

MIXED USE DEVELOPMENT

LE CLOS SANCROX

NOISE ASSESSMENT FOR PLANNING PROPOSAL

AND ASSOCIATED DA

Report No. M19131.01 (Revision 1)

Site: Le Clos
 Sancrox Road, SANCROX

Prepared by: Philip Thornton BE(UNSW) MIEAust CPEng NER
 Acoustic Consultant
 Matrix Thornton Consulting Engineers

Date: 10 December 2019

SUMMARY

This report discusses acoustic aspects of the proposed mixed-use development at Le Clos Sancrox.

Concerning noise from industrial and transport facilities external to the site:

- Noise from the Quarry and other industrial noise sources do not impose a serious constraint to planning of lots.
- Noise from the proposed high-speed railway is low risk.
- Traffic noise is predicted to comply with assessment criteria at existing and future residences.
- Design of a school may need to consider transportation noise into the school, depending on location.

CONTENTS

1	INTRODUCTION	3
2	DESCRIPTION OF THE DEVELOPMENT	3
3	TRAFFIC NOISE	5
3.1	TRAFFIC NOISE ASSESSMENT CRITERIA	5
3.2	EXISTING TRAFFIC NOISE INTO THE SITE	6
3.3	TRAFFIC NOISE GENERATED BY THE DEVELOPMENT	6
4	NOISE INTO THE SITE	8
4.1	ANIMAL BOARDING	8
4.2	HIGH SPEED RAIL	8
4.3	QUARRY NOISE	9
4.4	ORONTES CLOSE INDUSTRIAL SUBDIVISION	11
5	PLANNING OPTIONS FOR A SCHOOL	11
5.1	INDUSTRIAL NOISE	11
5.2	TRAFFIC NOISE	11
5.3	HIGH SPEED RAIL	11
6	CONCLUSION	12
	APPENDIX A: GLOSSARY OF ACOUSTIC TERMS	14
	APPENDIX B: SANCROX QUARRY AND RECEPTORS	15

FIGURES

FIGURE 2-1	PLAN OF PROPOSED DEVELOPMENT	4
FIGURE 2-2	SITE CONTEXT	5
FIGURE 4-1	HIGH SPEED RAIL PROPOSED ALIGNMENT (NORTH TO LEFT)	8
FIGURE 4-2	LOCATION OF QUARRY AND RECEPTORS IN QUARRY NIA	10

TABLES

TABLE 3-1	RNP CRITERIA FOR TRAFFIC NOISE DUE TO LAND USE DEVELOPMENT	6
TABLE 3-2	TRAFFIC MODELLING ASSUMPTIONS	7
TABLE 3-3	PREDICTED TRAFFIC NOISE LEVELS	7
TABLE 4-1	PREDICTED NOISE LEVELS FROM QUARRY	10

1 INTRODUCTION

The report concerns the proposed mixed-use development called Le Clos Sancrox at Sancrox. Council have requested a noise assessment of the development.

This report discusses noise issues and shows that none of those issues could result in significant noise impact to the development, or noise impact from the development to existing properties nearby.

2 DESCRIPTION OF THE DEVELOPMENT

Figure 2-1 shows a preliminary plan of the proposal. Residential lots are laid out on local roads feeding onto a collector road leading to Sancrox Road.

The site context is shown on Figure 2-2 which shows the aspects discussed below.

To the North:

Currently this is rural-residential and an animal boarding and breeding establishment. This area is likely be rezoned as part of the wider planning been undertaken by Council. The development provides a large treed area separating the development from Sancrox Road and existing residences north of Sancrox Road.

There is an existing quarry to the north-east. It is understood the Quarry may expand in the future. As no progress has been made on any proposed expansion since 2015, and no further information concerning this is available, a large area in the north-east corner has been left undeveloped. This will provide a buffer to the quarry. This will also provide a buffer to the potential development of a high-speed rail east of the development.

To the West:

Currently rural / grazing etc. This area is likely be rezoned as part of the wider planning being undertaken by Council. There are large separations to the development due to ecology, bushfire and new roads.

To the South & East

This is one large parcel of land which has currently been approved for a 4-lot subdivision. Heavily treed and in all of Council's planning to date, has identified this as an ecological corridor.

Figure 2-1 Plan of Proposed Development

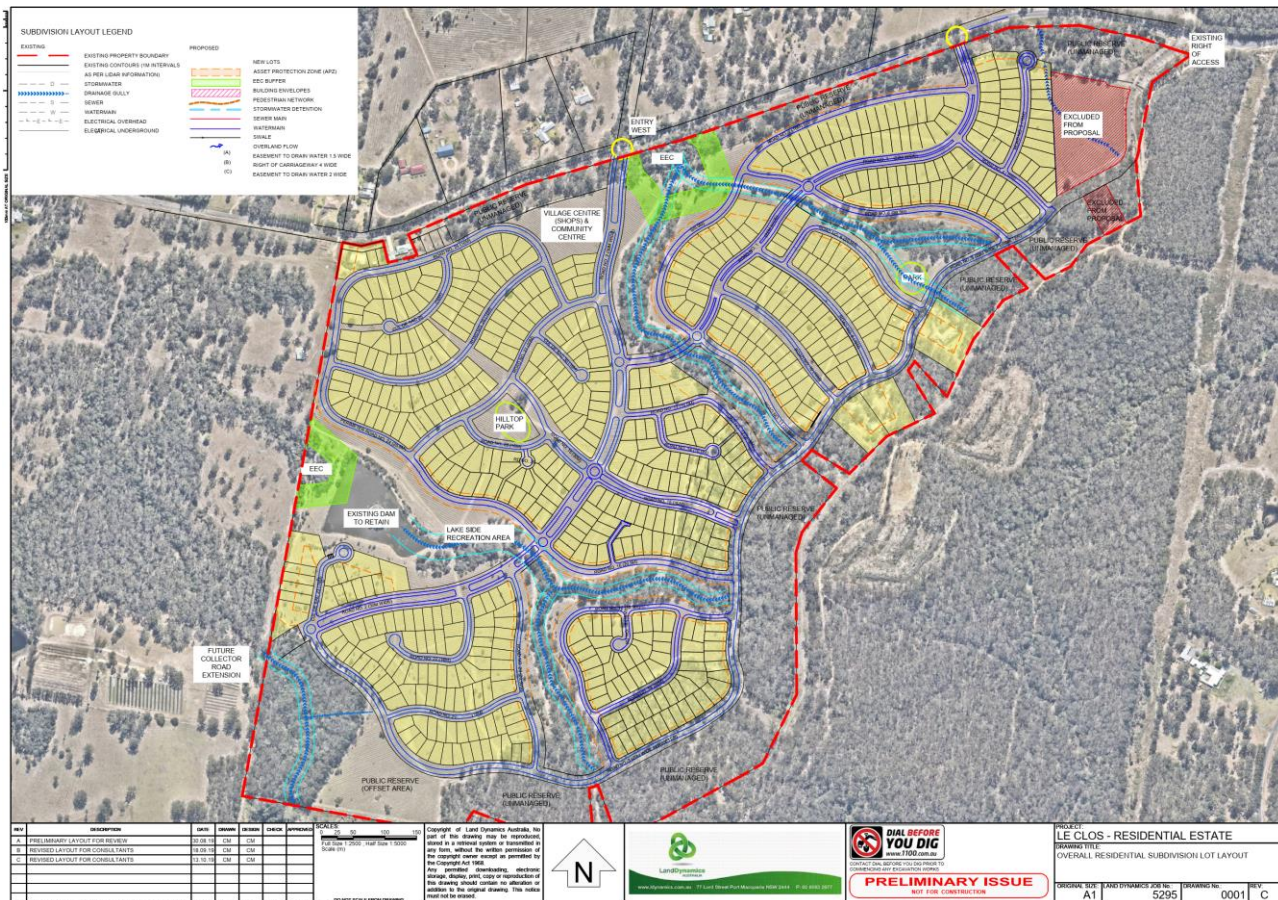


Figure 2-2 Site Context



3 TRAFFIC NOISE

3.1 TRAFFIC NOISE ASSESSMENT CRITERIA

The EPA's Road Noise Policy (RNP) sets out criteria for assessment of noise from vehicles on public roads. The RNP sets out noise criteria for 'arterial', 'sub-arterial' and 'local roads'. The assessment criteria are listed in Table 3-1.

The criteria are the same for existing residences affected by traffic from the development, and for new residences in the development affected by "self-generated" traffic – that is the houses in the development will be affected by traffic noise generated by other houses in the development.

Most of the roads in the development would be considered local roads. The main collector road of the development, as well as Sancox Road, could be considered sub-arterial roads for noise assessment.

For the existing residences affected by noise from sub-arterial roads (that is the houses north of the development) the *relative increase criteria* also state that the total traffic noise level increase should not be more than 12dBA.

Where predicted noise levels exceed the project-specific noise criteria, an assessment of all feasible and reasonable mitigation options should be considered. The RNP states that an increase of up to 2dB represents a minor impact that is considered barely perceptible to the average person.

Road Category	Assessment Criteria – dBA	
	Day (7am-10pm)	Night (10pm-7am)
Freeway / arterial / sub-arterial roads	L _{Aeq15hr} , 60 (external)	L _{Aeq,9hr} 55 (external)
Local Roads	L _{Aeq1hr} , 55 (external)	L _{Aeq,1hr} 50 (external)

Table 3-1 RNP Criteria for Traffic Noise due to Land Use Development

3.2 EXISTING TRAFFIC NOISE INTO THE SITE

Concerning existing traffic noise, the nearest road that carries a significant amount of traffic is the Pacific Highway, approximately 1500 m from the site. At that distance, noise from the Pacific Highway will be below the noise guidelines from the New South Wales Road Noise Policy (RNP).

3.3 TRAFFIC NOISE GENERATED BY THE DEVELOPMENT

The development itself will generate traffic. The report *High Level Traffic Impact Assessment as part of an overall Planning Proposal DP 776 681 Sancrox Road, Sancrox (Known as Le Clos)* by Streetwise (July 2019) gives existing and predicted traffic volumes.

The traffic report focuses on peak hour, however as Sancrox Road is considered a sub-arterial road, the overall daily traffic volumes are required. Typically, peak hour volumes are 10% of daily volumes, and 85% of the daily volume occurs during the daytime period.

The traffic report gives the predicted daily generation of the site as 10,519 trips. Based on these assumptions, the estimated existing and future (with development) daily volumes are as given in Table 3-2. The table also gives the traffic modelling assumptions concerning heavy vehicles, speed and road surface. It is assumed that Sancrox Road will be redeveloped, and that the future road surface will be upgraded from a chip seal to Dense Graded Asphaltic Concrete.

Traffic noise was modelled using the Calculation of Road Traffic Noise (CoRTN) method. The results for existing and future residences are given in Table 3-3.

In the tables, the periods labelled “future” relate to the future time when the development is hundred percent complete.

Period	Traffic volumes, vehicles per day		Heavy vehicles, %	Speed, km/h	Road Surface
	Day (7am-10pm)	Night (10pm-7am)			
Existing	850 vehicles	150 vehicles	5%	70	Chipseal
Future	8941 vehicles	1577 vehicles	2%	70	Dense Grade Asphaltic Concrete

Table 3-2 Traffic modelling assumptions

Receptor	Period	Noise Levels	
		Day (7am-10pm) L _{Aeq,15hr}	Night (10pm-7am) L _{Aeq,9hr} dBA
North of Sancrox Road (40m setback)	Existing	51	46
	Future	59	54
Within Development, south of Sancrox Road (nominal 50m setback)	Future	58	53

Table 3-3 Predicted Traffic Noise Levels

For the existing residences north of Sancrox Road noise is predicted to increase by 8 dBA due to the development. Based on the assumptions given, modelling shows the future noise level to be 59 dBA daytime and 54 dBA night time. These levels are 1 dBA below the assessment criteria, and the 8dBA increase is less than the 12dBA recommended by the relative increase criterion.

For the future residences at the development site, the predicted levels are 58 dBA daytime and 53 dBA night time. These are 2 dBA below the assessment criteria. It is noted that there is scope to provide some noise mitigation in the form of mounds between the road and the residences if required. Based on the modelling, no further mitigation would be required to meet the base assessment criteria, and that there is a 2 dBA buffer to allow for traffic growth from further development in the area.

4 NOISE INTO THE SITE

4.1 ANIMAL BOARDING

Across the site to the north is an existing animal boarding Business (Pets Park Kennels). There is potential for noise from the kennel to be audible from the site. It would be reasonable for the kennel business to be concerned that new residential developments could be annoyed by noise from the kennel and approach Council with noise complaints.

The existing nearest residential neighbour is approximately 200 m from the kennel. In the preliminary design of the development, the nearest residential components are also approximately 200 m from the kennel. If the kennel noise to existing residential neighbours meets the target levels of the New South Wales Noise Policy for Industry, then it will also comply with those targets at future residences.

4.2 HIGH SPEED RAIL

There is a proposal for high-speed rail (HSR) development joining Sydney and Brisbane. The proposed alignment of the track passes the site and is shown on Figure 4-1. The future residences closest to the rail line in the north east of the site would be approximately 150 m from the alignment.

The area at the north east of the site has deliberately been left undeveloped in part to act as a buffer to noise emission from the Quarry and the HSR.

Figure 4-1 High Speed Rail Proposed Alignment (North to left)



The High-Speed Rail Study, Phase 2 Report discussed noise emission from the HSR. It discussed the appropriate noise goal of 60 dBA for daytime noise emission from trains, and set distances from the track alignment where the HSR noise would be below this guideline (called the offset distance). The summary of noise emission findings is contained in Table 3 – 5 of the report, reproduced below. The table shows that to be fully compliant in a rural area, the residences would need to be at least 230 m from the rail alignment.

This assumes no reduction in noise level from noise walls or railway cuttings. With a noise mound of 2 m, the offset is reduced to 70 m. Rail cuttings serve the same acoustic purpose as a noise mound.

As the proposed alignment passes the site it goes through sections of cuttings and fill, the offset distance in this case would be somewhere between 70 and 230 m. As seen in Figure 4-1, the length of track impacting on the site is approximately 50% cutting and 50% fill. Assuming that cuttings are at least 2 m deep, this would lead to a reduction of approximately 3 dBA, implying an offset distance of 150 m.

The nearest residences in the proposal are 150m from the alignment. Based on the above assumptions, it is probable that noise will comply at all proposed lots. Given that it is extremely unlikely that the HSR proposal will ever proceed, and the separation of at least 150 m from the alignment, we consider it a low risk that the Le Clos Sancrox development would need to include any specific noise mitigation measures against emissions of the HSR should it proceed.

Table 3-5 Noise compliance offset distances

Scenario	Compliance offset distance
Rural area	230 m
Transition area with 2 m mounding	70 m
Transition area with 3 m mounding	51 m
Urban area with 2 m noise wall, 7 m from track centreline	25 m
Urban area with 2 m noise wall, 4 m from track centreline	21 m
Urban area on viaduct with 2 m noise barrier	21 m

Note 1: Rural areas have been assumed to comprise predominantly single storey receivers (e.g. dwelling, office, school).

Note 2: Urban areas have been assumed to comprise predominantly two storey receivers.

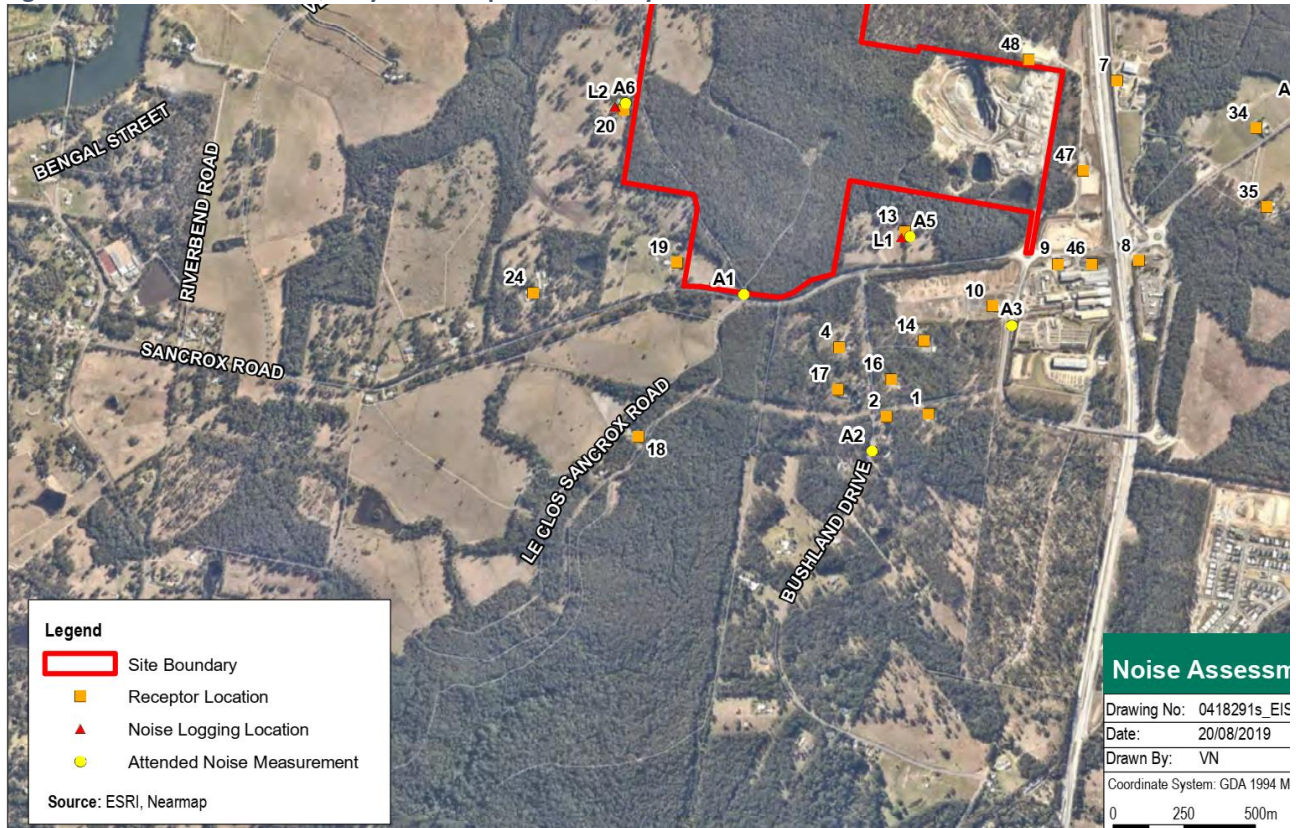
Note 3: Viaduct has been assumed to be predominantly elevated, resulting in a similar height as a second storey receiver.

4.3 QUARRY NOISE

There is an existing quarry to the north-east. The quarry has proposed an expansion and a noise assessment has been published as *Sancrox Quarry Expansion Noise and Vibration Impact Assessment*, August 2019 by ERM (The Quarry NIA). Figure 4-2 shows part of Figure F1.3 from the Quarry NIA (the full figure is included in Appendix B). This shows the location of the Quarry in relation to the Le Clos Sancrox site. The Quarry NIA assessed noise at residential premises surrounding the Le Clos Sancrox site. The most affected residences are denoted Receptor 18, 19 and 24.

Receptor 18 is located between the Quarry noise sources and the Le Clos Sancrox site. If the Quarry noise complies with appropriate limits at Receptor 18, it will also comply on the Le Clos Sancrox site. Receptors 19 and 24 are at a distance from the Quarry roughly equivalent to the centre of the Le Clos Sancrox site and would reasonably representative of the noise level to be expected on the site.

Figure 4-2 Location of Quarry and Receptors in Quarry NIA



Location	RBL (Day/Evening/Night)	Noise Trigger Levels (Day/Evening/Night)	Predicted Noise Level, Final Stage, NW Wind
Receptor 18	36/36/33	41/41/38	27
Receptor 19	36/36/33	41/41/38	33
Receptor 14	36/36/33	41/41/38	32
Le Clos Sancrox site	36/36/33	41/41/38	< 32

Table 4-1 Predicted Noise Levels from Quarry

The Quarry NIA further notes that maximum noise levels during night time operation will not cause sleep disturbance events at Receptor 19, and that noise and vibration from blasting are within the appropriate limits at Receptor 19. Therefore, maximum noise at night, and noise and vibration from blasting will be within appropriate limits at all locations within the Le Clos Sancrox site.

A large area in the north-east corner has been left undeveloped. This will provide a buffer to the quarry, though based on the Quarry NIA noise predictions, this is not necessary acoustically.

4.4 ORONTES CLOSE INDUSTRIAL SUBDIVISION

This industrial subdivision is approximately 600 m from the north-east corner of the site. The north-east corner of the site includes environmental buffers, and has been embellished to create an ecological corridor, which further increases the distance to the future residential dwellings.

There are many residences between the site and the industrial subdivision. Any noise emission from that subdivision would manifest first at one of the closer residences.

5 PLANNING OPTIONS FOR A SCHOOL

Some options for planning of the site include a school. While no site has been proposed, one of the likely options is in the North East corner of the site.

5.1 INDUSTRIAL NOISE

The most stringent guidelines for noise into school from the INP is that industrial noise level in classrooms should be below 35 dBA. If the classroom had open windows for ventilation, there would typically be a 10 dB reduction in noise from outside to inside. Therefore an appropriate target for industrial noise is 45 dBA outside the classrooms. From the Quarry NIA the industrial noise trigger level for daytime has been set at 38 dBA for residences. Therefore, any industrial noise source at the site which meets the requirements for residences will also meet the noise requirements for schools.

The predicted noise levels from the quarry (see Section 4.3) given in the Quarry NIA are significantly below the trigger levels in the INP.

5.2 TRAFFIC NOISE

The New South Wales Road Noise Policy (RNP) recommends traffic noise levels below $L_{Aeq,1hr}$ 40 dBA in classrooms, corresponding to the level of approximately 50 dBA outside the classrooms. The level of $L_{Aeq,15hr}$ 55 dBA is recommended for playgrounds.

As noted in Section 3, the predicted future level of traffic noise into the site, at a setback of 50 m from Sancrox Road is all 58 dBA.

While the predicted levels are above the recommendations of the RNP, simple design measures can be incorporated into the school to mitigate traffic noise to appropriate levels.

5.3 HIGH SPEED RAIL

Noise guidelines are given in the New South Wales Rail Infrastructure Noise Guideline (RING).

For playgrounds the noise guideline is similar to that for residences (60dBA), hence any playgrounds would ideally be offset from the railway line by more than 230m (See Section 4.2).

For classrooms the noise guideline is 40dBA internal, corresponding to 50 dBA external. School buildings located within approximately 1000 m of the HSR would require consideration of acoustics to mitigate railway noise. In general, appropriate levels in classrooms would be achieved by closing windows, hence appropriate design of classroom ventilation would need to be considered.

All areas of the Le Clos Sancrox site further than the offset distance of 230m from the HSR are considered suitable for location of the school. Depending on the layout of the school and the final alignment of the HSR some buildings may require acoustic treatment, principally including consideration of appropriate ventilation so that windows facing the HSR may be kept closed.

6 CONCLUSION

This report discussed acoustic aspects of the proposed mixed-use development at Le Clos Sancrox.

Concerning traffic noise:

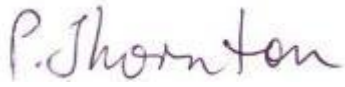
- Noise from existing significant roads will comply at the development due to the large distance. The site is approximately 1500 m from the Pacific Highway.
- Traffic noise generated by the development on Sancrox Road is expected to comply at existing Receptors. Those existing residences are generally setback 40 m from the road.
- Traffic noise generated by the development is expected to comply at future Receptors within the development itself.
- If the school is located on site, traffic noise into the school should be assessed. Depending on the location of the school, minor noise mitigation is may be required.

Concerning noise from industrial facilities external to the site:

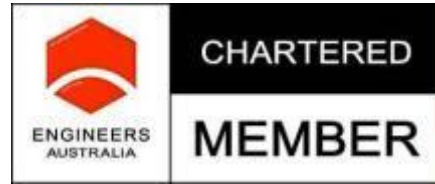
- The Sancrox Quarry S Assessment was used to show that noise from the Quarry will comply with appropriate noise trigger levels at all locations and all times. Noise from blasting and vibration will also comply.
- Noise from the existing kennel north of the site may be audible at some lots. It is recommended that noise from the kennel be assessed and if mitigation is necessary and agreement be reached with the operator of the kennel.

Concerning noise from the proposed High Speed Rail:

- Given that the distance from the alignment to the nearest proposed lots, and that the railway line may be in cut at this location, it is probable that noise from the railway will comply with guidelines at residential lots.
- HSR noise to a school, particularly if the school is located in the north-east corner of the site, may need to be considered. While noise to playgrounds will generally be satisfactory, noise to classrooms may require closed windows and therefore consideration of ventilation.



Philip Thornton BE(UNSW) MIEAust CPEng NER
Acoustic Consultant
Chartered Professional Engineer



APPENDIX A: GLOSSARY OF ACOUSTIC TERMS

Assessment Period	The period in a day over which assessments are made.
dB(A)	Unit of sound level in A-weighted decibels. The A-weighting approximates the sensitivity of the human ear by filtering these frequencies. The dB(A) measurement is considered representative of average human hearing.
L_{Aeq}	The A-weighted equivalent continuous sound pressure level, used to quantify the average noise level over a time period.
L_{A10}	The A-weighted sound pressure level exceeded for 10% of the measurement period. It is usually used as the descriptor for intrusive noise level.
L_{A90}	The A-weighted sound pressure level exceeded for 90% of the measurement period. It is usually used as the descriptor for background noise level.
$L_{Aeq15min}$	Refers to the A-weighted energy averaged equivalent noise level over a 15 minute time period.
L_{Cpeak}	The highest instantaneous C-weighted sound pressure level over the measurement period. It is usually used for high impulsive noise.
L_{Amax}	The maximum A-weighted sound pressure level for the measurement period.
Loudness	A 3dB(A) change in sound pressure level is just noticeable or perceptible to the average human ear; a 5dB(A) increase is quite noticeable and a 10dB(A) increase is typically perceived as a doubling in loudness.
RBL	The overall single figure background level representing the assessment period over the whole monitoring period. For the short-term method of assessment, the RBL is the measured $L_{A90, 15min}$ value, or where a number of measurements have been made, the lowest $L_{A90, 15min}$ value.

APPENDIX B: SANCROX QUARRY AND RECEPTORS

