APPENDIX I: DETAILS OF THE NOISE MEASUREMENT SURVEY AND EXISTING NOISE CLIMATE CONDITION ASSESSMENT

I1. GENERAL

The technical details of the noise measurement survey and general noise climate investigation related to the noise impact aspects for the assessment of the planned concentrating solar power (CSP) plant near Upington in the Northern Cape Province are dealt with in this Appendix. The site being investigated for the construction of the proposed CSP Plant is on the farm Olyvenhouts Drift which is situated about 10-kilometres west of Upington.

The noise impact assessment was undertaken in accordance with the requirements of the South African National Standard SANS 10328 (SABS 0328) *Methods for Environmental Noise Impact Assessments*. Noise measurements were taken at appropriate locations to establish the existing ambient noise conditions in the study area. Daytime period noise measurements were taken at all monitoring sites, while night-time measurements were only taken at a few of the monitoring sites.

Supplementary noise measurements to establish the baseline noise profiles of various plant/equipment to be used at the planned CSP Plant were taken at existing operational sites.

I2. STANDARDS AND MEASUREMENT EQUIPMENT

The sound pressure level (SPL) (noise) measurements were taken in accordance with the requirements of 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*. Two Type 1 Integrating Sound Level Meters, a Bruël and Kjaer Model 2230 meter and a Larson Davis 824 were used for the noise measurements. The former was used to provide supplementary data, where relevant, to that from the Larson Davis meter and thus the readings taken on the latter are the primary data recorded in this report. Both meters were calibrated at an accredited acoustical laboratory within the last 12 months of the measurement dates. The calibration status of the meters was also checked before and after completion of the total measurement period of the day. A calibrated signal with a sound pressure level of 94,0dB at 1 kHz and 114,0dB at 1 kHz were applied to the Bruël and Kjaer meter and the Larson Davis meter respectively. A Larson Davis Model CAL200 was used. A comparative calibration measurement between the two metres was also taken at the start of each measurement session.

For all measurements taken to establish the ambient noise levels, the equivalent noise level (L_{Aeq}), the maximum sound pressure level (L_{Amax}) and the minimum sound pressure level (L_{Amin}) during that measurement period were recorded. The frequency weighting setting was set on “A” and the time weighting setting of the meters were set on *Impulse* (I). Measurement periods of a minimum of 10 minutes were used where ambient conditions were to be established. Where the power station component was to be isolated, the variation in instantaneous sound pressure level (SPL) over a short period was measured

when the power station could be heard to predominate. For these latter measurements the time weighting setting of the meter was also set on *Impulse* (I).

At all the measurement sites, the meters were set up with the microphone height at 1,3 metres above ground level and well clear of any reflecting surfaces (a minimum of 3 metres clearance). For all measurements, a standard windshield cover (as supplied by the manufacturers) was placed on the microphone of each meter.

At the same time as each individual measurement was being taken, the qualitative nature of the *noise climate* in the area of the measurement site was assessed and recorded. This comprised an appraisal of the general prevailing acoustic conditions based on the subjective response to the sounds as perceived by the listener (i.e. *auditory observation* by the surveyor), as well as identifying those noise incidents, which influenced the noise meter readings during that measurement period. This procedure is essential in order to ensure that that there is a *human* correlation between the noise as perceived by the human ear and the noise, which is measured by the meter, as well as to establish any anomalies in the general ambient noise conditions.

I3. MEASUREMENT SITES

Noise measurements were taken at six (6) monitoring sites in the study area (Olyvenhouts Drift farm area) at Upington (refer to Figure I1).

i) SITE U1: On the farm Olyvenhouts Drift: On Road D3276 approximately 7000 metres north of its intersection with National Road N14.

ii) SITE U2: In the settlement of Oranjevallei (on the farm Olyvenhouts Drift) on the road outside the church. The measurement site is approximately 1000 metres south-east of National Road N14.

iii) SITE U3: On the farm Klip Kraal 451 just to the west of the farm labourer houses at the dairy buildings. The site is just to the south of the Upington-Keimos railway line and approximately 800 metres north-west of National Road N14.

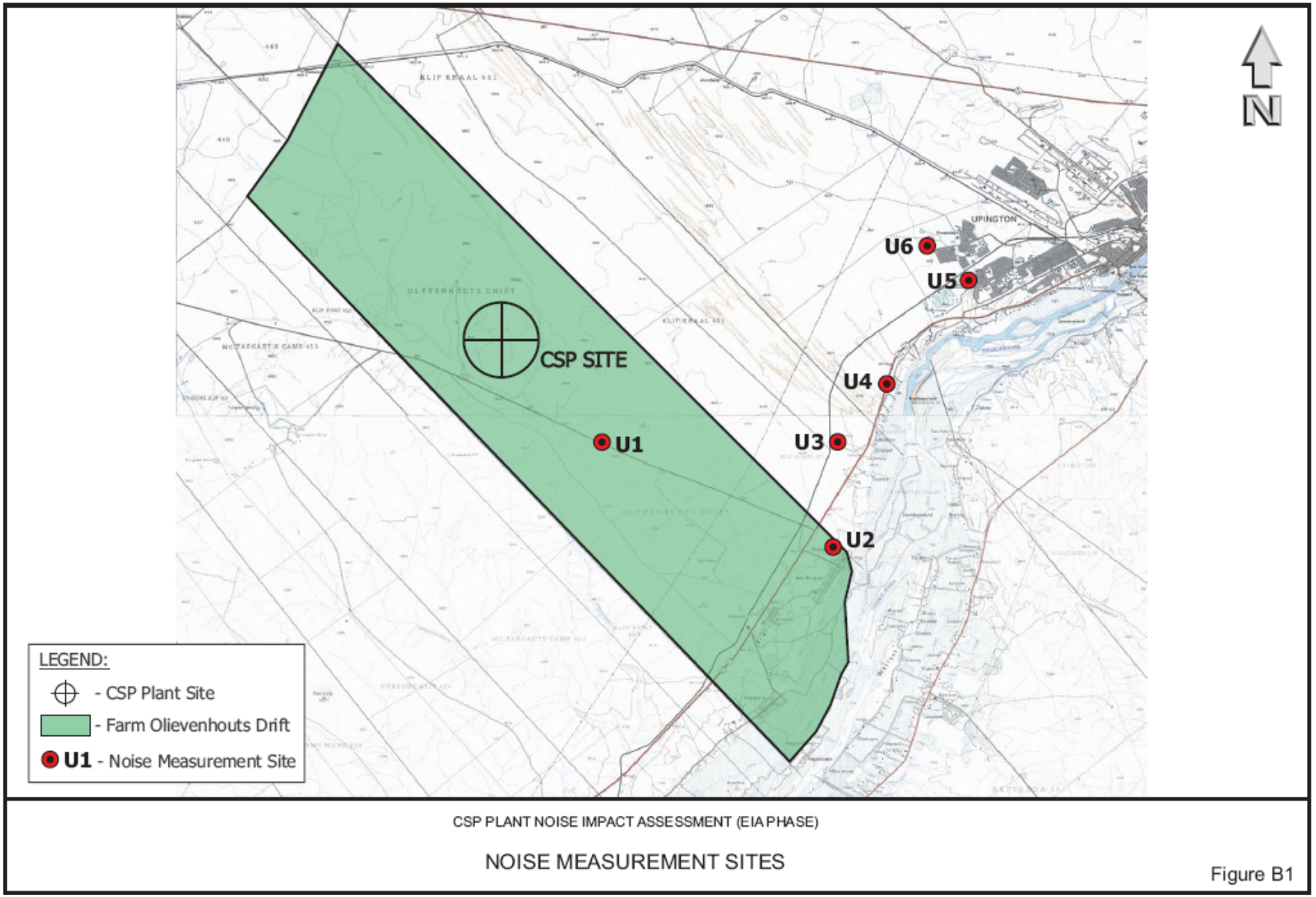

Figure I1: Noise Measurement Sites for the CSP Plant

iv) SITE U4: On the eastern side and 15 metres from the centreline of National Road N14 (at km 31,1).

v) SITE U5: On the western side of the residential area of Upington near the recreation centre. The site is approximately 900 metres north of National Road N14.

vi) SITE U6: On the north western perimeter of Upington (the residential area of Rosedale).

I4. MEASUREMENT DATES/TIMES

General observation of the noise conditions in the study area as well as the site specific sound pressure level (noise) measurements and observations were taken on Sunday, 12 February, and Monday 13 February 2006 during the daytime period from 9h30 to 17h00 and during the evening period from 19h30 to 22h30.

I5. NOISE MEASUREMENT DETAILS

I5.1. Summary of Ambient Sound Pressure Level Measurements

The results of the ambient noise condition measurement survey are summarised in Table I1. The equivalent sound pressure (noise) level (L_{Aeq}), the maximum sound pressure level (L_{Amax}) and the minimum sound pressure level (L_{Amin}) are indicated. Note that the equivalent sound pressure (noise) level may, in layman's terms, be taken to be the average noise level over the given period. This "average" is also referred to as the residual noise level (excluding the impacting noise under investigation) or the ambient noise level (if the impacting noise under investigation is included).

TABLE I1: EXISTING (YEAR 2006) AMBIENT NOISE LEVELS IN THE STUDY AREA FOR THE PLANNED CSP PLANT AT UPINGTON (OLYVENHOUTS DRIFT)

Measurement Site	Measured Sound Pressure Level (dBA)					
	Daytime Period			Evening Period		
	L_{Aeq}	L_{max}	L_{min}	L_{Aeq}	L_{max}	L_{min}
SITE U1	33.2	49.7	20.8	40.2	49.7	30.8
SITE U2	47.9	65.2	38.1	49.8	58.7	42.6
SITE U3	52.4	60.1	78.9	54.9	57.7	53.4
SITE U4	69.4	87.4	35.7	-	-	-
SITE U5	50.1	64.5	36.3	47.5	58.9	37.1
SITE U6	51.8	62.0	36.6	45.2	55.5	36.3

The weather conditions on all the survey days were such that the measurements to establish the ambient noise levels were not adversely affected and no specific corrective adjustments needed to be made.

I5.2. Noise Climate Related to the 24 hour Road Traffic

In order to complement the short-term noise measurements in the study area, the existing 24-hour residual noise levels related to the average daily traffic (ADT) flows on National Road N10, and National Road N14 were also calculated. These data provide an accurate base for the SANS 10103 descriptors.

The noise levels generated from the traffic on these Roads were calculated using the South African National Standard SANS 10210 (SABS 0210), *Calculating and Predicting Road Traffic Noise*. Typical situations were used for the calculation sites. The most recent traffic count data were used as the baseline for the calculations. Where necessary, these traffic count data were projected to give the Year 2006 statistics. The traffic data were obtained from Mikros Traffic Monitoring, the consultant firm which monitors traffic for SANRAL

The noise levels at various offsets from the centreline of these roads are summarised in Table I2. 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 sparse vegetation in the area will generally result in little attenuation with distance. 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.

TABLE I2: EXISTING NOISE CLIMATE ADJACENT TO MAIN ROADS (YEAR 2006)

Road	Noise Levels Alongside Roads at Given Offset from Centreline (SANS 10103 Indicator) (dBA)											
	50m Offset			100m Offset			250m 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}
N10	63.9	55.0	64.3	60.9	52.0	61.3	56.9	48.0	57.3	53.9	45.0	54.3
N14	65.9	57.1	66.3	62.9	54.1	63.3	58.9	50.1	59.3	55.9	47.1	56.3
	1000m Offset			2500m Offset			5000m Offset					
	L_d	L_n	L_{dn}	L_d	L_n	L_{dn}	L_d	L_n	L_{dn}			
N10	50.9	42.0	51.3	46.9	38.0	47.3	43.9	35.0	44.3			
N14	52.9	44.1	53.3	48.9	40.1	49.3	45.9	37.1	46.3			

I5.3. Prevailing Noise Climate

In overview, the existing situation with respect to the *noise climate* in the study area was found to be as follows:

i) The areas relatively far from the main roads are generally very quiet. Most sectors of the core study area have a typical rural *noise climate*. Residual noise levels increase in the areas closer to Upington.

ii) The main source of noise in the study area is from traffic on the main roads.