APPENDIX AC: ASSESSMENT OF NOISE IMPACT

AC1. GENERAL

Eskom is planning a new power station (Matimba B Power Station) in the vicinity of the existing Matimba Power Station, which is located to the west of Lephalale (Ellisras) in Limpopo Province. Four alternative sites were investigated initially during the Scoping Phase of the project. One site, namely that on the farm NaauOntkomen 509-LQ, has now been selected as the development site for the power station, while the farm immediately to the west, Eenzaamheid 510-LQ has been identified as the location of the ash dump. The NaauOntkomen site has been assessed in detail in this EIA phase of the study. The section of Steenbokpan Road across the farms NaauOntkomen and Eenzaamheid will need to be re-aligned in order to accommodate the power station and the ash dump.

For convenience in this report, the main road from Lephalale to Matimba Power Station has been called the following:

- Through and east of Onvewacht Township – "Nelson Mandela Drive".
- West of Onverwacht Township to the Steenbokpan Road intersection – "Nelson Mandela Drive Extension".
- West of the Steenbokpan Road intersection – "Stockpoort Road".

The assessment of the noise impact was guided by the requirements of the South African National Standard SANS 10328 (SABS 0328) titled *Methods for Environmental Noise Impact Assessments* and the Noise Control Regulations. A comprehensive assessment using the appropriate noise impact descriptors (standards) has been undertaken. The noise impact criteria used in this investigation specifically take into account those as specified in the South African National Standard SANS 10103:2003, *The Measurement and Rating of Environmental Noise with Respect to Land Use, Health, Annoyance and Speech Communication,* as well as those in the National Noise Control Regulations. Relevant aspects of these Regulations and SANS 10103:2003 are provided in Appendix A.

The position of all the noise sensitive sites in the area that are potentially affected by operations at the new power station were provided by the team undertaking the social impact assessment. The specific land use (type of farming activity) and position of the farmhouses, labourers' houses and other habitations were confirmed. The position of houses/dwellings on the farms was checked on the ground and off the following 1:50 000 topographical cadastral maps:

- SOUTH AFRICA 1:50 000 Sheet 2327CB STEENBOKPAN Second Edition, 1980.

- SOUTH AFRICA 1:50 000 Sheet 2327CD ROOIPAN Second Edition, 1980.
- SOUTH AFRICA 1:50 000 Sheet 2327DA ELLISRAS Second Edition, 1980. This map has note that it was partially revised from aerial photography in 1990.
- SOUTH AFRICA 1:50 000 Sheet 2327DC AFGUNS Second Edition, 1980.

AC2. ASSESSMENT OF THE PRE-CONSTRUCTION PHASE

Activities during the planning and design stages that have possible impact implications in the study area are related to field surveys (such as seismic testing and geological test borehole drilling for large building foundation investigations). As these survey activities will be of short duration and take place during the day, they are unlikely to cause any noise impact.

AC3. ASSESSMENT OF THE CONSTRUCTION PHASE

AC3.1. General

The potential noise climate was established in general for the construction of the new power station inclusive of appurtenant works such as the conveyor belt systems, internal road system, new sewage works and the construction of the re-aligned Steenbokpan Road and any other new access roads. The Steenbokpan Road, which at present is aligned through the centre of the farms NaauOntkomen and Eenzaamheid will have to be re-aligned. Two alignments have been investigated, namely one along the northern boundary of the two aforementioned farms (Alternative 1) and a second which initially follows the southern boundary of the farm NaauOntkomen and then veers northwards to follow the northern boundary of the farm Eenzaamheid. Refer to the Traffic Impact Report for the project by Goba Consulting Engineers and Project Managers for more details.

A large construction camp including housing for about 2000 construction workers is being planned for and this will be located on the farm Eenzaamheid.

Although many of the details of the planned Development's buildings and infrastructure have not yet been finalised, general concepts have been used in the noise impact evaluation and these are adequate to provide a sound basis for the analysis of typical noise conditions and impacts that are likely to prevail on the project. Data related to construction have been sourced from various consultants and the experience that JKA has had working on similar sites.

AC3.3. Construction Noise Conditions

Construction will likely be carried out during the daytime only (07h00 to 18h00 or 20h00). It should however be noted that certain activities may occasionally extend into the late evening period, while others such as de-watering operations may need to take place over a 24-hour

period. Some of the activities such as the construction of the chimney stacks could take place continuously (24-hours a day) over a number of weeks if a continuous sliding shutter concreting operation is used. It is estimated that the development of the project will take place over a period of 3 to 4 years.

AC3.3.1. ***Sources of Noise***

The following are likely to be the main construction related sources of noise for the power station and its infrastructure:

i) Construction camp establishment. This will be for the site offices, workshops and the accommodation camp for the workers on site.
ii) Activities related to the relocation of services.
iii) Excavation of building basements and service trenches. Blasting may be required in places but in general pneumatic breakers will be used where rock is encountered.
iv) Piling operations for large buildings and structures.
v) Erection of shuttering for concrete.
vi) Fixing of steel reinforcing.
vii) Placing and vibration of concrete. Poker vibrators will be used.
viii) Stripping of shuttering after concrete pour.
ix) Erection of structural steelwork.
x) Finishing operations on buildings. Cladding, services installation, etc.
xi) Installation of generating plant and ancillary plant.
xii) General movement of heavy vehicles such as concrete delivery vehicles, mobile cranes, mechanical dumpers and water trucks (dust suppression) around the site.
xiii) De-watering pumps. A 24-hour operation may sometimes be necessary.
xiv) Road construction equipment. Scrapers, dozers, compactors, etc. (Construction of the internal road system, access roads, and the re-aligned Steenbokpan Road).
xv) Construction site fabrication workshops and plant maintenance workshops.
xvi) Construction material and equipment delivery vehicles.
xvii) Concrete batching plant and asphalt batching plant on site.

The level and character of the construction noise will be highly variable as different activities with different plant/equipment take place at different times, over different periods, in different combinations, in different sequences and on different parts of the construction site. Typical noise levels generated by various construction equipment are given in Table AC1. These noise levels assume that the equipment is maintained in good order. Conservative attenuation conditions (related to intervening ground conditions and screening) have been applied.

TABLE AC1: TYPICAL NOISE LEVELS GENERATED BY CONSTRUCTION EQUIPMENT

Plant/Equipment	Typical Operational Noise Level at Given Offset (dBA)							
	5m	10m	25m	50m	100m	250m	500m	1000m
Air compressor	91	85	77	71	65	57	51	46
Compactor	92	86	78	72	66	58	52	46
Concrete mixer	95	89	81	75	69	61	55	49
Concrete vibrator	86	80	72	66	60	52	46	40
Conveyor belt	77	71	63	57	51	43	37	32
Crusher (aggregate)	90	84	76	70	64	56	50	44
Crane (mobile)	93	87	79	73	67	59	53	47
Dozer	95	89	81	75	69	61	55	49
Loader	95	89	81	75	69	61	55	49
Mechanical shovel	98	92	84	78	72	64	58	52
Pile driver	110	104	97	91	85	77	71	65
Pump	86	80	72	66	60	52	46	40
Pneumatic breaker	98	92	84	78	72	64	58	52
Rock drill	108	102	94	88	82	74	68	62
Roller	84	78	70	64	58	50	44	38
Trucks	-	81	73	67	64	60	57	54

AC3.3.2. ***Noise Impact***

The nature of the noise impact from the large building construction sites is likely to be as follows:

i) Source noise levels from many of the construction activities will be high. Noise levels from all work areas will vary constantly and in many instances significantly over short periods during any day working period.

ii) Exact daytime period and night-time period continuous equivalent sound pressure levels are not possible to calculate with certainty at this stage as the final construction site layout, work programme, work *modus operandi* and type of equipment have not been finalised. Working on a worst case scenario basis, it is estimated that the maximum noise levels from general construction operations should not exceed 62dBA at a distance of 1500 metres from the activity site.

iii) There are likely to be noise disturbance and noise nuisance effects on people living in the area of the construction site. Several of the farmhouses and farm labourer houses

identified as sensitive sites that are within this 1500 metres radius of the focus of construction activity could be affected.

iv) Ideally the daytime outdoor ambient noise levels (as specified in SANS 10103) should not exceed 50dBA.

v) For all construction work, the construction workers working with or in close proximity to equipment will be exposed to high levels of noise as can be seen from Table AC1 (refer to the 5 metre offset noise levels).

The nature of the noise impact from the road construction activities (internal roads, access roads and re-alignment of Steenbokpan Road) is likely to be as follows:

i) The level and character of the construction noise will be highly variable as different activities with different plant/equipment take place at different times, over different periods, in different combinations, in different sequences and on different parts of the construction site.

ii) As no specific construction details or possible locations of major ancillary activity sites are available at this stage, the anticipated noise from various types of construction activities cannot be calculated accurately. In general at this stage, it can be said that the typical noise levels of construction equipment at a distance of 15 metres lie in the range of 75 decibels (dBA) to 100dBA. Refer also to Table C1. Based on data from similar "linear" construction sites, a one-hour equivalent noise level of between 75dBA and 78dBA at a point 50 metres from the construction would be typical for the earthmoving phase.

iii) The noise from the construction of the Alternative 1 alignment of Steenbokpan Road will affect fewer noise sensitive sites than that from the Alternative 2 alignment construction.

iv) The noise generated by the construction traffic will raise the daytime ambient noise level alongside Nelson Mandela Drive by about only 0,5dBA but will increase the roadside daytime ambient noise level along the Steenbokpan Road (from Nelson Mandela Drive to the construction camp entrance on Eenzaamheid) significantly by 6dBA.

AC4. ASSESSMENT OF THE OPERATIONAL PHASE

AC4.1. General

The new power station was evaluated on the following basis:

i) Noise impact from Matimba B Power Station.

ii) Cumulative noise impact effects of both power stations.

iii) Noise impact from ancillary works.

iv) Noise impact from traffic generated by the new Power Station.

v) Features of acoustical significance.

AC4.2. General Noise Conditions Related to the Existing and New Power Stations

The existing Matimba Power Station has a generating capacity of about 3 900 Mega-watts (MW) from six generator units. The intended installed capacity of Matimba B Power Station will be 4 800 MW also from six generator units. The main noise source from the power stations is the cooling fans, which are installed on one side only of the power stations. There are 48 fans per generating unit at the existing facility (a total of 6x48=288). It is estimated by Eskom that the new Power Station will possibly require up to 72 fans per generating unit (a total of 6x72=432). This is an increase of 50%. From a noise generation perspective this increase in the number of fans will not significantly increase the total ambient noise level generated by the whole bank of fans. Conservatively this increase has been taken to be 2dBA. Note that it would take a doubling of the number of fans to produce an increase in noise level of 3dBA. The condenser fan platform at fan level is 45 metres above ground level. This configuration of fans is likely to result in approximately the following ambient noise conditions around Matimba B Power Station (from power station source only):

- 58dBA at 1000 metres.
- 52dBA at 2000 metres.
- 46dBA at 3000 metres.
- 42dBA at 4000 metres.
- 38dBA at 5000 metres.
- 34dBA at 6000 metres.

Noise levels on the far side of the power station building to the fans will be slightly quieter due to shielding from the building.

The noise levels given are the unmitigated values. A conservative approach has been taken in that a hard intervening ground condition has been modelled. The thick vegetation in the area will generally result in greater attenuation with distance than shown. There will also be greater attenuation than shown with distance where there are houses, other buildings and terrain restraints in the intervening ground between the source and the receiver point.

AC4.3. General Noise Conditions Related to Ancillary Works

AC4.3.1. ***Conveyor Belt Systems***

For the details of the noise levels from a conveyor belt system at various offset distances refer to Table AC1. The noise levels from an intermediate drive house for a conveyor belt will be of the order of:

- 51dBA at a 500 metres offset.

- 46dBA at a 1000 metres offset.
- 41dBA at a 2000 metres offset.

AC4.3.2. ***Ash Dump Spreader Operations***

The maximum noise levels from the ash spreading operations at an ash dump will be of the order of:

- 55dBA at a 500 metres offset.
- 49dBA at a 1000 metres offset.
- 43dBA at a 2000 metres offset.

AC4.3.3. ***Sewage Works Operation***

When the aeration rotors are working the ambient noise level will be 40dBA at a 300 metres offset.

AC4.4. Traffic Operational Conditions

The predicted traffic data for the operational conditions once the new Power Station is commissioned were supplied by the consulting engineers Goba Consulting Engineers and Project Managers. It has been estimated that the new Power Station will generate about 800 additional trips daily.

The future ambient noise situations along Nelson Mandela Drive Extension/Stockpoort Road and Steenbokpan Road were calculated using the South African National Standard SANS 10210 (SABS 0210), *Calculating and Predicting Road Traffic Noise*. The noise levels at various offsets from the centreline of these roads were established and these data are summarised in Table AC2. The noise descriptors used are those prescribed in SANS 10103:2003, namely:

i) Daytime equivalent continuous rating (noise) level ($L_{Req,d}$) (L_d used in Table), namely for the period from 06h00 to 22h00).

ii) Night-time equivalent continuous rating (noise) level ($L_{Req,n}$) (L_n used in Table), namely for the period from 22h00 to 06h00).

iii) Day-night equivalent continuous rating (noise) level ($L_{R,dn}$) (L_{dn} used in Table), namely for the 24 hour period from 06h00 to 06h00).

The noise levels given are the unmitigated values. A conservative approach has been taken in that a hard intervening ground condition has been modelled to simulate winter conditions (burnt veld). The thick vegetation in the area will generally result in greater attenuation with distance than shown. There will also be greater attenuation with distance than shown where there are

houses, other buildings and terrain restraints in the intervening ground between the source and the receiver point.

The following traffic and traffic noise conditions are anticipated. Access to the new power station and the ash dump site will be from the Steenbokpan Road. All the traffic generated by the new facility will route from Lephalale along Nelson Mandela Drive and Steenbokpan Road. The ambient noise levels due to this additional traffic will increase present residual levels along Nelson Mandela Drive Extension and along Stockpoort Road by about 1dBA. Residual noise levels will however be increased significantly by about 5dBA during the day and 8dBA during the night along Steenbokpan Road. Refer to Table AC2 and compare with Table B3.

TABLE AC2: PREDICTED NOISE CLIMATE ADJACENT TO MAIN ROADS AFTER COMMISSIONING OF MATIMBA B POWER STATION

Road	Noise Levels Alongside Roads at Given Offset from Centreline (SANS 10103 Indicator) (dBA)											
	50m Offset			100m Offset			200m Offset			500m Offset		
	L_d	L_n	L_{dn}	L_d	L_n	L_{dn}	L_d	L_n	L_{dn}	L_d	L_n	L_{dn}
N Mandela Dr Ext	59.3	48.4	59.0	56.3	45.4	56.0	53.3	42.4	53.0	49.3	38.4	49.0
Stockpoort Road	58.4	47.5	58.1	55.4	44.5	55.1	52.4	41.5	52.1	48.4	37.5	48.1
Steenbokpan Rd	53.3	42.4	53.0	50.3	39.4	50.0	47.3	36.4	47.0	43.7	32.4	43.0

Note that there are presently no noise sensitive sites close to Nelson Mandela Drive Extension (along the section west of Onverwacht Township to Steenbokpan Road). There are two noise sensitive sites next to Steenbokpan Road.

AC4.5. Features of Acoustical Significance

AC4.5.1. ***Wind***

The wind blows mainly from the north-east (44% of the time) with a large percentage still time (30%).

AC4.5.2. ***Topography***

The terrain in the study area is relatively flat with a gentle fall to the north-east.

AC4.5.3. ***Vegetation***

The vegetation in the area is thick bush and trees

AC5. EVALUATION SUMMARY OF THE IMPACT OF THE DEVELOPMENT SITE

The analysis has been made with the assumption that the orientation of the new power station will be similar to Matimba Power Station that is with the cooling fans on the eastern side of the generator building. The following noise related issues were ascertained:

i) The site of the new power station lies at a distance of about 5500 metres to the south-west of the existing power station. The cumulative effects from the existing power station will be marginal.

ii) There will be a noise increase in the area due to the new power station over a 220 degree sector ranging from the north-east to the west of the site.

iii) The site is 7000 metres from Marapong Township. Marapong is partially shielded fro the new site by the existing power station.

iv) The site is 9500 metres from Lephalale (Onverwacht Township).

v) There are 6 farmhouses/dwellings within 6000 metres of the site.

vi) The additional traffic generated by Matimba B will raise the present ambient noise levels along Nelson Mandela Drive (in Lephalale) only marginally. Houses close to the road are already significantly impacted particularly at night.

vii) It is estimated that 60% of the traffic generated by the new power station will route to and from Lephalale along Nelson Mandela Drive Extension while the remaining 40% will route to and from Marapong via Stockport Road. The additional traffic generated by Matimba B will raise the present ambient noise levels along Nelson Mandela Drive Extension only marginally (namely by about 1dBA). There are no noise sensitive sites close to this section of road. The additional traffic generated by Matimba B will raise the present ambient noise levels significantly along the Steenbokpan Road up to the entrance to the new facility. There are at present 2 noise sensitive sites close to this section of road.

viii) There will be no noise impact from the new ash dump operations on Marapong.

ix) There will be no noise impact from the new ash dump operations on Lephalale.

x) There will be minor noise impact from the new ash dump operations on sites to the west of the planned facility.

xi) There will be no impact from the conveyor belt system.

xii) The general noise climate of the site is only marginally affected from the noise from the existing power station.

xiii) The prevailing wind will increase the noise in the farming area to the south-east of the new power station.