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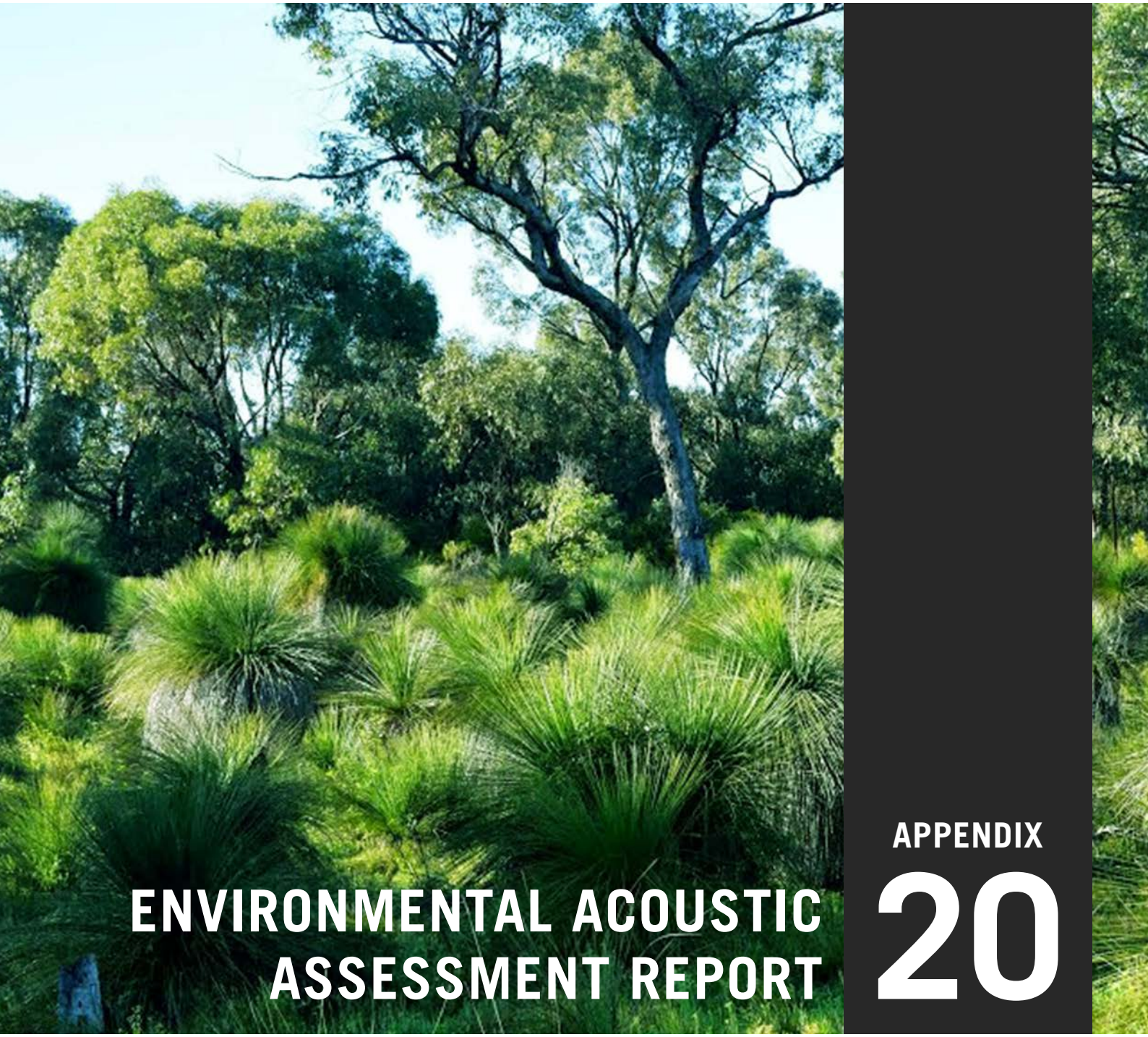

APPENDIX

20

ENVIRONMENTAL ACOUSTIC ASSESSMENT REPORT

APPENDIX 20: Environmental Acoustic Assessment Report

AURORA ENVIRONMENTAL

WASTE TO ENERGY POWER STATION
EAST ROCKINGHAM

ENVIRONMENTAL ACOUSTIC ASSESSMENT

AUGUST 2017

OUR REFERENCE: 22140-2-17194

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ENVIRONMENTAL ACOUSTIC ASSESSMENT
EAST ROCKINGHAM

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FOR

AURORA ENVIRONMENTAL

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CONTENTS

APPENDIX

1. INTRODUCTION

Herring Storer Acoustics (HSA) was commissioned by Aurora Environmental to undertake a noise level impact assessment of noise emissions from the proposed waste to energy power station to be located at Lot 1 Office Road, East Rockingham, within the Kwinana Industrial Estate.

The objective of the study is to assess noise emissions from the Facility at noise sensitive premises surrounding the proposed site for compliance with the requirements of the *Environmental Protection (Noise) Regulations 1997*.

For information a locality plan is attached is Appendix A.

2. SUMMARY

The closest residences of concern are located within the suburbs of Medina, Calista and North Rockingham. As the power station could operate during the night period, noise received at the neighbouring residences needs to comply with the assigned night period noise level of 35 dB(A). However, as the power station is located within an area with other industry, noise received at the residences needs to be considered as NOT significantly contributing. Thus, noise received at the surrounding residential premises needs to comply with 30 dB(A).

Noise received at the neighbouring noise sensitive premises, located outside the Kwinana Industrial Area, in the worst case location was calculated at 29 dB(A). Therefore, noise received at these residences would be considered as NOT significantly contributing and would be deemed to comply with the requirements of the *Environmental Protection (Noise) Regulations 1997*.

Additionally, noise received at the residences located within the Kwinana Industrial Area would also comply with the Regulatory requirements.

Based on the noise modelling, noise received at the neighbouring industrial premises, with the above noise ameliorations, has been calculated at up to 65 dB(A). At this noise level, noise received at the neighbouring industrial premises would also comply with the Regulatory requirements, even if a +5 dB(A) penalty for tonality was applied. Even with the inclusion of the penalty for a tonal component, noise received at the neighbouring industrial premises would comply with the assigned L_{A10} noise level of 75 dB(A).

Based on the above, noise emissions from the proposed power station, would be deemed to comply with the Regulatory requirements at all times.

3. CRITERIA

The *Environmental Protection (Noise) Regulations 1997* stipulate the allowable noise levels at any noise sensitive premises from other premises. For noise sensitive premises, the allowable noise level is determined by the calculation of an influencing factor, which is added to the baseline criteria set out in Table 1 of the Regulations. The baseline assigned noise levels are listed in Table 3.1. For commercial and industrial premises, the allowable noise levels are fixed.

TABLE 3.1 - BASELINE ASSIGNED OUTDOOR NOISE LEVEL

Premises Receiving Noise	Time of Day	Assigned Level (dB)		
		L_{A10}	L_{A1}	L_{Amax}
Noise sensitive premises: highly sensitive area	0700 - 1900 hours Monday to Saturday (Day)	45 + IF	55 + IF	65 + IF
	0900 - 1900 hours Sunday and Public Holidays (Sunday / Public Holiday Day)	40 + IF	50 + IF	65 + IF
	1900 - 2200 hours all days (Evening)	40 + IF	50 + IF	55 + IF
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and Public Holidays (Night)	35 + IF	45 + IF	55 + IF
Noise sensitive premises: any area other than highly sensitive area	All hours	60	75	80
Industrial and utility premises in the Kwinana Industrial Area	All hours	75	85	90

Note: L_{A10} is the noise level exceeded for 10% of the time.
L_{A1} is the noise level exceeded for 1% of the time.
L_{Amax} is the maximum noise level.
IF is the influencing factor.

It is a requirement that received noise be free of annoying characteristics (tonality, modulation and impulsiveness), defined below as per Regulation 9.

"impulsiveness" means a variation in the emission of a noise where the difference between L_{Apeak} and $L_{Amax\ Slow}$ is more than 15 dB when determined for a single representative event;

"modulation" means a variation in the emission of noise that –

(a) is more than 3 dB $L_{A\ Fast}$ or is more than 3 dB $L_{A\ Fast}$ in any one-third octave band;
(b) is present for more at least 10% of the representative assessment period; and
(c) is regular, cyclic and audible;

"tonality" means the presence in the noise emission of tonal characteristics where the difference between –

(a) the A-weighted sound pressure level in any one-third octave band; and
(b) the arithmetic average of the A-weighted sound pressure levels in the 2 adjacent one-third octave bands,

is greater than 3 dB when the sound pressure levels are determined as $L_{Aeq,T}$ levels where the time period T is greater than 10% of the representative assessment period, or greater than 8 dB at any time when the sound pressure levels are determined as $L_{A\ Slow}$ levels.

Where the above characteristics are present and cannot be practicably removed, the following adjustments are made to the measured or predicted level at other premises.

TABLE 3.2 - ADJUSTMENTS TO MEASURED LEVELS

Where **tonality** is present	Where **modulation** is present	Where **impulsiveness** is present
+5 dB(A)	+5 dB(A)	+10 dB(A)

Note: These adjustments are cumulative to a maximum of 15 dB.

We note that Regulation 7 - Prescribed Standard for noise emissions states under sub-regulation 1:

Noise emitted from any premises or public place when received at other premises -

(a) must not cause, or significantly contribute to, a level of noise which exceeds the assigned level.

Additional, it also states that:

*For the purposes of subregulation (1) (a), a noise emission is taken to **significantly contribute to** a level of noise if the noise emission as determined under subregulation (3) exceeds a value which is 5 dB below the assigned level at the point of reception.*

Hence, if the noise received at a premises is 5 dB(A) or more below the assigned noise level, then noise received at that premises is considered to be NOT "significantly contributing" and deemed to comply with the requirements of the *Environmental Protection (Noise) Regulations 1997* regardless of any other noise received at that premises from other sources.

As the power station would operate during the night period, noise received at the neighbouring residence outside Area B of the Kwinana Industrial Area would need to comply with the assigned night period L_{A10} noise level of 35 dB(A). However, as the power station is located within an industrial estate, noise received at a residence would need to be considered as NOT significantly contributing and acoustic criteria would be 5 dB(A) below the assigned noise level or 30 dB(A).

It is understood that there are a couple of residences located within the Kwinana Industrial Area. At these residence, the influencing factor would, due to their location within Area B of the Kwinana Policy Area, be +10 dB and the assigned noise level would be as listed in Table 3.3.

TABLE 3.3 - ASSIGNED OUTDOOR NOISE LEVEL – RESIDENCES WITHIN KWINANA INDUSTRIAL AREA

Premises Receiving Noise	Time of Day	Assigned Level (dB)		
		$L_{A\ 10}$	$L_{A\ 1}$	$L_{A\ max}$
Noise sensitive premises : Highly sensitive area	0700 - 1900 hours Monday to Saturday	55	65	75
	0900 - 1900 hours Sunday and Public Holidays	50	60	75
	1900 - 2200 hours all days	50	60	65
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and Public Holidays	45	55	65

Note: L_{A10} is the noise level exceeded for 10% of the time.
L_{A1} is the noise level exceeded for 1% of the time.
L_{Amax} is the maximum noise level.

Noise received at these residences would also need to comply with the NOT "significantly contributing" requirements. Therefore, to comply with the regulatory requirements at these residences within the Policy Area, noise received from the Waste to Energy Power Station during the night period would need to comply with an L_{A10} noise level of 40 dB(A).

Noise received at the neighbouring industrial premises would need to comply with the assigned L_{A10} noise level of 75 dB(A). Due to the close proximity of neighbouring industrial premises to this facility compared to other industries, noise received at the boundary of the neighbouring industries would be dominated by the noise received from the Waste to Energy Power Station and the "significantly contributing" requirement would not be applicable. Therefore, the assigned L_{A10} noise level of 75 dB(A) is the applicable regulatory criteria at for the neighbouring residence.

4. PROPOSED FACILITY

The proposed facility is a waste to energy power station and would be located at Lot 1 Office Road, East Rockingham in the Kwinana Industrial Estate.

Given the location of the site, the neighbouring residences of concern are located within Medina, Calista and North Rockingham.

The power station would operate during the night period. Therefore, the night period would be the critical period for compliance. Additionally, as the noise emissions from the facility are basically steady state, noise emissions would need to comply with the assigned L_{A10} noise levels as outlined above in Section 3 – Criteria. Therefore, unless otherwise stated, noise levels stated within this assessment are L_{A10} noise levels.

For information, a site plan showing the plant layout is attached in Appendix A.

As shown on the site plan attached in Appendix A, sources, as listed below, will be located within the building :

- Residual Reception Facility (RRF);
- Generators; and
- Incineration Bottom Ash (IBA) treatment and storage.

From information supplied by the client, we understand that the construction of the building will be a metal clad on a steel frame, however, thermal insulation (anticon) will be installed under the roof.

The sound power levels of the equipment is listed in Table 4.1. Also listed in table 4.1 is the elevation of the noise source above ground level.

TABLE 4.1 –SOUND POWER LEVELS

Item of Equipment	Sound Power Level, (dB(A))	Elevation above Ground Level (m)
Bunker	95	15
Boiler	105	20
Bottom Ash Extraction	98	1
Hydraulic Station	93	2
Primary Air Fan	92	7
Secondary Air Fan	92	7
ID fan	97	2
Flue Gas Cleaning	107	12
Stack	97	60
Feed Water Pumps	92	1
Condensate Pumps	99	1
Air Cooled Condensers	106	15
Re-coolers	98	15
Turbine	101	7
Lignite Coke Blower	98	2
IBA Processing	101	10
Compressed Air Station	95	2
Emergency Generator	96	2
Front End Loader	105	2
Trucks	97	3

The noise model includes 2 front end loaders and 4 trucks.

5. MODELLING

Noise modelling of the noise propagation from the Facility was carried out using an environmental noise modelling computer program, 'SoundPlan'. Both single point and noise contour calculations were undertaken for this study. Noise contours show the overall noise level that would be received at a location due to the various activities carried out, whereas single point calculations show the influence of individual items on the overall noise resulting at a specific location.

Noise modelling was undertaker using the sound power levels listed in Table 4.1.

Weather conditions for the modelling were undertaken using the "Default Conditions for Noise Modelling" as stipulated within the Environmental Protection Authority's "*Draft Guidance for Environmental Noise for Prescribed Premises"* for the night period as listed in Table 5.1.

TABLE 5.1 – WEATHER CONDITIONS

Condition	Night
Temperature	15°C
Relative humidity	50%
Pasquill Stability Class	F
Wind speed	3 m/s*

* From sources, towards receivers.

Notes :

1 Calculations are always undertaken with the wind direction from the sources to the receiver.

2 A ground absorption co-efficient of 0.6, which we understand is the same as used in the Kwinana Industrial Council (KIC) noise model.

3 To be conservative, no other building apart from the building associated with this project have been included in the noise model.

Single point calculations were carried out for noise received at closest residential premises located around the site and results are listed in Table 5.2. The location of the following single point locations are shown on the locality plan attached in Appendix A. We understand that these points are reference monitoring points used to assess noise emissions from the KIC and are understood to represent to worst case locations for each locality.

TABLE 5.2 – CALCULATED NOISE LEVELS

Item	Calculated Noise Levels (dB(A))
1 – North Rockingham	28
2 – Hillman	27
3 – Leda	29
4 – Calista	29
5 – Medina	27
6 – Residence within Area B	28

Based on the noise modelling, noise received at the neighbouring industrial premises, has been calculated at up to 65 dB(A). However, noise received at the neighbouring industrial premises could be tonal and a +5 dB(A) penalty. Therefore, including the +5 dB(A) penalty, the adjusted noise level at the neighbouring industries would be 70 dB(A).

We note that at the neighbouring residential premises, at the calculated noise level noise received at these locations would not be tonal or contain any other annoying characteristics, thus no penalties would be applied calculated noise levels listed above.

The noise contour plot for the power station is attached as Figure B1 in Appendix B.

6. DISCUSSION

As the power station would operate during the night period, noise received at the neighbouring residence located outside the Zone B of the Kwinana Industrial Area would need to comply with the assigned night period L_{A10} noise level of 35 dB(A). However, as the power station is located within an industrial estate, noise received at a residence would need to be considered as NOT significantly contributing and acoustic criteria would be 5 dB(A) below the assigned noise level or 30 dB(A). Due the combination of noise received at the surrounding residential premises, the background noise levels in these areas are relatively high. With noise received at these neighbouring premises being NOT significantly contributing or 5 dB(A) below the assigned noise level, noise received at these premises would not contain any annoying characteristics and no penalties would be applied.

For those residence located within Zone B of the Kwinana Policy Area would, taking into account the requirements to be considered as NOT “significantly contributing” during the night period, need to comply with an L_{A10} of 40 dB(A).

Noise received at the neighbouring industrial premises would need to comply with the assigned L_{A10} noise level of 75 dB(A). Due to the close proximity of neighbouring industrial premises to this facility compared to other industries, noise received at the boundary of the neighbouring industries would be dominated by the noise received from the Waste to Energy Power Station and the “significantly contributing” requirement would not be applicable. Therefore, the assigned L_{A10} noise level of 75 dB(A) is the applicable regulatory criteria at for the neighbouring residence.

Based on the noise modelling, noise received at the neighbouring industrial premises, with the above noise ameliorations, has been calculated at up to 65 dB(A). At this noise level, noise received at the neighbouring industrial premises would also comply with the Regulatory requirements, even if a +5 dB(A) penalty for tonality was applied. Even with the inclusion of the penalty for a tonal component, noise received at the neighbouring residential premises would comply with the assigned L_{A10} noise level of 75 dB(A).

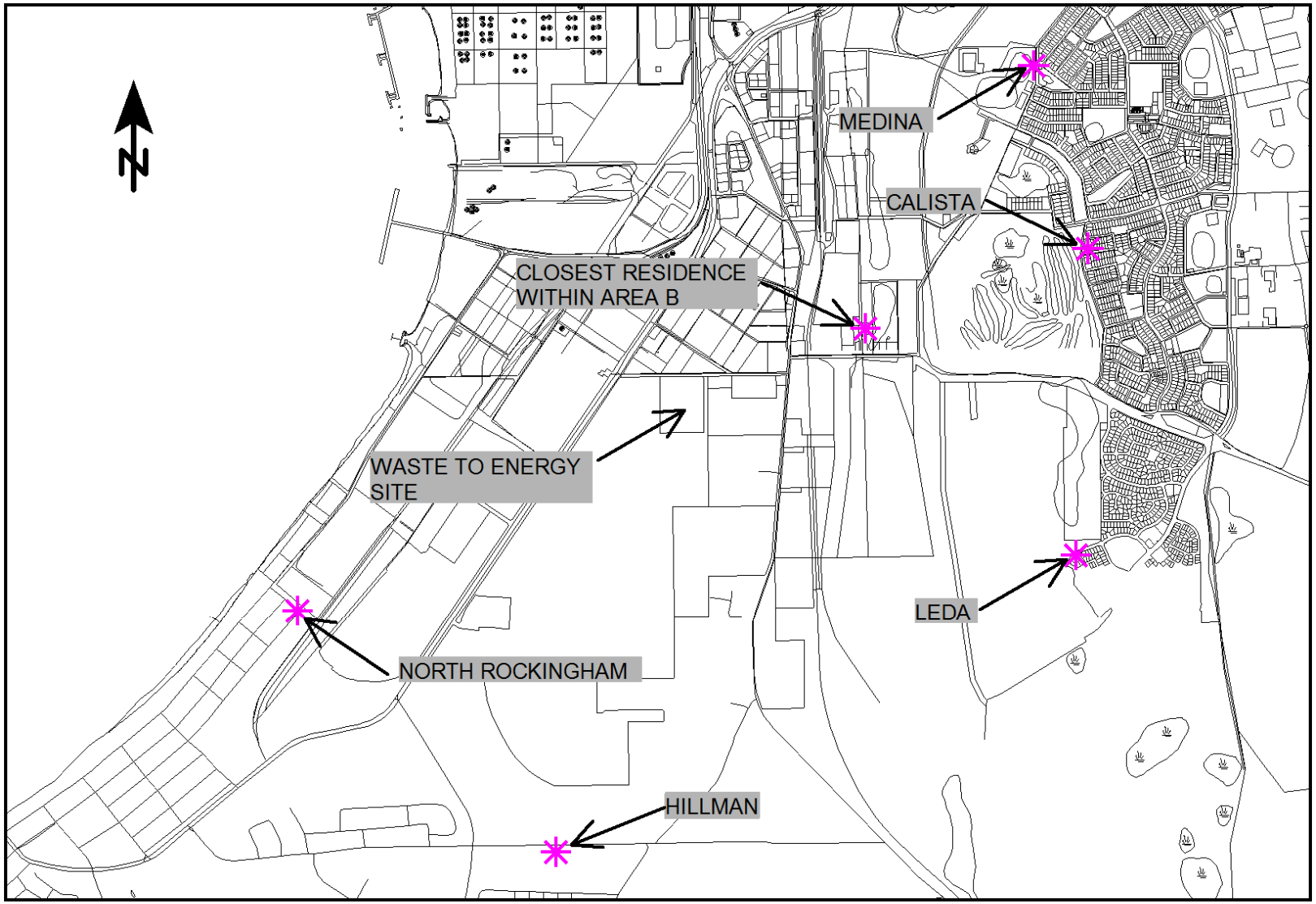
Additionally, noise received at the neighbouring residences would be considered as NOT significantly contributing and would be deemed to comply with the regulations.

Given the above, noise emissions from the proposed power station, would be deemed to comply with the Regulatory requirements at all times.

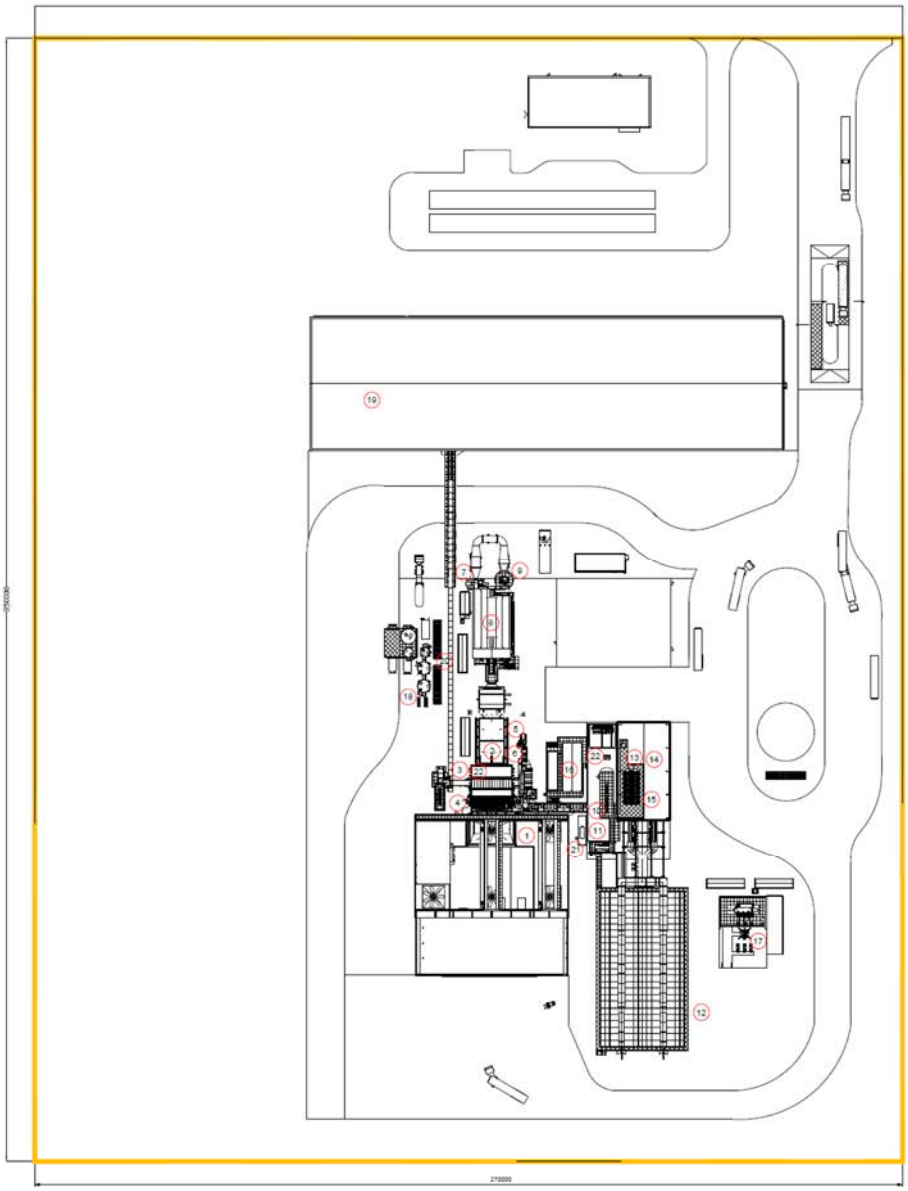
APPENDIX A

LOCALITY PLAN

LOCALITY PLAN / SINGLE POINT RECIEVER LOCATIONS – FIGURE A1

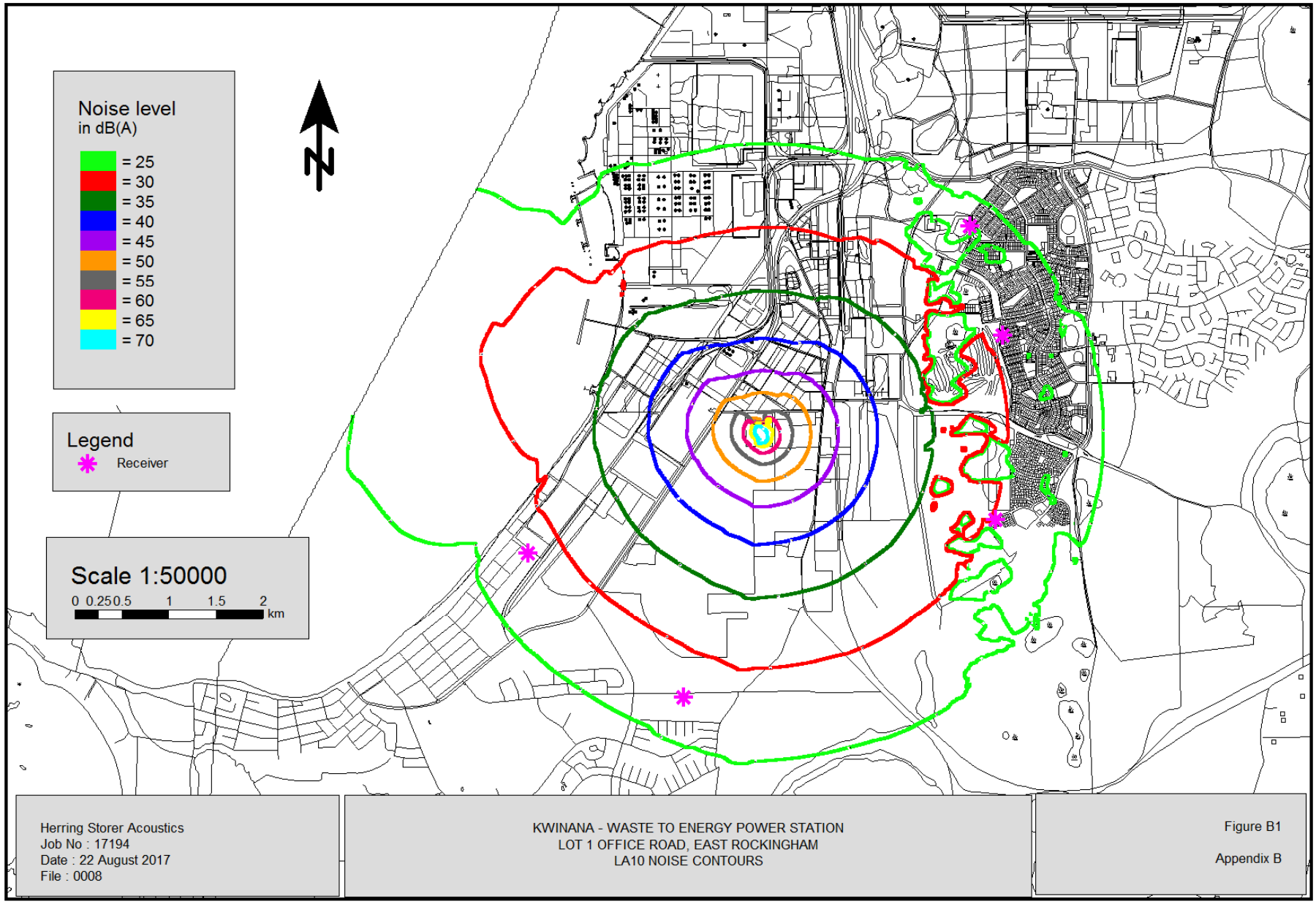


PLANT LAYOUT / NOISE SOURCE – FIGURE A2



APPENDIX B

NOISE CONTOUR PLOT


Noise level
in dB(A)
= 25
= 30
= 35
= 40
= 45
= 50
= 55
= 60
= 65
= 70
N
Legend
Receiver
Scale 1:50000
0 0.250.5 1 1.5 2
km
Herring Storer Acoustics
Job No : 17194
Date : 22 August 2017
File : 0008
KWINANA - WASTE TO ENERGY POWER STATION
LOT 1 OFFICE ROAD, EAST ROCKINGHAM
LA10 NOISE CONTOURS
Figure B1
Appendix B