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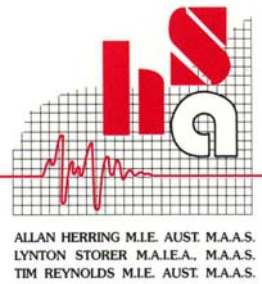

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NORTHERN WASTE ROCK DUMPS

ENVIRONMENTAL ACOUSTIC ASSESSMENT

BY

HERRING STORER ACOUSTICS

FOR

KALGOORLIE CONSOLIDATED GOLD MINES PTY LTD

JULY 2006

OUR REFERENCE: 5556-8-05033

CONTENTS

APPENDICIES

1.0 INTRODUCTION

Herring Storer Acoustics (HSA) was commissioned by Kalgoorlie Consolidated Gold Mines Pty Ltd (KCGM) to undertake a noise level impact assessment of noise emissions from the proposed Northern Waste Rock Dumps. These dumps are to comprise of two areas referred to as the North East and North West Waste Rock Dumps for the purpose of modelling and this report.

The objective of the study is to assess the likely impact of noise from mobile equipment operating on these waste rock dumps at noise sensitive premises located to the west of the North East Waste Rock Dump (NEWRD) in both Williamstown and Kalgoorlie/ Boulder and to the north and west of the North West Waste Rock Dump (NWWRD) in Williamstown and Kalgoorlie/ Boulder respectively.

As requested by the Department of Environment, this report also analyses the noise received at noise sensitive premises due to the cumulative effect of all KCGM operations, including the Waste Rock Dumps, the existing mining operations and the proposed Golden Pike Cutback.

In relation to the North East and North West Waste Rock Dumps, there are 2 conditions that need to be considered, these being:

1 the construction of noise bunds on the town side of the Waste Rock Dumps,

and

2 the dumping of waste rock under the various proposed management strategies.

2.0 SUMMARY

2.1 BUND CONSTRUCTION

It is proposed to construct a noise bund prior to construction of the Northern Waste Rock Dumps, to reduce the noise impacts on residents in Boulder and Williamstown. This noise bund will also form part of the outer wall of the waste dump.

To minimise the impact of building the noise bunds on the neighbouring noise sensitive premises, it is proposed that the noise bunds be constructed only during the day period only (i.e. 0700 to 1900 hours Monday to Saturday and excluding Public Holidays). Even so, noise levels received at the selected noise sensitive premises during bund construction would exceed the criteria stipulated in the *Environmental Protection (Noise) Regulations 1997* by up to 13 dB(A). A summary of predicted noise levels compared to the appropriate assigned noise level are listed in Table 2.1.

TABLE 2.1 – PREDICTED NOISE LEVEL FOR BUND CONSTRUCTION vs ASSIGNED LEVELS

Receiver Location	Modelled Results		Assigned L_{A10}#
	NEWRD	NWWRD	
Baden Street, Williamstown	62	61	56
Hewitt Street, Boulder	60	65	53
Short Street, Boulder	58	64	51

NEWRD = North East Waste Rock Dump
NWWRD = North west Waste Rock Dump
# Assigned Noise Levels for Day period 0700hrs to 1900hrs Monday to Saturday (Excluding Public Holidays)
Noise levels listed include a +5 dB(A) penalty for a tonal component.

From the acoustic modelling it is predicted that noise received at Short Street during construction of the noise bund for the Northern Waste Rock Dump would exceed the assigned day period noise level by up to 13 dB(A). Therefore, a Regulation 17 variation in the assigned noise level would be required for this activity.

However, KCGM will use similar noise control measures proposed for the recently approved Loop Line noise bund, and will implement KCGM's Noise Management Plan to minimise noise impacts during construction of the Northern Waste Rock Dumps noise bund.

2.2 WASTE ROCK DUMPING

Once an outer bund has been constructed, noise received at all sensitive premises can be managed to be within the criteria stipulated in the *Environmental Protection (Noise) Regulations 1997* provided the operational restrictions as detailed in Section 5.0, Results and Table A are implemented as part of a Noise Management Plan based on Section 6 of this report "Noise Management". A summary of predicted noise levels with 10 and 20 metre high bunds compared to the appropriate assigned noise level are listed in Tables 2.2 and 2.3.

TABLE 2.2 – PREDICTED NOISE LEVEL FOR DUMPING WITH 10m BUND vs ASSIGNED LEVELS

Receiver Location	Modelled Results		Assigned L_{A10}#
	NEWRD	NWWRD	
Baden Street, Williamstown	51 – 62	49 – 59	46
Hewitt Street, Boulder	47 – 59	49 – 59	43
Short Street, Boulder	47 – 57	48 – 52	41

NEWRD = North East Waste Rock Dump
NWWRD = North west Waste Rock Dump
# Assigned Noise Levels for night period 2200hrs to 0700hrs Monday to Saturday and 2200hrs to 0900hrs Sundays and Public Holidays.

TABLE 2.3 – PREDICTED NOISE LEVEL FOR DUMPING WITH 20m BUND vs ASSIGNED LEVELS

Receiver Location	Modelled Results		Assigned L_{A10}#
	NEWRD	NWWRD	
Baden Street, Williamstown	39 – 45	37 – 40	46
Hewitt Street, Boulder	36 – 39	40 – 41	43
Short Street, Boulder	34 – 38	40	41

NEWRD = North East Waste Rock Dump
NWWRD = North west Waste Rock Dump
# Assigned Noise Levels for night period 2200hrs to 0700hrs Monday to Saturday and 2200hrs to 0900hrs Sundays and Public Holidays.

The 3 locations chosen as receiver points, one in Williamstown, and two in Boulder, have been selected as they are nearest to the proposed waste rock dumps (refer to Appendix C). The lowest resultant noise levels are achieved when the waste rock dumps are at a height of 40 metres above existing ground level and also have the benefit of a 20 metre high noise bund.

Given the predicted noise level relative to the existing background noise levels and the predicted noise received from the existing mining operations, noise received at the noise sensitive premises from the dumping of waste rock behind at 20 metre bund would not be considered tonal and no penalty would be applied to the noise received at a noise sensitive premises. Therefore, resultant noise levels predicted from the waste rock dump operations and equipment as part of this assessment would not be expected to be measurable and the adjustment for the tonal component would not apply.

With a 10m differential between the top of the bund and the bench height, noise received at a noise sensitive premises could be considered tonal at the start of the project when operations are at the existing ground levels. However, as the height of the benches increases and differential in height between the top of the bund and the receivers increases so does the barrier affect, and noise received from dumping operations would decrease and would eventually no longer be considered tonal and would comply with the regulatory requirements. Therefore, restrictions to dumping would apply during the early stages of the project as summarised in Table A.

Noise emissions from the dumping of waste rock at both the North East and North West Waste Rock Dumps will, with the proposed management practices, comply with the requirements of the *Environmental Protection (Noise) Regulations 1997*.

2.3 CUMULATIVE NOISE EMISSIONS

As requested by the Department of Environment, cumulative noise modelling was carried out for the existing mining operations and the proposed Golden Pike Cutback. The noise contour plots are attached in Appendix B.

Tables 2.4 and 2.5 show the resultant noise levels received at the selected single point locations for various operations modes of the Northern Waste Dumps compared to the cumulative noise level that would be received at those locations from the existing mining operations (including the Golden Pike Cutback).

TABLE 2.4 – BUND CONSTRUCTION AND MINING OPERATIONS

Receiver Location	Day Period Assigned Noise Levels	Calculated Noise Level (dB(A))		
		NEWRD	NWWRD	Mining Operations*
Baden Street Williamstown	**56**	62	61	57
Hewitt Street, Boulder	**53**	60	65	59
Short Street, Boulder	**51**	58	64	62

* Includes Existing mining and proposed Golden Pike cutback at 20m below existing ground level
Calculations include +5 dB(A) penalty for tonal component

TABLE 2.5 – DUMPING OPERATIONS AND MINING OPERATIONS

Receiver Location	Overnight Assigned Noise Levels	Calculated Noise Level (dB(A))		
		NEWRD#	NWWRD#	Mining Operations*
Baden Street Williamstown	**46**	39 – 45	37 – 40	57
Hewitt Street, Boulder	**43**	36 – 39	40 – 41	59
Short Street, Boulder	**41**	34 - 38	40	62

Behind 20m bund
* Includes Existing mining and proposed Golden Pike cutback at 20m below existing ground level
Calculations include +5 dB(A) penalty for tonal component

During the construction of the bund, noise received at the neighbouring noise sensitive premises would be approximately the same as current noise levels. However, noise received from the dumping of waste rock at the dumps would be significantly below the noise received from existing operations.

3.0 CRITERIA

The *Environmental Protection (Noise) Regulations 1997* stipulate the allowable noise levels at any noise sensitive premises from another 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. At the selected noise sensitive premises, located in Williamstown and Boulder at the nearest locations to the proposed waste rock dumps, the assigned L_{A10} noise levels at the various times of the day, which are primarily influenced by proximity to mining leases, are as listed in Table 3.1 below.

TABLE 3.1 - ASSIGNED L_{A10} NOISE LEVELS

Location	Assigned L_{A10} Noise Level (dB(A))			
	Day	Evening	Sunday	Night
Baden Street, Williamstown	56	51	51	46
Hewitt Street, Boulder	53	48	48	43
Short Street, Boulder	51	46	46	41

Note: Day: 0700 to 1900 hours Monday to Saturday
Evening: 1900 to 2200 hours any day
Sunday: 0900 to 1900 hours any Sunday or Public Holiday
Night: 2200 to 0700 hours Monday to Saturday (excluding Public Holiday)
2200 to 0900 hours on any Sunday and Public Holiday

Note that L_{A1} Assigned Noise Levels are 10 dB(A) higher than the above L_{A10} criteria.

Throughout this report, L_{A10} are used unless noted otherwise, as these noise levels will be emitted for greater than 10% of the time.

It is a requirement that noise from the site be free of annoying characteristics (tonality, modulation and impulsiveness) at another premises, 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 15dB 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.

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 FOR ANNOYING CHARCATERISTICS

Where tonality is present	Where modulation is present	Where impulsiveness is present
+ 5 dB	+ 5 dB	+ 10 dB

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

4.0 METHODOLOGY

Modelling of the noise propagation was carried out using the computer program, "SoundPlan" Version 6.3. Single point calculations were also carried out for the specific selected locations as identified in Table 3.1, primarily to assess the impact of barriers between the operating equipment and residential areas.

Input data for computer modelling included:

- Topographical data, including proposed barriers to be constructed.
- Worst case weather conditions (based on actual data).
- Octave band sound power levels as used for other modelling of noise emissions from the KCGM mining operations and as determined from measurements carried out at the KCGM mining operations.

The proposed inventory of equipment was obtained from KCGM and is as detailed in Table 4.1.

TABLE 4.1 – EQUIPMENT SCHEDULE FOR NORTHERN WASTE ROCK DUMPS

Equipment	NWWRD	NEWRD
Cat 793 – Truck	3	4
Cat 16G Grader	1	1
Cat D10R Dozer	1	1
Cat 783 Water Truck	1	1

Previous noise modelling was carried out using the "standard" weather conditions as outlined in the Environmental Protection Authority's *"Draft Guidance for Assessment of Environmental Factors No.8 - Environmental Noise"* for the day and night periods and as listed in Table 4.2. However as requested by the Department of Environment, the worst case weather conditions were determined for Kalgoorlie using actual meteorological data from 2004. The conditions used in the acoustic modelling are as listed in Table 4.3.

TABLE 4.2 – STANDARD DoE WEATHER CONDITIONS

Condition	Day Period	Night Period
Temperature	20 °C	15°C
Relative humidity	50%	50%
Pasquil Stability Class	A	E
Wind speed	4 m/s	3 m/s

TABLE 4.3 – WORST CASE CONDITIONS FROM MEASURED WEATHER DATA

Condition	PARAMETER
Temperature	5°C
Relative humidity	60%
Pasquil Stability Class	F
Wind speed	4 m/s

From the meteorological data provided, Pasquil Stability Class F occurs for approximately 29% of the time, with Stability Class B the next highest at approximately 17 %. From the wind roses, wind between 3 and 4.5 m/s occurs for the highest percentage of time. Noise modelling was carried out using the above data.

Note : Preliminary single point calculation also indicated that the worst case noise propagation with a 4m/s breeze and an F Pasquil stability Class was a temperature of 5°C and a relative humidity of 60%. Therefore, these conditions have been used in the noise modelling.

For the Northern Waste Dumps, single point calculations were carried out for the following scenarios:

Bund Construction

- North East Waste Rock Dump bund construction at mine RL –40m (existing ground level)
- North East Waste Rock Dump bund construction at mine RL 0 (+40m to existing ground level)
- North West Waste Rock Dump bund construction at mine RL –40m (existing ground level)
- North West Waste Rock Dump bund construction at mine RL 0 (+40m to existing ground level)

Waste Rock Dumping

- North East Waste Rock Dump at mine RL –40m (existing ground level)
- North East Waste Rock Dump at mine RL 0 (+40m to existing ground)
- North West Waste Rock Dump at mine RL–40m (existing ground level)
- North West Waste Rock Dump at mine RL 0 (+40m to existing ground)

Note : The construction of the bunds will only occur during the day period.

Noise contour plots were only carried out for bund construction at the existing ground level and the dumping of waste rock behind a 20 metre bund, as these provide the range of noise emissions associated with the project.

These scenarios are representative of operations at the commencement of the dumps and also after approximately 18 months when the dumps will be approximately 40 metres above the existing ground levels.

As requested by the Department of Environment cumulative noise modelling was carried out for the existing Mining and the proposed Golden Pike Cutback at 20 metres below existing ground level

All calculations were carried out for the worst case conditions. For the Golden Pike operations calculations were carried out with the mining operations occurring at 20m below the existing ground level, as we believe this would be considered representative of noise emission from the Golden Pike operations over life of the project.

To show the cumulative effect of the waste dumps, the following cumulative noise contours were produced :

- North East Waste Rock Dump bund construction at mine RL –40m (existing ground level) with existing mining and Golden Pike (this would occur during the day period).
- North West Waste Rock Dump bund construction at mine RL –40m (existing ground level) with existing mining and Golden Pike (this would occur during the day period).
- Dumping at North East Waste Rock Dump at mine RL –40m (existing ground level) and behind 20 metre bund, with existing mining and Golden Pike.

- Dumping at North West Waste Rock Dump at mine RL –40m (existing ground level) and behind 20 metre bund, with existing mining and Golden Pike.

The noise contour plots are attached in Appendix B.

5.0 RESULTS

5.1 BUND CONSTRUCTION

The results of the single point calculations for the construction of the North Eastern and North Western Waste Rock Dumps together with the level of exceedance are shown in Tables 5.1 and 5.2.

TABLE 5.1 – NORTH EAST WASTE ROCK DUMP (NEWRD) – BUND CONSTRUCTION

Receiver Location	Day Assigned Noise Levels	Calculated		Exceedance	
		Existing Ground	+40m	Existing Ground	+40m
Baden Street Williamstown	**56**	62	62	6	6
Hewitt Street, Boulder	**53**	60	60	7	7
Short Street, Boulder	**51**	58	58	7	7

TABLE 5.2 – NORTH WEST WASTE ROCK DUMP (NWWRD) – BUND CONSTRUCTION

Receiver Location	Day Assigned Noise Levels	Calculated		Exceedance	
		Existing Ground	+40m	Existing Ground	+40m
Baden Street Williamstown	**56**	61	61	5	5
Hewitt Street, Boulder	**53**	65	65	12	12
Short Street, Boulder	**51**	64	64	13	13

Assigned Noise Levels for Day period 0700hrs to 1900hrs Monday to Saturday (Excluding Public Holidays)
Noise levels listed include a +5 dB(A) penalty for a tonal component.
Existing Ground = RL –40 / +40m Above Existing Ground = RL 0

With no bund in place or during the construction of the bund, noise received at noise sensitive premises could be considered tonal and could exceed the assigned day period noise level by up to 13 dB(A), given the relative noise level of the existing mining operations.

KCGM would restrict the construction of the bunds to the day period (0700 to 1900 hours Monday to Saturday, excluding public holidays). Construction of the bund will also be subject to other restrictions on operating times for dust control. This will also reduce the potential noise impacts on the community.

KCGM will use similar noise control measures proposed for the recently approved Loop Line noise bund, and will implement KCGM's Noise Management Plan to minimise noise impacts during construction of the Northern Waste Rock Dumps noise bund, to as low as reasonably practicable.

5.2 WASTE ROCK DUMPING

The results of the single point calculations for waste rock dumping behind a 10m bund together with the level of exceedance are shown in Tables 5.3 and 5.4.

TABLE 5.3 – NEWRD WITH 10m BUND – WASTE ROCK DUMPING

Receiver Location	Day Assigned Noise Levels	Calculated		Exceedance	
		Existing Ground	+40m	Existing Ground	+40m
Baden Street Williamstown	**56**	62	51	6	C
Hewitt Street, Boulder	**53**	59	47	6	C
Short Street, Boulder	**51**	57	47	6	C

TABLE 5.4 – NWWRD WITH 10m BUND – WASTE ROCK DUMPING

Receiver Location	Day Assigned Noise Levels	Calculated		Exceedance	
		Existing Ground	+40m	Existing Ground	+40m
Baden Street Williamstown	**56**	59	49	3	C
Hewitt Street, Boulder	**53**	59	49	6	C
Short Street, Boulder	**51**	52	48	1	C

Assigned Noise Levels for Day period 0700hrs to 1900hrs Monday to Saturday (Excluding Public Holidays)
Noise levels listed include a +5 dB(A) penalty for a tonal component
Existing Ground = RL –40 / +40m Above Existing Ground = RL 0
C = Complies with appropriate assigned noise level

The results of the single point calculations for waste rock dumping behind a 20m bund together with the level of exceedance are shown in Tables 5.5 and 5.6.

TABLE 5.5 –NEWRD WITH 20m BUND – WASTE ROCK DUMPING

Receiver Location	Overnight Assigned Noise Levels	20m Bund		20m Bund	
		Existing Ground	+40m	Existing Ground	+40m
Baden Street Williamstown	**46**	45	39	C	C
Hewitt Street, Boulder	**43**	39	36	C	C
Short Street, Boulder	**41**	38	34	C	C

TABLE 5.6 – NWWRD WITH 20m BUND – WASTE ROCK DUMPING

Receiver Location	Overnight Assigned Noise Levels	20m Bund No Bund		20m Bund	
		Existing Ground	+40m	Existing Ground	+40m
Baden Street Williamstown	**46**	40	37	C	C
Hewitt Street, Boulder	**43**	41	40	C	C
Short Street, Boulder	**41**	40	40	C	C

Assigned Noise Levels for night period 2200hrs to 0700hrs Monday to Saturday and 2200hrs to 0900hrs Sundays and Public Holidays.
Existing Ground = RL –40 / +40m Above Existing Ground= RL 0
C = Complies with appropriate assigned noise level

With a 10m differential between the top of the bund and the bench height, noise received within the town could, given the calculated noise level, be considered tonal at the start of the project when operating at the existing ground levels. However, as the height of the benches increases and differential in height between the top of the bund and the receivers increases, so does the barrier affect and noise received from dumping operations would decrease and would eventually no longer be considered tonal, and would comply with the regulatory requirements. Therefore, tonality has been included in the above calculations to assess the worst case condition. During the evening period or on a Sunday or Public Holiday dumping would not be allowed when westerly winds are present until the overall bench level is sufficient for compliance to be achieved under all wind conditions.

With at least a 20 metre relative bund height, noise received at noise sensitive premises would not be considered tonal, given the predicted noise level (with 20m bund) relative to the existing background noise levels (including the existing mining operations). Therefore, resultant noise levels predicted from the waste rock dump operations and equipment as part of this assessment would not be expected to be measurable and the adjustment for the tonal component would not apply.

5.3 CUMULATIVE NOISE EMISSIONS

As requested by the Department of Environment, cumulative noise modelling was carried out for the existing mining operations and the proposed Golden Pike Cutback. The noise contour plots are attached in Appendix B.

Tables 5.7 to 5.9 show the resultant noise levels received at the selected single point locations for the various operations modes of the Northern Waste Dumps compared to the cumulative noise level that would be received at those locations from the existing mining operations (including the Golden Pike Cutback).

TABLE 5.7 – BUND CONSTRUCTION AND MINING OPERATIONS

Receiver Location	Day Period Assigned Noise Levels	Calculated Noise Level (dB(A))		
		NEWRD	NWWRD	Mining Operations*
Baden Street Williamstown	**56**	62	61	57
Hewitt Street, Boulder	**53**	60	65	59
Short Street, Boulder	**51**	58	64	62

* Includes Existing mining and proposed Golden Pike cutback at 20m below existing ground level
Calculations include +5 dB(A) penalty for tonal component

TABLE 5.8 – DUMPING OPERATIONS BEHUND 10m BUND AND MINING OPERATIONS

Receiver Location	Overnight Assigned Noise Levels	Calculated Noise Level (dB(A))		
		NEWRD#	NWWRD#	Mining Operations*
Baden Street Williamstown	**46**	51 – 62	49 – 59	57
Hewitt Street, Boulder	**43**	47 – 59	49 – 59	59
Short Street, Boulder	**41**	47 – 57	48 – 52	62

\# Behind 10m bund
* Includes Existing mining and proposed Golden Pike cutback at 20m below existing ground level
Calculations include +5 dB(A) penalty for tonal component

TABLE 5.9 – DUMPING OPERATIONS BEHIND 20m BUND AND MINING OPERATIONS

Receiver Location	Overnight Assigned Noise Levels	Calculated Noise Level (dB(A))		
		NEWRD#	NWWRD#	Mining Operations*
Baden Street Williamstown	**46**	39 – 45	37 – 40	57
Hewitt Street, Boulder	**43**	36 – 39	40 – 41	59
Short Street, Boulder	**41**	34 – 38	40	62

Behind 20m bund
* Includes Existing mining and proposed Golden Pike cutback at 20m below existing ground level
Calculations include +5 dB(A) penalty for tonal component

During the construction of the bund, noise received at the neighbouring noise sensitive premises would be approximately the same as current noise levels. However, noise received from the dumping of waste rock at the dumps would be significantly below the noise received from existing operations.

It is also noted that in October 2000, background noise levels were measured with all of KCGM mining operations shut down and that in the eastern locations of Kalgoorlie-Boulder, these levels generally exceeded the Assigned Noise Levels for each area. For example, at Short Street, 43 dB(A) measured at 0349 Hrs on 24 October 2000 exceeds the night time Assigned Noise Level of 41 dB(A) for this location; refer Table 3.1.

It is noted that the existing mining operations could, with the inclusion of the tonal component, exceed the assigned night period noise level by up to 21 dB(A).

6.0 NOISE MANAGEMENT

Construction of the noise bund which will form the outer wall of the Northern Waste Rock Dumps will exceed the day-time assigned noise levels by up to 13 dB(A) and will require a Regulation 17 variation under the *Environmental Protection (Noise) Regulations 1997*. However, to minimise the noise impacts to as low as reasonably practicable, KCGM will implement similar noise control measures proposed for the recently approved Loop Line noise bund. Construction of the noise bund will be in accordance with KCGM's current Noise Management Plan.

To minimise noise emissions from construction of the Northern Waste Rock Dumps during the night period, either of the following are recommended:

1) The effective barrier height is maintained at least 20 metres between active dumping and residences.

   or

2) The dumping of waste is split between two benches, such that:-

   a) the number of trucks dumping at the upper bench is limited to less than 10% of the time, so that noise emissions need to comply with the L_{A1} assigned level; which is 10 dB(A) higher than the corresponding L_{A10} levels.

b) the remaining trucks dump at a lower bench.

c) the minimum barrier height is 10 and 20 metres, relative to the actual ground for the upper and lower benches respectively.

Operational constraints for the various operating conditions and wind directions are listed in Table A in Appendix A.

There are no specific engineering management controls recommended as a result of this study. However, in addition to the noise management measures listed above, general management practices are recommended as follows:-

1) Ensure the “quietest reasonably available” equipment is used on this site.

2) All mobile equipment used during construction be fitted with ‘Smart Alarms’.

3) Operator training in ‘least noisy’ operation of equipment and also awareness of proximity of residences.

4) Larger trucks to be utilised as feasible in order to reduce number of truck cycles.

For: **HERRING STORER ACOUSTICS**

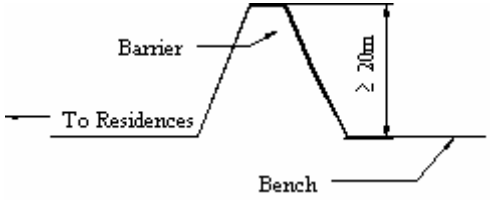
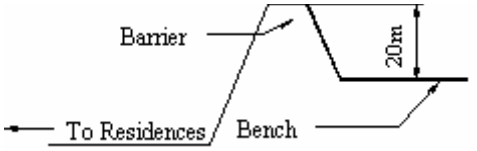
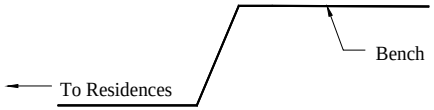
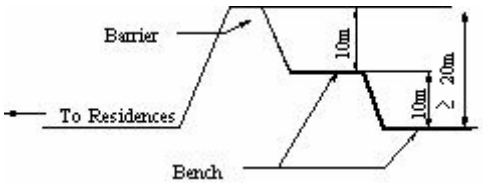
Tim Reynolds

31 July 2006

APPENDIX A

TABLE A – OPERATIONAL CONSTRAINTS

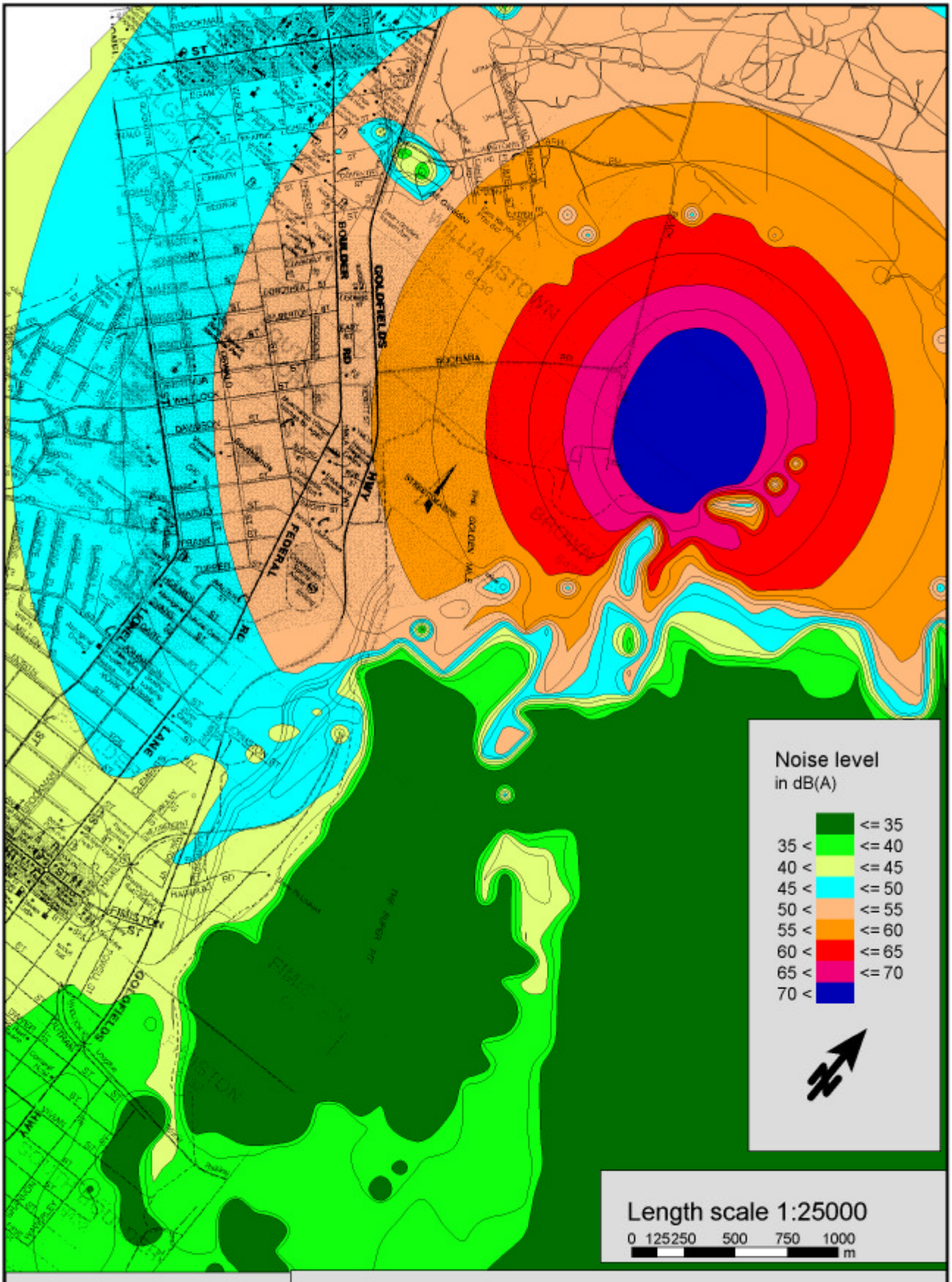
TABLE A - OPERATING RESTRICTIONS FOR KCGM WASTE DUMP OPERATIONS

Operating Scenarios		Restriction for Different Times of Day		
		Day*	**Evening#**	**Night▼**
At Ground Level Barrier Height Maintained at least 20 metres		Unrestricted	Unrestricted	Unrestricted
Above Ground Level Barrier Height between 10 and 20 metres		Unrestricted	Until Bench Sufficient Height Above Ground Restricted to winds from south to north west (via west)	Restricted to winds from south to north west (via west)
Above Ground Level Barrier Height between 10 and 0 metres (i.e. at top of barrier)		Restricted to Westerly Winds Only	Restricted to Westerly Winds Only	Exceeds under all wind conditions
Split Level Dumping Trucks on Top Bench Limited to less than 10% of time Barrier Height to Top Bench Maintained at 10 metres Barrier Height to Bottom Bench Maintained at 20 metres		Unrestricted	Unrestricted	Unrestricted

Day* 0700 – 1900 hours Monday to Saturday
Evening# 1900 – 2200 hours Everyday and 0900 – 1900 hours Sundays and Public Holidays
Night▼ 2200 – 0700 hours Monday to Saturday and 2200 – 0900 hours Sundays and Public Holidays

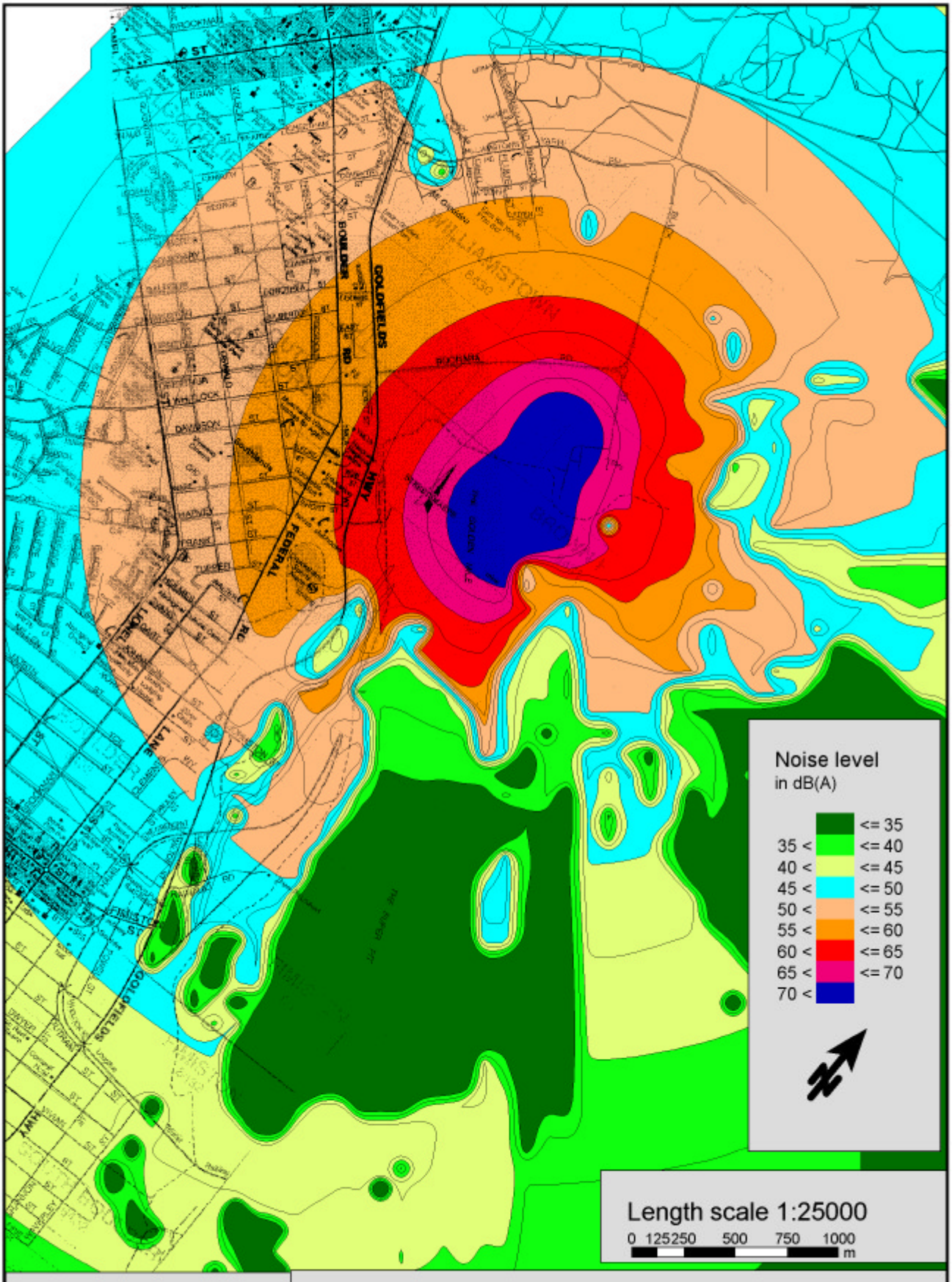
APPENDIX B

NOISE LEVEL CONTOURS



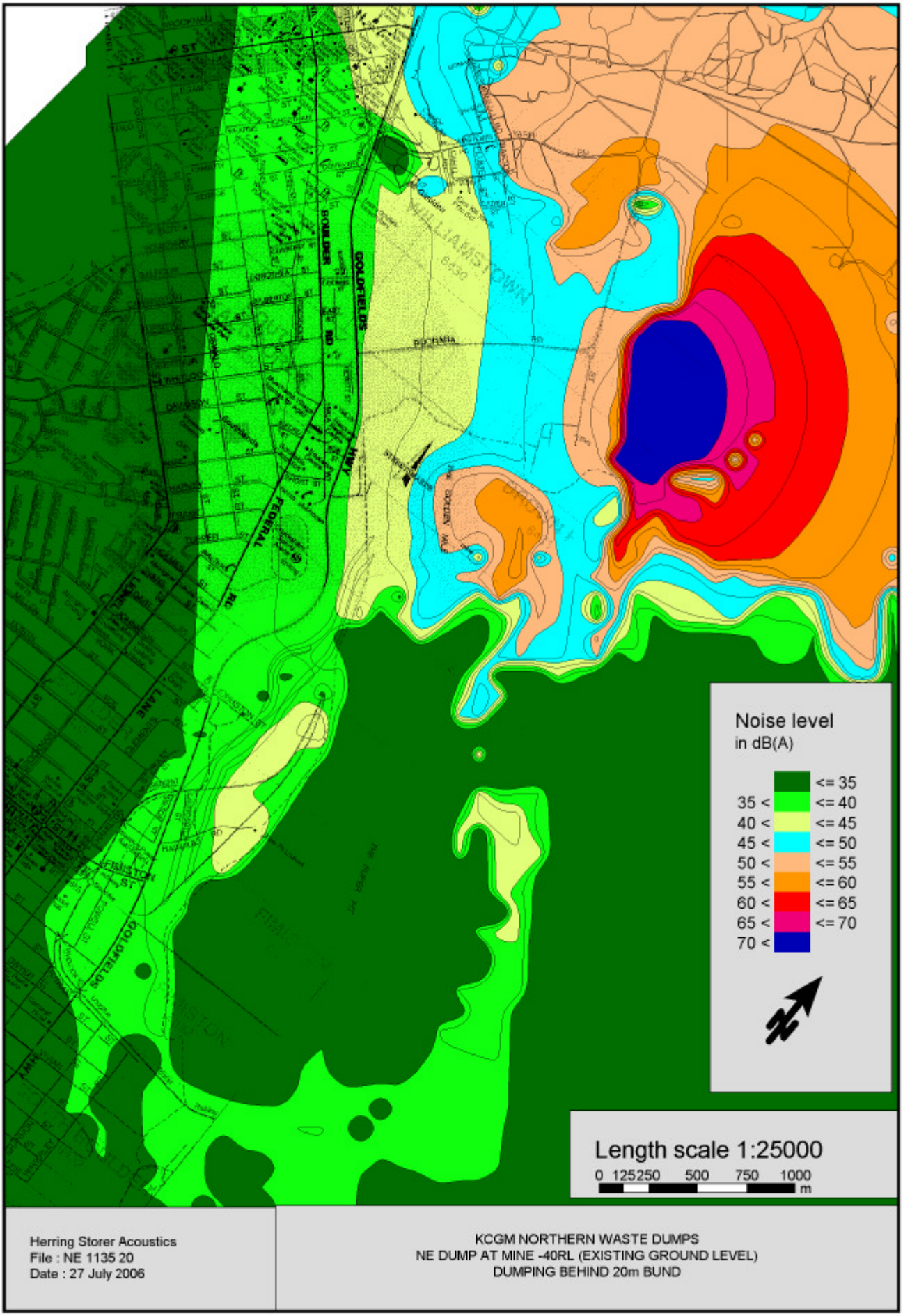
Herring Storer Acoustics
File : NE 1136 40
Date : 20 July 2006

KCGM NORTHERN WASTE DUMPS
NE DUMP AT MINE -40RL (EXISTING GROUND LEVEL)
BUND CONSTRUCTION



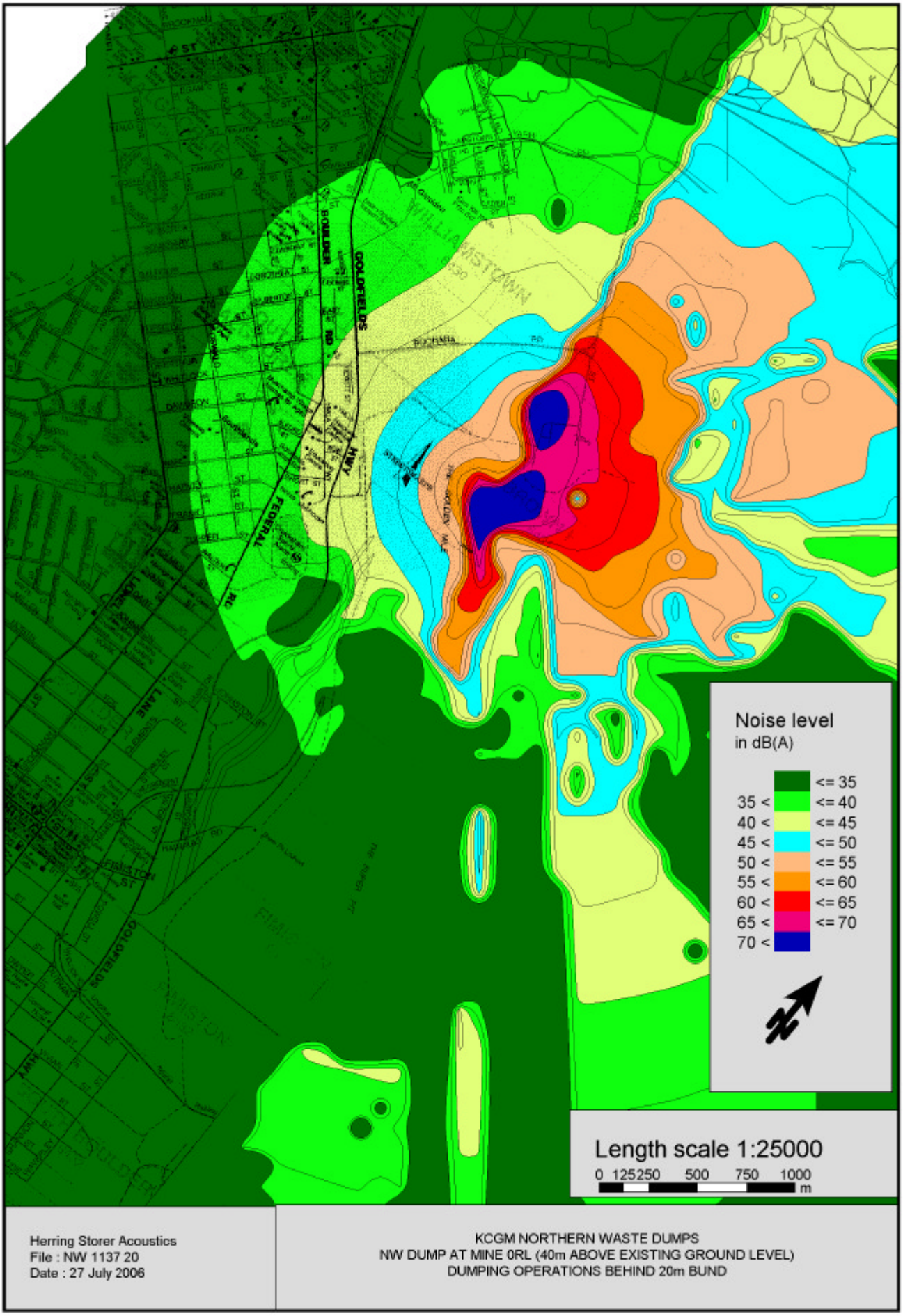
Herring Storer Acoustics
File : NW 1134 40
Date : 21 July 2006

KCGM NORTHERN WASTE DUMPS
NW DUMP AT MINE -40RL (EXISTING GROUND LEVEL)
BUND CONSTRUCTION



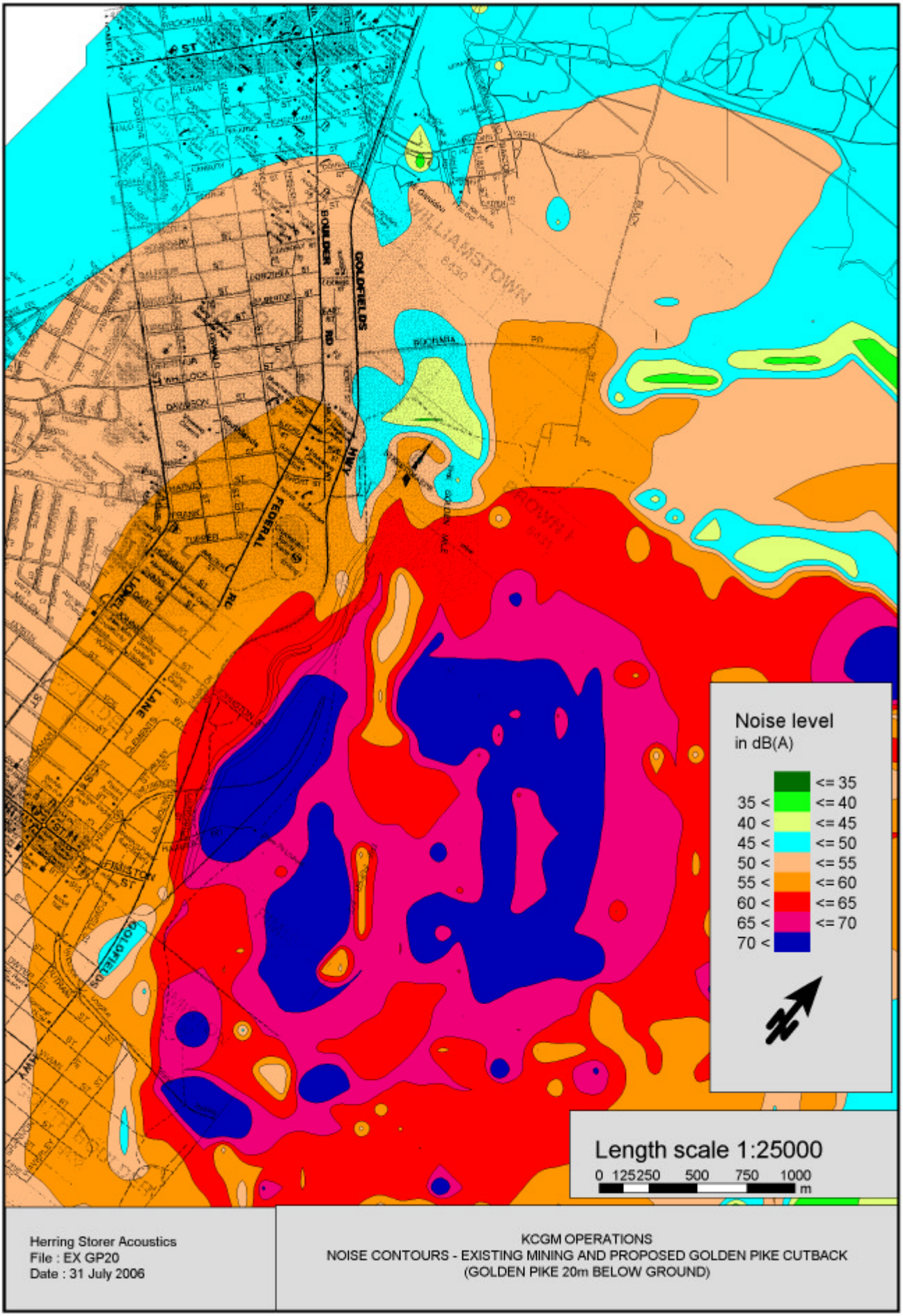
Herring Storer Acoustics
File : NE 1135 20
Date : 27 July 2006

KCGM NORTHERN WASTE DUMPS
NE DUMP AT MINE -40RL (EXISTING GROUND LEVEL)
DUMPING BEHIND 20m BUND



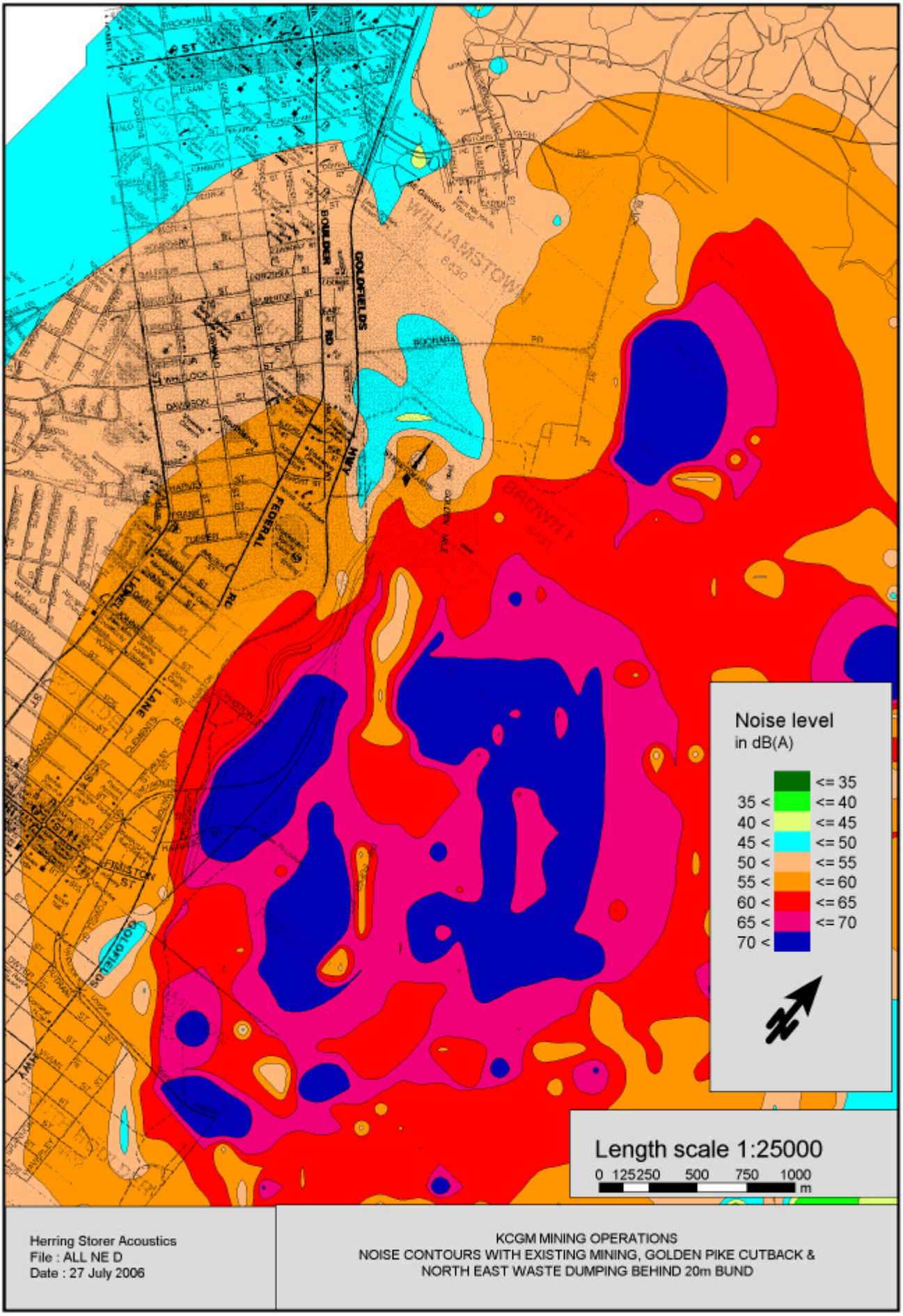
Herring Storer Acoustics
File : NW 1137 20
Date : 27 July 2006

KCGM NORTHERN WASTE DUMPS
NW DUMP AT MINE 0RL (40m ABOVE EXISTING GROUND LEVEL)
DUMPING OPERATIONS BEHIND 20m BUND



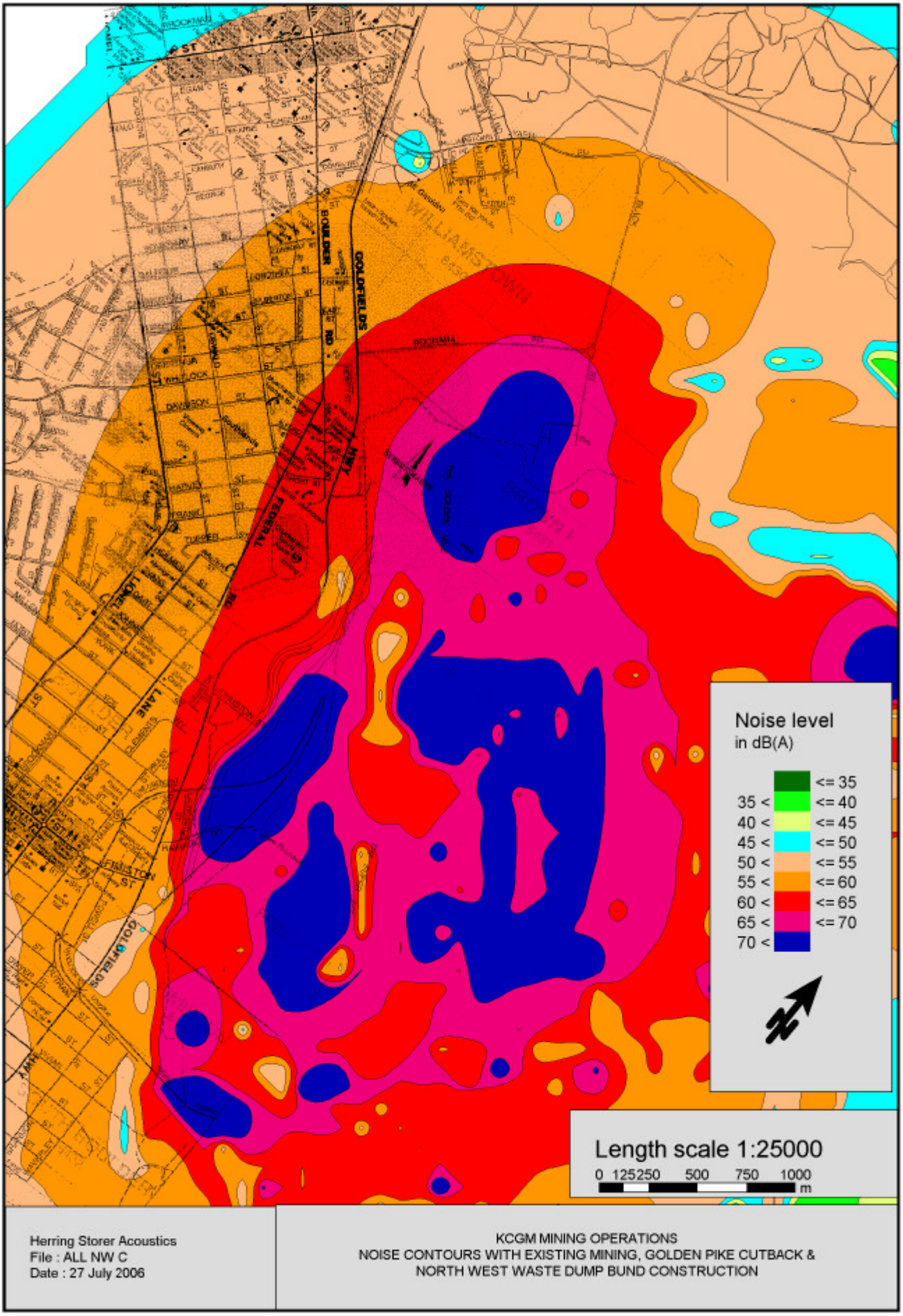
Herring Storer Acoustics
File : EX GP20
Date : 31 July 2006

KCGM OPERATIONS
NOISE CONTOURS - EXISTING MINING AND PROPOSED GOLDEN PIKE CUTBACK
(GOLDEN PIKE 20m BELOW GROUND)



Herring Storer Acoustics
File : ALL NE D
Date : 27 July 2006

KCGM MINING OPERATIONS
NOISE CONTOURS WITH EXISTING MINING, GOLDEN PIKE CUTBACK &
NORTH EAST WASTE DUMPING BEHIND 20m BUND

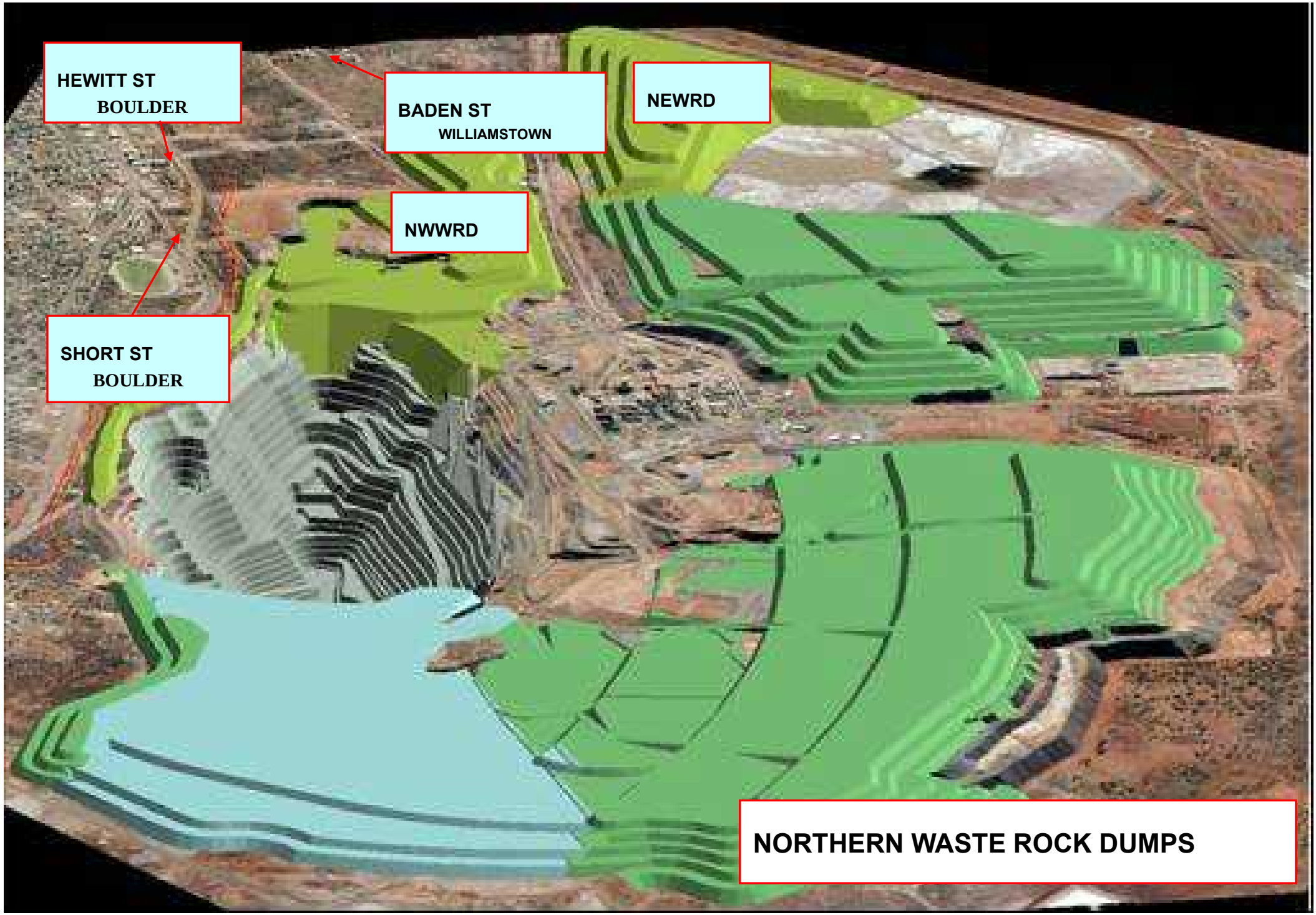


Herring Storer Acoustics
File : ALL NW C
Date : 27 July 2006

KCGM MINING OPERATIONS
NOISE CONTOURS WITH EXISTING MINING, GOLDEN PIKE CUTBACK &
NORTH WEST WASTE DUMP BUND CONSTRUCTION

APPENDIX C

AERIAL GRAPHIC
FINAL PIT & WASTE ROCK DUMPS


HEWITT ST
BOULDER
BADEN ST
WILLIAMSTOWN
NEWRD
NWWRD
SHORT ST
BOULDER
NORTHERN WASTE ROCK DUMPS