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CAMECO AUSTRALIA

KINTYRE URANIUM PROJECT
THE PILBARA

ENVIRONMENTAL NOISE ASSESSMENT

DECEMBER 2011

OUR REFERENCE:13970-4-11174

DOCUMENT CONTROL PAGE

ENVIRONMENTAL NOISE ASSESSMENT
THE PILBARA

Job No: 11174

Document Reference : 13970-4-11174

FOR

CAMECO AUSTRALIA

DOCUMENT INFORMATION			
Author:	G. Watts / T. Reynolds	**Checked By:**	Tim Reynolds / George Watts
Date of Issue :	13 December 2011		

REVISION HISTORY

Revision	Description	Date	Author	Checked
1	Revised for Comments	16/12/2011	GW	TR
2	Revised Layout	19/09/2012	TR	GW
3	Revised Site Layout	11/06/2013	TR	GW

DOCUMENT DISTRIBUTION

Copy No.	Version No.	Destination	Hard Copy	Electronic Copy
1	1	Cameco Australia		✓
1	2	Cameco Australia		✓
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1	4	Environ		✓
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CONTENTS

APPENDICIES

1.0 INTRODUCTION

Cameco Australia commissioned Herring Storer Acoustics to carry out an environmental acoustic assessment of noise emissions from the proposed Kintyre Uranium Project. The objectives of the study were to:

- Determine, by modelling, noise propagation from the mining operations.
- Assess the predicted noise levels received at the closest noise sensitive premises, for compliance with the *Environmental Protection (Noise) Regulations 1997*.
- If exceedances are predicted, investigate possible noise control options that will reduce noise emissions to achieve compliance with the regulations.

For information, an area plan is attached in Appendix A.

2.0 SUMMARY

As mining and the processing plant would operate 24 hours per day, under the *Environmental Protection (Noise) Regulations 1997* noise received at the neighbouring noise sensitive premises from the mining and the processing plant needs to comply with the assigned L_{A10} noise level of 35 dB(A) for the night period.

The neighbouring noise sensitive premises for which compliance with the regulations is required are in the order of 80km away from the proposed mine site. Noise received at these noise sensitive premises has been calculated to be in the order of 0 dB(A). Therefore, noise received at the neighbouring noise sensitive premises would be deemed to comply with the requirements of the *Environmental Protection (Noise) Regulations 1997*.

Although not required to comply with the requirements of the *Environmental Protection (Noise) Regulations 1997*, an assessment has also be undertaken of the noise that would be received at the accommodation camp associated with the mining operations. Noise received at the accommodation camp has been calculated at 30 dB(A) or 35 dB(A) including adjustment for tonal characteristics. At these levels, noise emissions comply with the *Environmental Protection (Noise) Regulations 1997* at the accommodation camp.

3.0 CRITERIA

The criteria used are in accordance with the *Environmental Protection (Noise) Regulations 1997*. These regulations stipulate maximum allowable external noise levels determined by the calculation of an influencing factor, which is then added to the base levels shown in Table 1. The influencing factor is calculated for the usage of land within the two circles, having radii of 100m and 450m from the premises of concern.

Table 1 - Baseline Assigned Outdoor Noise Level

Premises Receiving Noise	Time of Day	Assigned Level (dB)		
		L_{A10}	L_{A1}	L_{Amax}
Residential	0700 – 1900 hours Monday to Saturday	45 +IF	55 +IF	65 +IF
	0900 - 1900 hours Sunday and Public Holidays	40 +IF	50 +IF	65 +IF
	1900 – 2200 hours all days	40 +IF	50 +IF	65 +IF
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and Public Holidays	35 +IF	45 +IF	55 +IF

Notes: 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 noise received at another premises, be free of annoying characteristics (tonality, modulation and impulsiveness), defined below as per Regulation 9 of the *Environmental Protection (Noise) Regulations 1997*.

"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 3dB $L_{A\ Fast}$ or is more than 3dB $L_{A\ Fast}$ 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.

For information, examples of the above annoying characteristics are:

"impulsiveness" banging, thumping or other short term high noise levels, such as hammering.

"modulation" cyclic noise such as a siren.

"tonality" source where most of the energy is confined to a small part of the audible spectrum, such as whining or a droning.

If the above characteristics exist and cannot be practicably removed, then any measured level is adjusted according to Table 2 below.

Table 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.

The influencing factor ("IF") has been assessed as 0 for the surrounding residential premises. The assigned outdoor noise levels for the proposed usage would be as for the base levels listed in Table 3.

Table 3 - Baseline Assigned Outdoor Noise Level

Premises Receiving Noise	**Time of Day**	**Assigned Level (dB)**		
		L_{A10}	**L_{A1}**	**L_{Amax}**
Residential	0700 – 1900 hours Monday to Saturday	45	55	65
	0900 - 1900 hours Sunday and Public Holidays	40	50	65
	1900 – 2200 hours all days	40	50	65
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and Public Holidays	35	45	55

Notes: 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.

4.0 MINING OPERATIONS

As mining and the processing would be a 24 hours per day operation, under the *Environmental Protection (Noise) Regulations 1997,* noise received at the neighbouring noise sensitive premises from the mining and processing plant needs to comply with the assigned L_{A10} noise level of 35 dB(A) for the night period.

Additionally, under the *Environmental Protection (Noise) Regulations* 1997, it is a requirement that noise received at a premises be free of annoying characteristics (tonality, modulation and impulsiveness). However, if the annoying characteristic cannot be practically removed and noise received at the premises is deemed to contain an annoying characteristic then a penalty is added to the noise received at that premises. Noise emissions from mining equipment and processing plants are normally tonal in nature, however, in this case, given the distance to the neighbouring noise sensitive premises, it is likely that the tonal nature of the noise received at these premises would be masked by the natural background noise level and the +5 dB(A) penalty for a tonal component would not be applied. However, to be conservative it has been assumed that noise received at the neighbouring noise sensitive premises would contain a tonal characteristic and the 5 dB(A) penalty would be applied to the noise received at a premises.

The closest noise sensitive premises to the mining operations, other than the accommodation village associated with the mine, are understood to be:

Nifty – 80km
Parnngurr – 80km
Telfer – 90km
Punmu – 113km

The noise sensitive premises are shown on the attached locality plan in Appendix A.

It is noted that, due to the distances involved, calculations have not been conducted for the noise sensitive premises located at greater than 20km from the proposed mining operations, for noise received at this distance would not be audible at less than 10 dB(A). Although not required to comply with the regulations, noise levels have also been assessed at the proposed accommodation village, which has been treated as a noise sensitive premises.

5.0 METHODOLGY / MODELLING

Noise received at the accommodation village was determined using the noise modelling computer program "SoundPlan". SoundPlan uses the theoretical sound power levels determined from measured sound pressure levels to calculate the noise level received at a specific location.

The calculations used the following input data:

a) Ground contours.
b) Standard DEC weather conditions as stipulated within the Environmental Protection Authority's *"Draft Guidance for Noise Assessment of Environmental Factors No. 8 – Environmental Noise* for the night period. The weather conditions are as listed in Table 4.
c) Sound power levels used in the model were based on file data of similar operations. The sound power data is summarised in Table 5.

Table 4 - Weather Conditions

Condition	Night Period
Temperature	15 ^{o}C
Relative Humidity	50%
Pasquill Stability Class	F
Wind Speed	3 m/s*

* From sources, towards receivers.

Table 5 - Sound Power Levels dB(A)

Item	Sound Power Level dB(A)
Front End Loader	117
Haul Truck (15 off)	119
Drill Rig (6 off)	124
Processing Plant	124
Grader (2 off)	113
Ball Mill	110
Excavator (3 off)	114
Diesel Generator (2 off)	116

Although there would be some diversity in noise emissions from the mining operations, to be conservative noise modelling was undertaken with all equipment operating.

Single point calculations and noise contour calculations were undertaken for the mining operations. Noise contours show the overall noise level that would be received at a location due to the various activities carried out, where as single point calculations show the influence of individual items on the overall noise resulting at a specific location.

6.0 RESULTS

Single point calculations were carried out for proposed accommodation camp and the resultant noise levels are summarised in Table 6.

Table 6 - Calculated Noise Levels from Mining

Location	Calculated Noise Level (dB(A))
Accommodation camp	30

It is noted that noise levels at locations further afield (Nifty, Parnngurr, Telfer and Punmu) noise levels are calculated to be in the order of 0 dB(A) – hence no further analysis has been carried out for these locations.

The noise contour plot is attached in Appendix B for information.

7.0 DISCUSSION

As mining and processing would occur 24 hours per day, under the *Environmental Protection (Noise) Regulations 1997* noise received at the neighbouring noise sensitive premises from the mining and processing plant needs to comply with the assigned L_{A10} noise level of 35 dB(A) for the night period. Additionally, if noise emissions from the mining and processing plant, when received at a noise sensitive premises, has been assumed to contain a tonal characteristic, then under the Regulations a +5 dB(A) penalty is applied to the noise received at a premises. The calculated noise levels and adjustments are listed in Table 7.

Table 7 – Applicable Adjustments and Assessable Level of Noise Emissions

Location	Calculated Noise Level, dB(A)	Applicable Adjustments to Measured Noise Levels, dB(A)			Assessable Noise Level, dB(A)
		Where Noise Emission is NOT music			
		Tonality	Modulation	Impulsiveness	
Accommodation camp	30	+5	-	-	35

Based on the above an assessment was undertaken for the worst case location and the assessment is summarised in Table 8.

Table 8 – Assessment of Noise Level Emissions

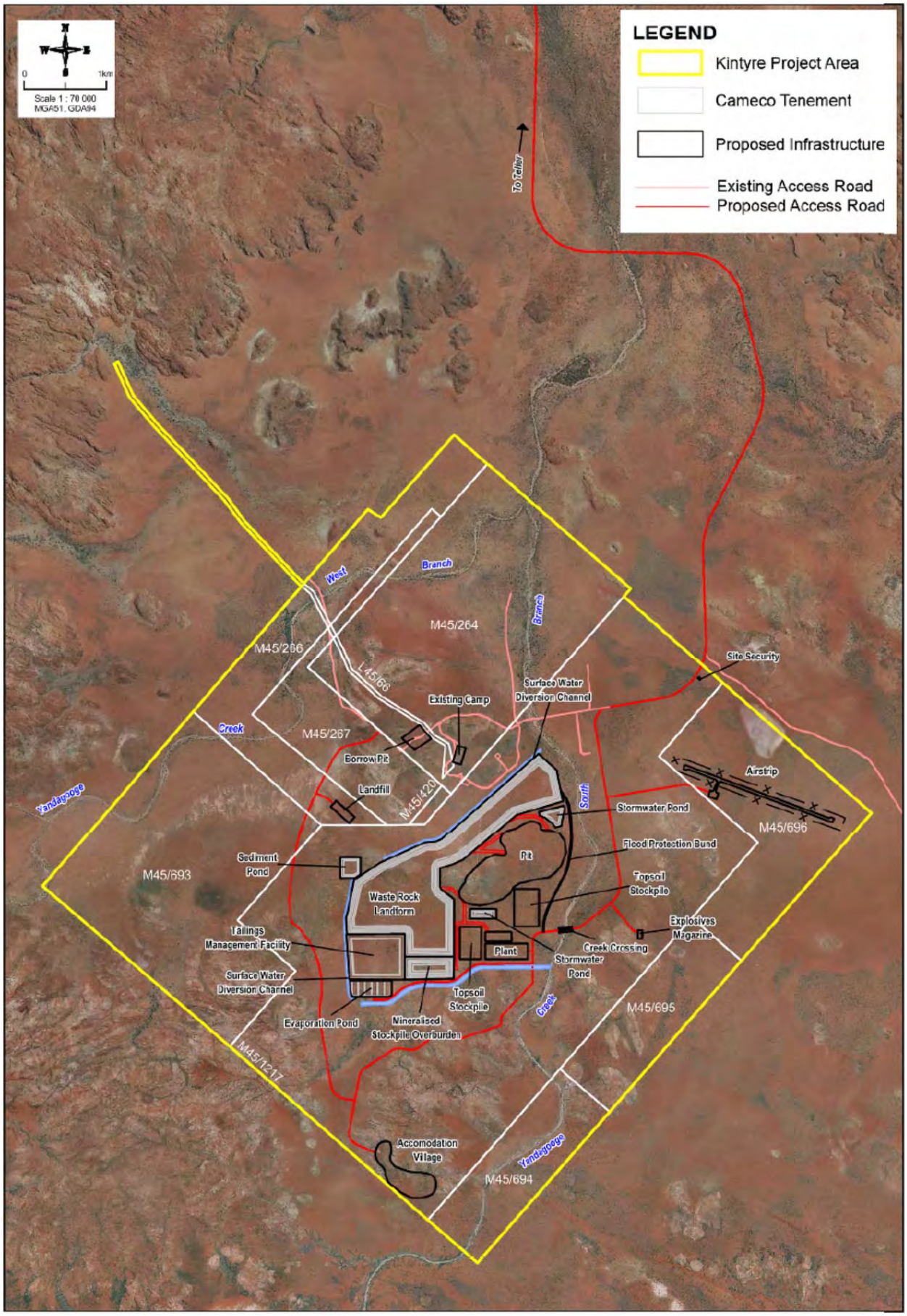
Scenario	Assessable Noise Level, dB(A)	Applicable Times of Day	Applicable L_{A10} Assigned Level (dB)	Exceedance to Assigned Noise Level (dB)
Accommodation camp	35	Day	45	Complies
		Sunday / Public Holiday Day Period	40	Complies
		Evening	40	Complies
		Night	35	Complies

Noise levels emissions at the proposed accommodation camp have been calculated to comply with the *Environmental Protection (Noise) Regulations 1997*. It is noted that compliance with the Regulations at this location may not be required, however, does provide a guide to ensure the amenity of personnel at the camp is sufficient.

APPENDIX A

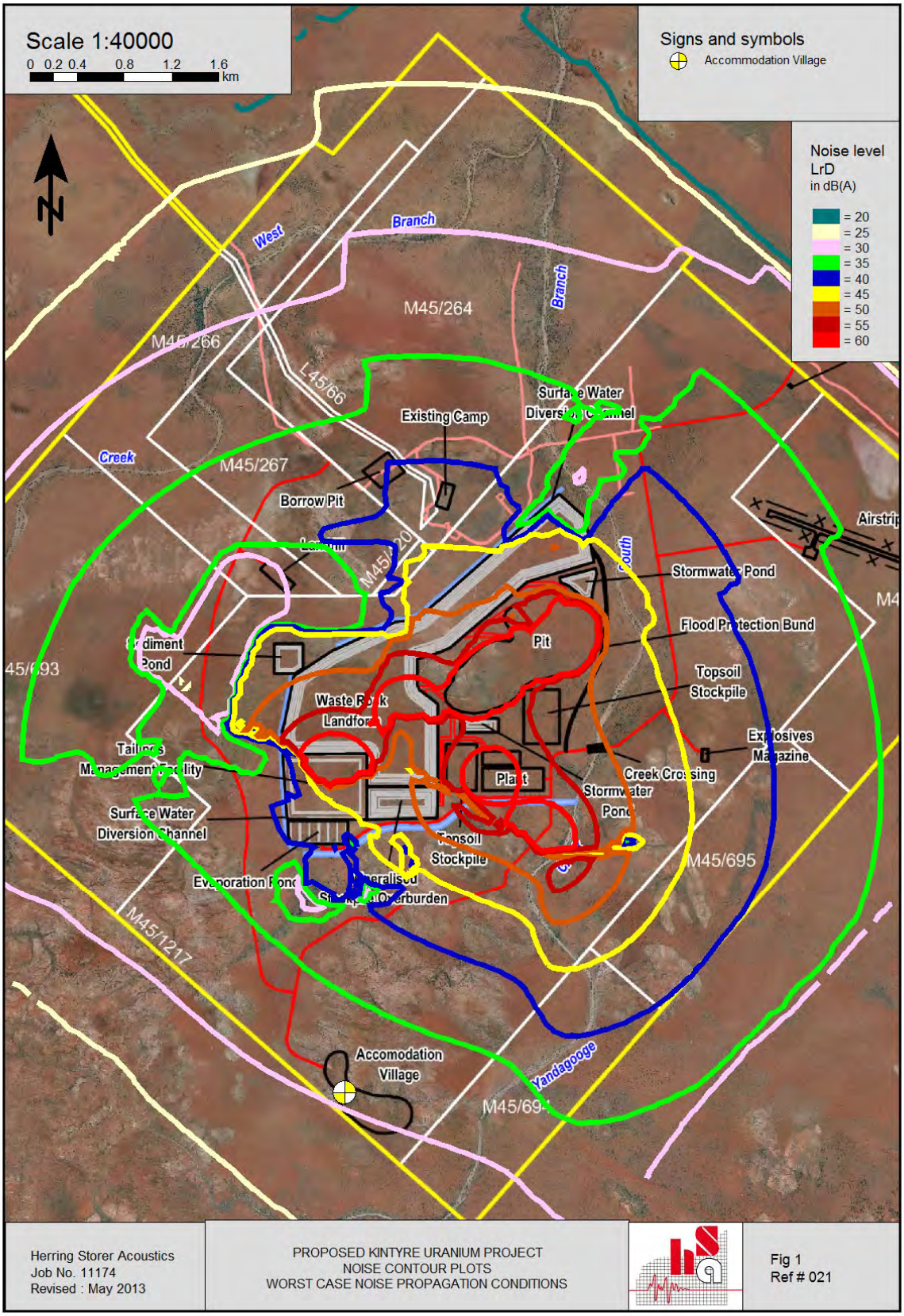
LOCALITY PLAN

Author: S. Williamson ~ Drawn: CAD Resources ~ Tel 9246 3242 ~ URL www.cadresources.com.au ~ Date July 2010 ~ A4 ~ CAD Ref g1826_Env_ESD_2010_002.dgn


LEGEND
Kintyre Project Area
Cameco Tenement
Proposed Infrastructure
Existing Access Road
Proposed Access Road
Scale 1 : 70 000
MGA51, GDA94
0
1km
To Telfer
West Branch
Branch
M45/264
M45/266
L45/66
Site Security
Surface Water Diversion Channel
Existing Camp
Creek
M45/267
Borrow Pit
Landfill
M45/420
Yandagooge
Airstrip
South
Stormwater Pond
M45/696
Flood Protection Bund
Pit
Sediment Pond
M45/693
Topsoil Stockpile
Waste Rock Landform
Explosives Magazine
Tailings Management Facility
Plant
Creek Crossing
Stormwater Pond
Surface Water Diversion Channel
Topsoil Stockpile
Creek
M45/695
Evaporation Pond
Mineralised Stockpile Overburden
M45/1217
Accomodation Village
Yandagooge
M45/694

APPENDIX B

NOISE CONTOUR PLOT


Scale 1:40000
0 0.2 0.4 0.8 1.2 1.6 km
N
Signs and symbols
Accommodation Village
Noise level
LrD
in dB(A)
= 20
= 25
= 30
= 35
= 40
= 45
= 50
= 55
= 60
West Branch
Branch
M45/264
M45/266
L45/66
Existing Camp
Surface Water Diversion Channel
Creek
M45/267
Borrow Pit
Airstrip
M45/220
South
Stormwater Pond
Flood Protection Bund
Pit
Topsoil Stockpile
Waste Rock Landform
Explosives Magazine
Plant
Creek Crossing
Stormwater Pond
Surface Water Diversion Channel
Topsoil Stockpile
M45/695
M45/1217
Accomodation Village
Yandagooge
Herring Storer Acoustics
Job No. 11174
Revised : May 2013
PROPOSED KINTYRE URANIUM PROJECT
NOISE CONTOUR PLOTS
WORST CASE NOISE PROPAGATION CONDITIONS
Fig 1
Ref # 021

APPENDIX C

REFERENCES

References

1. *Environmental Protection (Noise) Regulations 1997*, as ammended in 2000.

2. *Draft Guidance for Noise Assessment of Environmental Factors No. 8 – Environmental Noise*. Environmental Protection Authority May 2007.