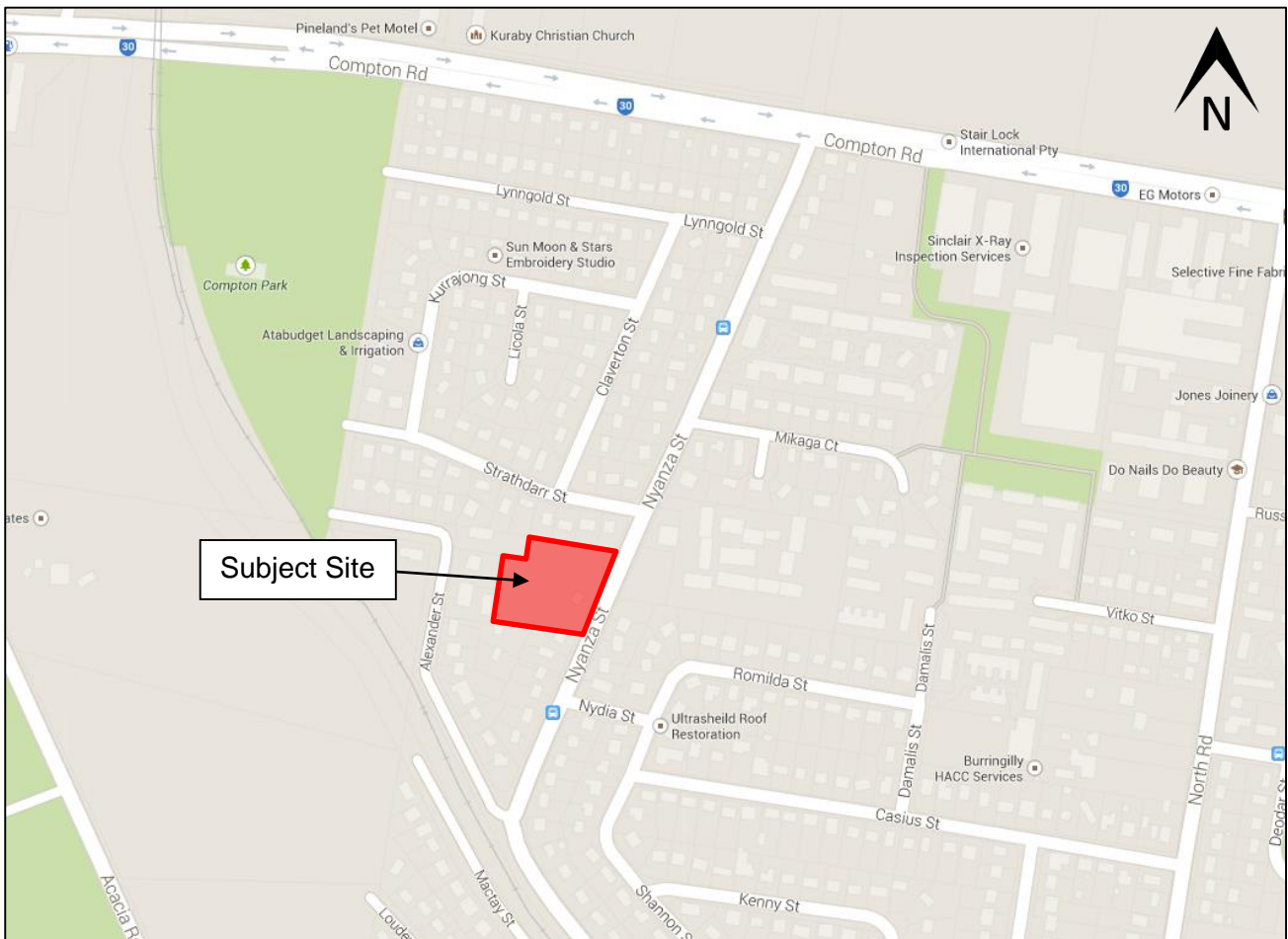
Study objectives are as follows:

- Site inspection and measurement of the existing background noise levels at a representative location within the subject site using an automated noise logger over a continuous seven day monitoring period;
- Review of the layout of the proposed development to determine the operational noise sources that may impact on surround land uses;
- Development of a three dimensional noise propagation model considering the proposed development layout and location and sound power level of the dominant operational noise sources;
- Calculation of the operational noise levels at the facades of the nearest noise sensitive places external to the proposed development site;
- Assessment of operational noise levels against the “Acoustic Quality Objectives” and “Background Creep” criteria from the *Environmental Protection (Noise) Policy 2008* including consideration of the appropriate time periods from the *Environmental Protection Regulation 2008*; and
- Recommendation of appropriate noise control measures to prevent noise from the activities at the church impacting on the surrounding noise sensitive places.

### 1.3 Project Area and Description

The subject site is located at 18-26 Nyanza Street in Woodridge within the Logan City Council local government area. The site is described as Lot 3 on RP209064 with a total area of approximately 6,512 square metres. Access is via Nyanza Street with existing residential dwellings located to the north, south and west of the site. There is an existing high set timber dwelling on the property which will be demolished before construction of the new church begins.

The location of the subject site is presented in Figure 1.1.



**Figure 1.1 Site Location (Google Maps Extract)**

## 1.4 Proposed Development

The proposal comprises of the following elements:

- Place of worship (church);
- Priest's office;
- Amenities block;
- Carpark; and
- Landscaping.

The layout of the proposed development is presented in Appendix A.

## 2. Existing Noise Amenity

### 2.1 Noise Measurement Location

ATP Consulting Engineers carried out site specific noise measurements to obtain information about the existing noise amenity at the subject site.

Noise measurements were carried out from the 30<sup>th</sup> of March (Sunday) to the 8<sup>th</sup> of April 2014 (Tuesday). The noise logger was programmed to record noise levels at 15 minute statistical intervals.

The location of the noise logger is presented in Figure 2.1 and in Appendix B.



Figure 2.1 Noise Measurement Locations

### 2.2 Equipment Used

The following noise measurement equipment was used:

- Acoustic Research Labs Pty Ltd – EL316 Noise Logger; and
- Sound Level Calibrator – NC 74.

The noise measurement instruments conform to ASIEC61672.1-2004 and the measurements were undertaken in accordance with AS1055-1997. Calibration was performed prior to commencement of the noise measurements and spot checks were carried out in the field. The maximum calibration drift recorded was <0.1 dB(A).

## 2.3 Meteorological Conditions

Daily weather observations from the Bureau of Meteorology meteorological station at Logan City Water Treatment Plant indicates that meteorological conditions during the noise measurement periods were fine with light to moderate winds on the days considered in the assessment.

## 2.4 Noise Measurement Results

The results of the noise measurements carried out at the subject site are presented in Table 2.1 and in Appendix C.

**Table 2.1 Noise Measurement Results**

Date	L <sub>90</sub> (11-hour) dB(A)	L <sub>90</sub> (4-hour) dB(A)	L <sub>90</sub> (9-hour) dB(A)
<b>31 March 2014 (Monday)</b>	41	37	33
<b>1 April 2014 (Tuesday)</b>	39	38	34
<b>2 April 2014 (Wednesday)</b>	39	38	34
<b>3 April 2014 (Thursday)</b>	38	38	36
<b>4 April 2014 (Friday)</b>	40	40	35
<b>5 April 2014 (Saturday)</b>	40	40	35
<b>Average</b>	<b>40</b>	<b>39</b>	<b>35</b>

The noise levels presented above are representative of typical noise amenity in areas with low density transportation (noise area category R2 as specified in AS1055.2 – 1997). This is an indication that the major roads in the area (Campton Road and Acacia Road) and the Brisbane to Gold Coast railway corridor (located at approximately 150 m to the south-west) do not influence the noise amenity at the surroundings of the proposed church.

## Noise Assessment Criteria

### 2.5 Acoustic Quality Objectives

The *Environmental Protection (Noise) Policy 2008* (the policy) identifies environmental values for the acoustic environment and sets acoustic quality objectives for sensitive receptors. The purpose of the acoustic quality objectives is to protect the acoustic amenity of the environment.

The applicable criteria from Schedule 1 of the policy are presented in Table 2.2.

**Table 2.2 Environmental Noise Criteria**

Sensitive Receptor	Period	Objective ( $L_{Aeq,adj,1-hour}$ )	Environmental Value
Dwelling (for outdoors)	Daytime and evening	50	Health and wellbeing
Dwelling (for indoors)	Daytime and evening	35	Health and wellbeing
	Night-time	30	Health and wellbeing, in relation to the ability to sleep

The noise criteria are expressed in terms of  $L_{Aeq,adj,1-hour}$  for the 1-hour period of maximum activities at the investigated site.

### 2.6 Controlling Background Creep

Clause 10 (2) of the *Environmental Protection (Noise) Policy 2008* makes allowance for maximum allowable additional noise over the existing background noise level ( $L_{A90,T}$ ). This, so called 'background creep', noise criteria is applicable to the combined noise emissions from the church.

The overall A-weighted equivalent continuous adjusted sound pressure level ( $L_{Aeq,adj,T}$ ) must not exceed the background noise levels by more than 5dB(A). These criteria were applied to the activities at the proposed church during day-time and evening services.

The applicable criteria are presented in Table 2.3.

**Table 2.3 Background Creep Criteria**

Period	Objective <sup>1</sup>	Criteria ( $L_{Aeq,adj,T}$ )
Daytime (7:00am to 6:00pm)	Background noise level ( $L_{A90,T}$ ) + 5dB(A)	<b>45</b> (40 + 5)
Evening (6:00pm to 10:00pm)	Background noise level ( $L_{A90,T}$ ) + 5dB(A)	<b>44</b> (39 + 5)

<sup>1</sup> The "Background Noise Level" is the A-weighted sound pressure level equalled or exceeded for 90% of the time interval considered in the absence of the noise under investigation.

### 3. Noise Impact Assessment

#### 3.1 Noise Sensitive Receptors

The proposed development site is adjacent to existing dwellings along the side and rear boundaries. The nearest existing noise sensitive receptors are as follows:

- Two storey house at 2 Strathdarr Street
- Two storey house at 4 Strathdarr Street
- High set house at 6 Strathdarr Street
- High set/split level house at 8 Strathdarr Street
- Two storey house at 16 Nyanza Street

#### 3.2 Modelling Methodology

The industrial module of the SoundPLAN noise propagation software was used to calculate the noise levels at the nearest sensitive receptors. The calculations were carried out as per the procedures specified in the International Standard ISO9613. The calculation method for a single frequency is as follows:

$$L_s = [ L_w + D_i + K_0 ] - [ D_s + D ]$$

Where:

- $L_s$  sound pressure for a single frequency
- $L_w$  sound power
- $D_i$  directivity of the source
- $K_0$  spherical model
- $D_s$  spreading
- $D$  different contributing factors

The noise propagation losses, in addition to spreading, are calculated as a combination of screening, volume absorption (foliage, buildings) and the ground attenuation. In a large scale model dominated by distance, where the ground attenuation dominates, the effect of the screening is zero dB. Where the screening effect by natural or manmade obstacles along the noise propagation path is bigger than the ground absorption, the ground absorption is ignored.

#### 3.3 Operational Noise Sources

Based on typical noise sources associated with the operation of a church, the following sources were considered in the model:

- Vehicle movement on internal roadways and parking areas;<sup>2</sup>
- Conversation in normal spoken voice outside the church building; and
- Air-conditioning units on the office building.

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<sup>2</sup> The traffic report for the project recommends 25 carparking spaces, but to provide conservative noise assessment additional 20 cars parked in the grassed area near Nyanza Street were considered in the model.

It is important to note that the proposed church does not have any amplified ‘call to prayer’ system or bell tower.

The overall development is small scale, reflecting the relatively small size of the congregation to be served by the proposed church. The proposed church will provide day-time (starting after 9:30am) and evening services (starting at 6:00pm). The highest attendance of church services is expected during day-time on Sunday, starting after 9:30am and finishing at around 1:00pm.

The noise propagation modelling was carried out with consideration of the characteristics of the various noise sources such as pronounced tonal characteristics (continuous “humming” noise) or intermittent (impulsive) noise. The sound power levels and tonality/impulsiveness adjustment factors for the noise sources considered in the model are presented in Table 3.1.

**Table 3.1 Sound Power Levels of Noise Sources**

Type of Activity	Sound Power Level dB(A) (re 10 <sup>-12</sup> W)	Tonality/ Impulsiveness Adjustment dB(A)
Car Parking <sup>3</sup>	80 (max)	-
Conversation <sup>4</sup>	75	-
Air-conditioning <sup>5</sup>	86	+5

### 3.4 Modelling Scenario

The noise sources from the proposed church were represented in a three-dimensional model developed using SoundPLAN software. A conservative noise propagation modelling methodology was adopted with the following assumptions:

- Car movements at the car parking areas and on access ways is based on two car movements per hour per parking bay continuously during day time hours (7:00am – 6:00pm) and evening (6:00pm – 10:00pm).
- Up to 50 people in conversation in the area at the rear (main entrance) of the church building for the whole of each hour during day time (7:00am – 6:00pm) and evening (6:00pm – 10:00pm).
- One air conditioning unit located on the northern façade of the office building at ground level and operating for the whole of each hour during day time (7:00am – 6:00pm).
- Waste collection will be carried out as a curbside collection as per the current established practice in the area.

Receivers were attached to the most exposed facades of the nearest noise sensitive residential buildings at an elevation of 1.5m above each floor (ground and upper floor).

<sup>3</sup> Based on 25 car parking spaces, and additional 20 cars parked in grassed area near Nyanza Street, with 2 car movements per hour.

<sup>4</sup> SoundPLAN Library “Speaking very loud”

<sup>5</sup> SoundPLAN Library “Snow Blower (Compressed Air)”

### 3.5 Calculated Noise Levels

The highest calculated noise levels at the nearest noise sensitive places are presented in Table 3.2 with full results presented in Appendix D.

**Table 3.2 Calculated Noise Levels**

Building	Façade	Daytime* L <sub>eq,adj,1-hr</sub> dB(A)	Criteria Day-time dB(A) <sub>Leq,adj,1hr</sub>	Criteria Evening dB(A) <sub>Leq,adj,1hr</sub>	Compliance
2 Strathdarr Street	S	40	45	44	Yes
4 Strathdarr Street	S	41			Yes
6 Strathdarr Street	S	42			Yes
8 Strathdarr Street	S	42			Yes
14a Nyanza Street	E	38			Yes
16 Nyanza Street	N	44			Yes

\*Façade-adjusted

A grid noise map (noise contours) of the calculated noise levels showing propagation patterns of operational noise sources is presented in Appendix E.

## 4. Discussion and Recommendations

The noise impact assessment was carried out at the request of Macedonian Orthodox Church which is proposing to establish a place of worship (church and associated facilities) on land described at Lot 3 on RP209064, 18-26 Nyanza Street in Woodridge, within the Logan City Council local government area. There are existing dwellings to the north, south and west of the site, which are considered the nearest noise sensitive receptors to the proposed church.

The results of the site specific noise measurements, undertaken in late March and early April, are representative of typical noise amenity in areas with low density transportation (noise area category R2 as specified in AS1055.2 – 1997). This is an indication that the major roads in the area (Campton Road and Acacia Road) and the Brisbane to Gold Coast railway corridor (located at approximately 150 m to the south-west) do not influence the noise amenity in the surroundings of the proposed church.

Queensland *Environmental Protection (Noise) Policy* has established environmental noise criteria in the form of acoustic quality objectives and control of background noise creep. The former are set criteria not to be exceeded following introduction of new development whilst the latter ensures the existing acoustic environment is not impacted by addition of more than 5dB(A) above the background noise level. Considering the proposed church will provide day-time (after 9:30am) and evening services (starting at 6:00pm), the background creep criteria is the most stringent criteria that the proposed development has to comply with.

Noise propagation modelling was carried out for the proposed development considering all potential noise sources from the regular church activities. The noise sources considered were vehicle noise from parking areas and access ways, conversation (spoken voice) by members of the congregation in an outdoors setting, and mechanical noise from the air conditioning unit on the northern façade of the office building.

The 3D model considered the site of Lot 3 on RP209064 as well as the nearest dwellings on the allotments to the north, south and west. Receptors (calculation points) were located on the ground most exposed façade on the ground and the upper floors of each house.

The results of the noise propagation modelling, considering conservative assumptions about sound power levels and hours of operation of noise sources, indicate compliance with the controlling criteria ( $L_{Aeq,adj,T}$ ) for 'background noise creep' of 45 dB(A) for day-time and 44 dB(A) for evening.

The proposed place of worship (church) at Lot 3 on RP209064, 18-26 Nyanza Street in Woodridge, is a small scale development which does not include major noise sources (e.g. amplified 'call to prayer' or bell tower). Typical church activities, with services during day-time (after 9:30am) and evening (after 6:00pm), are unlikely to generate noise emissions which may exceed the acceptable noise levels specified in the *Environmental Protection (Noise) Policy 2008*.

## 5. Conclusions

Based on the results of the noise impact assessment for the proposed place of worship at 18-26 Nyanza Street in Woodridge, the following is concluded:

- The results of the site specific noise measurements, indicate that the major roads in the area (Campton Road and Acacia Road) and the Brisbane to Gold Coast railway corridor (located at approximately 150 m to the south-west) do not influence the noise amenity in the surroundings of the proposed church.
- Queensland *Environmental Protection (Noise) Policy* has established environmental noise criteria in the form of acoustic quality objectives and control of background noise creep. Considering the proposed church will provide day-time (after 9:30am) and evening services (starting at 6:00pm), the background creep criteria is the most stringent criteria that the proposed development has to comply with.
- Noise propagation modelling was carried out with a 3D model representative of the church site as well as the nearest dwellings on the allotments to the north, south and west. Receptors (calculation points) were located on the ground most exposed façade on the ground and the upper floors of each house.
- The results of the noise propagation modelling, considering conservative assumptions about sound power levels and hours of operation of noise sources, indicate compliance with the controlling criteria ( $L_{Aeq,adj,T}$ ) for 'background noise creep' of 45 dB(A) for day-time and 44 dB(A) for evening.
- Typical church activities, at Lot 3 on RP209064, 18-26 Nyanza Street in Woodridge, with services during day-time (after 9:30am) and evening (after 6:00pm), are unlikely to generate noise emissions which may exceed the acceptable noise levels specified in the *Environmental Protection (Noise) Policy 2008*.

## 6. References

- Australian Standard AS1055.1-1997 (*Acoustics – Description and measurement of environmental noise Part 1: General Procedures*)
- Australian Standard AS1055.2-1997 (*Acoustics – Description and measurement of environmental noise Part 2: Application to Specific Situations*)
- Bureau of Meteorology, 2014, *Climate Data Online – Logan City, Queensland*. Available at: <http://www.bom.gov.au/climate/dwo/201404/html/IDCJDW4073.201404.shtml> accessed on 15 April 2014
- Queensland Government, 1994, *Environmental Protection Act 1994*, Queensland Environmental Protection Authority, Brisbane
- Queensland Government, 2008, *Environmental Protection (Noise) Policy 2008*, Department of Environment and Resource Management, Brisbane
- Queensland Government, 2008, *Environmental Protection Regulation 2008*, Department of Environment and Resource Management, Brisbane

## Appendix A – Proposed Development Layout



## Appendix B – Site Photos



**Photo 1: Location of the Noise Logger at the Site (18-26 Nyanza Road, Woodridge)**



**Photo 2: Typical High-set Houses near the Subject Site**

## Appendix C – Noise Measurement Results

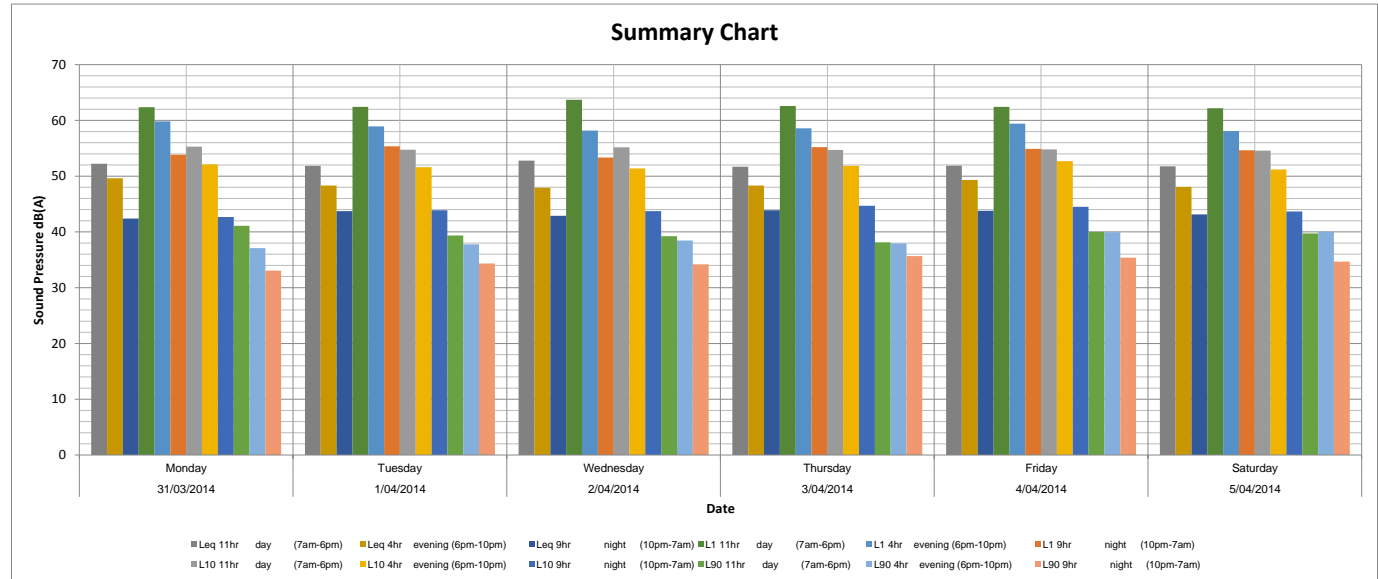


ATP140306  
Macedonian Church  
Commercial

Use for average	Date	Day	Leq 11hr day (7am-6pm)	Leq 4hr evening (6pm-10pm)	Leq 9hr night (10pm-7am)	L1 11hr day (7am-6pm)	L1 4hr evening (6pm-10pm)	L1 9hr night (10pm-7am)	L10 11hr day (7am-6pm)	L10 4hr evening (6pm-10pm)	L10 9hr night (10pm-7am)	L90 11hr day (7am-6pm)	L90 4hr evening (6pm-10pm)	L90 9hr night (10pm-7am)
√	31/03/2014	Monday	52	50	42	62	60	54	55	52	43	41	37	33
√	1/04/2014	Tuesday	52	48	44	62	59	55	55	52	44	39	38	34
√	2/04/2014	Wednesday	53	48	43	64	58	53	55	51	44	39	38	34
√	3/04/2014	Thursday	52	48	44	63	59	55	55	52	45	38	38	36
√	4/04/2014	Friday	52	49	44	62	59	55	55	53	45	40	40	35
√	5/04/2014	Saturday	52	48	43	62	58	55	55	51	44	40	40	35
	<b>AVERAGE</b>		52	49	43	63	59	55	55	52	44	40	39	35

Acoustic Research Laboratories Pty Ltd - Type 1 Environmental Noise Logger

Logger Serial Number 16-707-017  
 Measurement Title ATP140306  
 Measurement started at 30/03/2014 10:47  
 Measurement stopped at 8/04/2014 9:43  
 Frequency Weighting A  
 Time Averaging Fast  
 Statistical Interval 15 minutes  
 Auxiliary Power Disabled  
 Tape Recorder Disabled  
 Short Term Leq Disabled  
 Short Term Leq Length N/A  
 Start Trigger N/A  
 Stop Trigger N/A  
 Master Timer N/A  
 Sub Timer N/A  
 Pre-measurement Reference 94  
 Post-measurement Reference 94  
 Engineering Units dB SPL



## Appendix D – Assessed Receiver Levels (SoundPLAN)

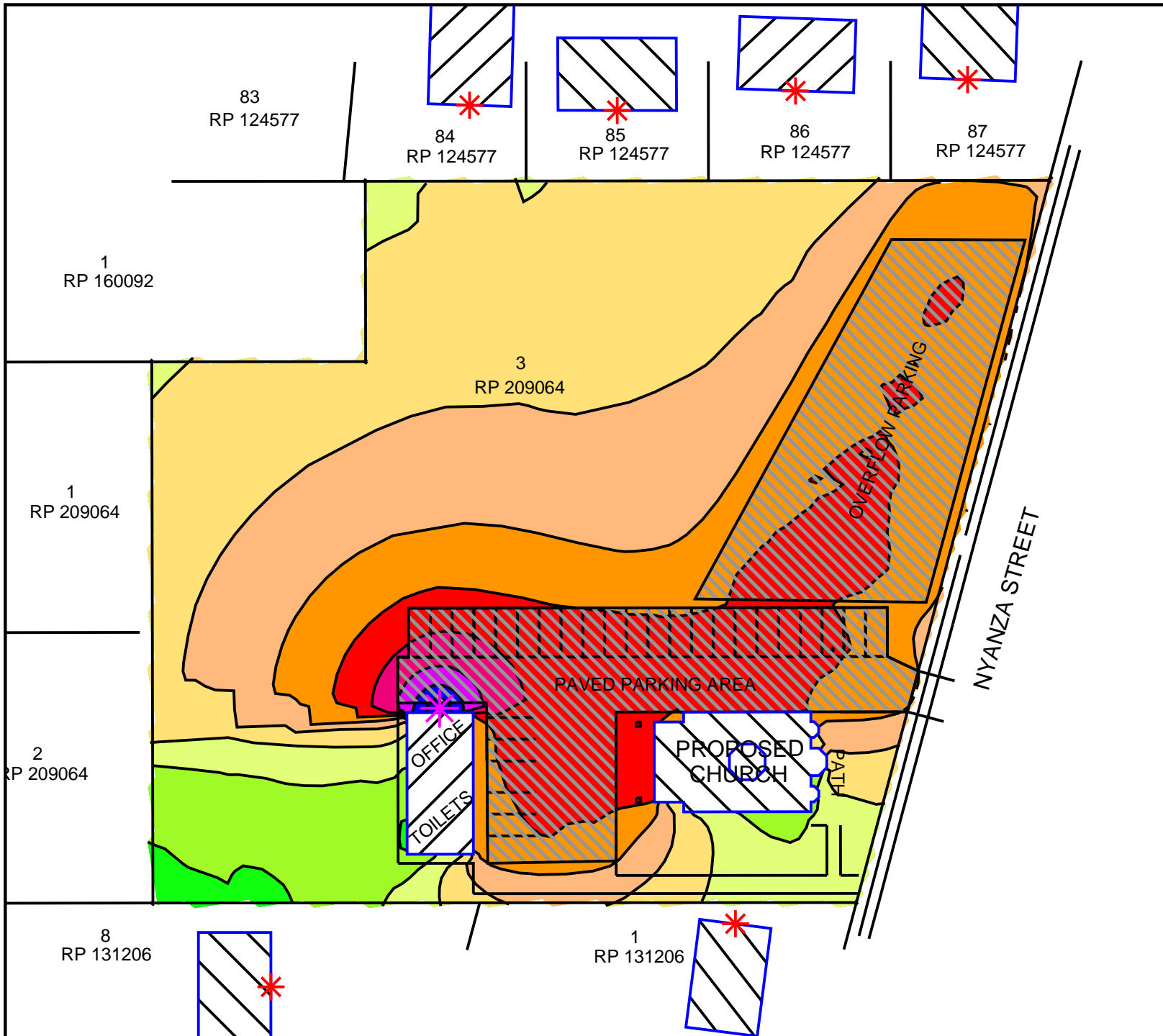
# 18 Nyanza Street, Woodridge Assessed Receiver Levels Operational Noise Calculation

Receiver	Floor	Facade	SPL Daytime Leq (1-hour) dB(A)	SPL Evening Leq (1-hour) dB(A)
2 Strathdarr Street	GF	S	43	43
	F 1		44	44
4 Strathdarr Street	GF	S	44	44
	F 1		44	44
6 Strathdarr Street	GF	S	44	44
	F 1		44	44
8 Strathdarr Street	GF	S	44	44
	F 1		44	44
14A Nyanza Street	GF	E	38	38
	F 1		39	39
16 Nyanza Street	GF	N	44	44
	F 1		44	44

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## Appendix E – Noise Contour Map (SoundPLAN)



Macedonian Church

18 Nyanza Street,  
Woodridge

Noise Propagation  
All Sources - Daytime

Noise Level  
Leq (1-hour) @ 1.8m AGL  
in dB(A) (Free-Field)



Angle Increment = 1  
Grid Spacing = 5m

Signs and symbols

- Point source
- Carpark
- Building
- Point receiver

Scale 1:600

