ATTACHMENT 5

NOISE ASSESSMENT

41.4303.R8:ZSC

30th June, 2011

Optima Developments Pty Ltd
PO Box 3136
UMINA BEACH NSW 2257

Attention: Mr C. Oliver

ACOUSTIC ASSESSMENT
PROPOSED SUBDIVSION AT
76 BERKELEY ROAD, FOUNTAINDALE

The purpose of this report is to present the results and findings of an acoustical assessment of the noise intrusion from industrial premises in Enterprise Park and road traffic on Berkeley Road.

We are instructed an application to Wyong Shire Council for rezoning of Lot 504 DP 1134328, Berkeley Road, Fountaindale, was prepared by Optima Developments Pty Ltd (Town Planning and Development Consultants). Following a review of the application the Council requested the provision of additional material relating to noise.

In an extract from the Council's desktop assessment the following matters pertaining to noise were raised:

Part of the land is zoned 7(f) Environmental Protection. As mentioned under "Site History and Land Uses" section of this report, this zone was established to restrict the scale of development on landing at major noise generators. In this instance the likely noise sources are from industrial premises located in the Corella Close. Manns Road and Apprentice Drive industrial areas. In addition, traffic noise from enterprise drive and Berkeley Road also plays a part in the cumulative impact of noise.

THE ACOUSTIC GROUP

20-22 FRED STREET, LILYFIELD, 2040, NSW, AUSTRALIA
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Additional noise affecting this development is likely to arise from general traffic noise from those roads indicated above. In addition, noise from vehicle movements within the industrial area, public address systems and machinery operation will affect the development.

It is clear that the noise issue will need to be resolved through a consultant noise assessment study in order to ensure that this issue is properly addressed. Noise impacts and appropriate mitigation measures will need to be assessed and/or be incorporated into future development design and/or conditions of approval.

The Site

The proposed subdivision (shown in Appendix A) involves land on either side of Berkeley Road with the topography of the land being relatively flat on the northern side of the road and rising at the southern extremities of the subdivision.

The portion of Berkeley Road bisecting the site is a low point in the road in that on either side of the proposed subdivision the topography of the land causes the road to rapidly gain elevation.

Acoustic Criteria – Industrial Noise

In 2003 an extensive acoustic assessment in relation to residential development for Glenning Valley (between Berkeley Road/Bottlebrush Drive and Enterprise Drive) was undertaken by Steven Cooper Acoustics (for Optima Developments) and identified existing and predicted noise emission contours from the Berkeley Vale Industrial Estate (also referred to as Enterprise Park). Subsequent development applications for properties along Berkeley Road have referred to the 2003 report and measurements by Wilkinson Murray (for Council) and Reverb Acoustics (for Lot 50 DP 755263).

An acoustic assessment prepared by Wilkinson Murray for the Council (in 1993 and 1994) and reviewed by Challis Consulting (in 1993 and 1994) identified predicted noise contours for an existing situation and also a future scenario. The Wilkinson Murray study considered the complete utilisation of the industrial zone area incorporating the roads nominated by Council and nominated noise contributions in terms of seven industrial zones upon which the cumulative noise impact from all the industrial activities was determined.

In terms of the subject site the future scenario nominated a daytime and night time noise level of between 25 and 30 dB(A).

The 2003 acoustic assessment by Steven Cooper Acoustics confirmed the predicted levels for the industrial area by was of attended and unattended noise monitoring resulting in a noise contour as to the extent of residential development consistent with the noise studies and EPA noise policies.

For the purpose of this assessment advice was sought from Council as to the assessment of noise from the industrial area. Subsequent advice received in May 2011 was to utilise the Amenity Criteria in Table 2.1 of the EPA's *Industrial Noise Policy*.

If the proposed subdivision is considered to result in the site being classified as a suburban area then the Amenity Noise targets for all industrial noise sources are 55 dB(A) in the day, 45 dB(A) in the evening and 40 dB(A) at night.

If the proposed subdivision is considered to result in the site being classified as a rural area then the Amenity Noise targets for all industrial noise sources are 50 dB(A) in the day, 45 dB(A) in the evening and 40 dB(A) at night.

The Wilkinson Murray predicted noise levels from the industrial operations when assessed at the subject site are significantly less than the noise targets nominated by the EPA in their *Industrial Noise Policy* document. Therefore the development of a residential subdivision would not cause any restrictions or limitations on the current or future operations in the industrial area.

Acoustic Criteria – Road Traffic Noise

In relation to road traffic noise Berkeley Road connects two major arterial roads (Enterprise Drive and Wyong Road) and therefore in noise terms is considered to be a collector road rather than a local road by reference to the EPA's *Environmental Criteria for Road Traffic Noise* ("ECRTN") document.

The ECRTN provides road classifications in terms of noise impact and as such is different to road classifications used by traffic engineers.

Table 1 in the ECRTN sets out recommended Leq noise criteria for different classifications of roads and various types of developments. The table sets out noise targets for the daytime period (7 AM to 10 PM) and night time (10 PM to 7 AM) and where the criteria will already exceeded there is a permissible increase to the existing level.

The table below provides the relevant extracts from Table 1 of the ECRTN to show the noise limits for arterial, collector and local road.

TYPE OF DEVELOPMENT	DAY (7am – 1opm) dB(A)	NIGHT (10pm – 7am)	WHERE CRITERIA ARE ALREADY EXCEEDED
2. New residential land use developments affected by freeway/arterial traffic noise	$L_{Aeq(15\ hr)}$ 55	$L_{Aeq(9hr)}$ 50	Where feasible and reasonable, existing noise levels should be reduced to meet the noise criterion via judicious design and constructions of the development. Locations, internal layouts, building materials and construction should be chosen so as to minimise noise impacts.

5. New residential developments affected by collector traffic noise	$L_{Aeq(1\ hr)}$ 60	$L_{Aeq(9hr)}$ 50	Where feasible and reasonable, existing noise levels should be reduced to meet the noise criterion via judicious design and constructions of the development. Locations, internal layouts, building materials and construction should be chosen so as to minimise noise impacts.
11. New residential developments affected by traffic noise from local roads	$L_{Aeq(1\ hr)}$ 55	$L_{Aeq(1hr)}$ 50	Where feasible and reasonable, existing noise levels should be reduced to meet the noise criterion via judicious design and constructions of the development. Locations, internal layouts, building materials and construction should be chosen so as to minimise noise impacts.

Measurement Techniques

For the purpose of assessing the existing noise levels at the subject site a site visit was carried out on the evening of Monday 2nd May 2011 to install a noise logger on the northern portion of the subdivision (closest to the industrial area) and during the installation of the logger conduct attended measurements.

A return site visit occurred on the afternoon of Monday 9th May 2011 to retrieve the noise logger and conduct attended measurements.

The locations of both the attended and unattended measurements are set out in Appendix A.

Measurements were taken in accordance with the Australian Standard AS1055 *"Acoustics - Description and Measurement of Environmental Noise"* and the requirements of the noise measurement survey sheets contained in the *"Environment Protection Authority - Environmental Noise Control Manual"* and the ambient background measurement procedures set out in Appendix B of the EPA's *Industrial Noise Policy*.

The attended sound level measurements were recorded using a NATA Calibrated Brüel & Kjær 2260 Sound Level Meter (serial No. 1772289). The reference calibration level of the meter was checked prior to and after measurements using a Brüel & Kjær Sound Level Calibrator Type 4231 and exhibited no system drift. The NATA Calibration of the sound level meter is current.

The unattended sound level measurements were recorded using two Svan 957 Sound Level Meters. Each meter was set to record statistical sound level measurements utilising standard 15 minute periods as required by the DECCW. The reference calibration level of the logger was checked prior to and after measurements using a Brüel & Kjær Calibrator type 4231 and exhibited no system drift.

Measurement Results

At the installation of the noise logger no noise from the industrial area could be detected with the ambient background level being influenced by general broad band traffic noise from Enterprise Drive to the north.

The attended measurements found a background level of 39 dB(A) from distant traffic and a Leq level of 47 dB(A). Similar levels were obtained during the retrieval of the noise logger.

A graphical representation of the dB(A) noise level over time for the two 15 minute sample measurements and the resultant statistical noise levels are set out in Appendix B.

The results of the unattended noise logger in terms of the A-weighted 15 minute statistical levels are provided in graphical format in Appendix C for the 7 days of monitoring with the table of results on page C1 in Appendix C providing ambient background levels in accordance with the INP procedures for long-term noise monitoring and also include the traffic noise Leq levels both in terms of the 15 hour/9 hour assessment periods for arterial roads and the maximum and minimum 1 hour levels. The maximum level of 71 dB(A) was not associated with traffic but assumed to be associated with cows on the subject lot that tool an interest in the logger when being installed.

The ambient background levels provided in the table of logger results in Appendix C are the as measured data, whereas the road traffic noise levels being recorded in the free field have an additional +2.5 dB(A) "façade correction" to determine the noise level if assessed adjacent to the facade of the building.

The table of results in Appendix C reveal the existing ambient background levels to be significantly below the amenity noise targets nominated in the INP and as the industrial noise was inaudible in the acoustic environment at the time of the installation and retrieval of the logger the resultant contribution from industrial premises is similar to that predicted by Wilkinson Murray.

Appendix D identifies the octave band L90 levels and octave band Leq levels for the INP assessment periods from the entire one week of data. Also are attached graphical results of the octave band L90 and Leq levels for one of the sample days.

In terms of traffic noise if Berkeley Road is considered to be an arterial/sub-arterial road then the existing noise levels for both the day time and night time periods are below the recommended noise target for new residences in proximity to such roads. The logger position was in line with the existing building on the adjoining property to the east and on a 3dB per doubling basis for road traffic noise be provision of a building on that alignment, or up to half the distance between the existing building alignment and the edge of the road would result in noise levels less than that recommended in the ECRTN for an arterial/sub-arterial road and therefore no additional noise controls would be required for such residential dwellings.

Such a position relates to a 20 metre setback from the side boundary, which we have been advised is the set back nominated by Council for the subdivision.

If Berkeley Road was considered to be a Collector Road in terms of the ECRTN definitions then there is a requirement to determine the upper 10 percentile of the traffic Leq 1 hour levels for the day and night time periods. A calculation of the logger results reveals an existing upper 10 percentile Leq level of 49 dB(A) in the day and 48 dB(A) at night for the logger position (without facade correction).

Consideration of a facade corrected level at the nominated minimum setback of 20 metres from the front boundary would result in an upper 10 percentile one hour Leq level of 55 dB(A) for the day and 54 dB(A) for the night. Both of these levels are less than the recommended ECRTN limits for new residential developments affected by collector traffic noise.

Accordingly for the nominated setback there is no need for any additional noise controls as a result of road traffic noise from Berkeley Road under the ECRTN requirements.

It is proposed from 1 July 2011 that the Department of Environment Climate Change & Water will utilise a replacement traffic noise policy identified as *NSW Road Noise Policy.*

In terms of road traffic noise at residential premises the same criteria as set out in the ECRTN will apply and therefore there would be no change with respect to noise controls.

Conclusions

An application for a subdivision of 76 Berkeley Road, Fountaindale was reviewed by officers of Wyong Shire Council leading to the request for an acoustic assessment to accompany the subject application.

Council considered there was a need to address noise from the existing industrial area to the north and also noise from traffic on Berkeley Road.

A previous assessment with respect to the Glenning Valley utilised the results of a noise planning document for the industrial precinct developed for Council and supplemented by attended monitoring to confirm the extent the magnitude of noise from the industrial area. The noise planning study carried out for Council indicated that with the full utilisation of the industrial area to the north there would be no acoustic impact with respect to the subject subdivision, and more importantly the provision of residential dwellings on the subdivision would not impinge or restrict the industrial operations.

A site visit to install a noise logger during the evening period found no audible noise from the industrial precinct, that the background noise was from distant traffic on Enterprise Drive and confirmed the view that industrial noise was not an issue.

The results of attended measurements and unattended measurements on the northern portion of the subdivision was set back from the road boundary so as to ascertain any contribution from industrial or distant traffic sources, apart from traffic on Berkeley Road. The results of the measurements when adjusted to include the facade correction required under the road traffic noise policies used by the DECCW and considering a location being 20 metres from the front boundary (nominated as the minimum setback) reveals road traffic noise levels less than that specified by the EPA/DECCW for new residential dwellings adjacent to a sub arterial road or a collector road.

Accordingly no additional noise control measures to address road traffic noise or industrial noise are required for the residential dwellings that may be erected on the proposed subdivision at 76 Berkeley Road, Fountaindale.

Yours faithfully,

THE ACOUSTIC GROUP PTY LTD

STEVEN E COOPER

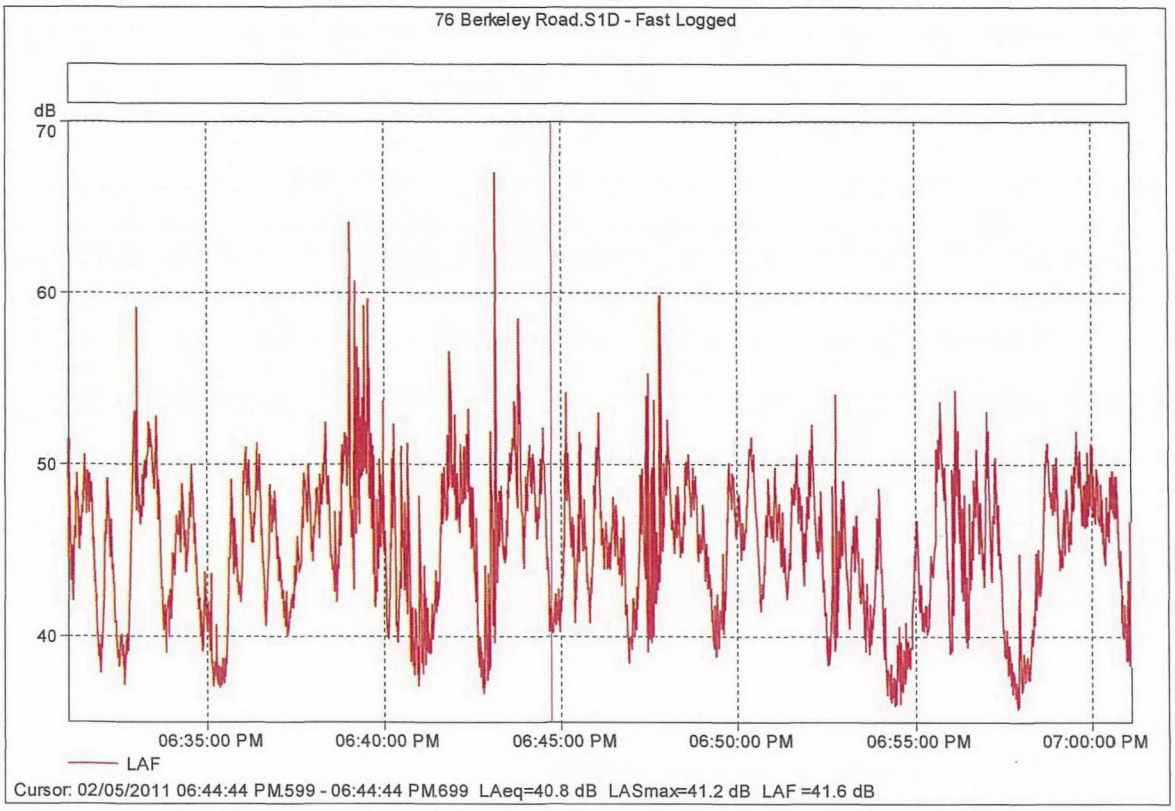
APPENDIX A: Site and Measurement Locations

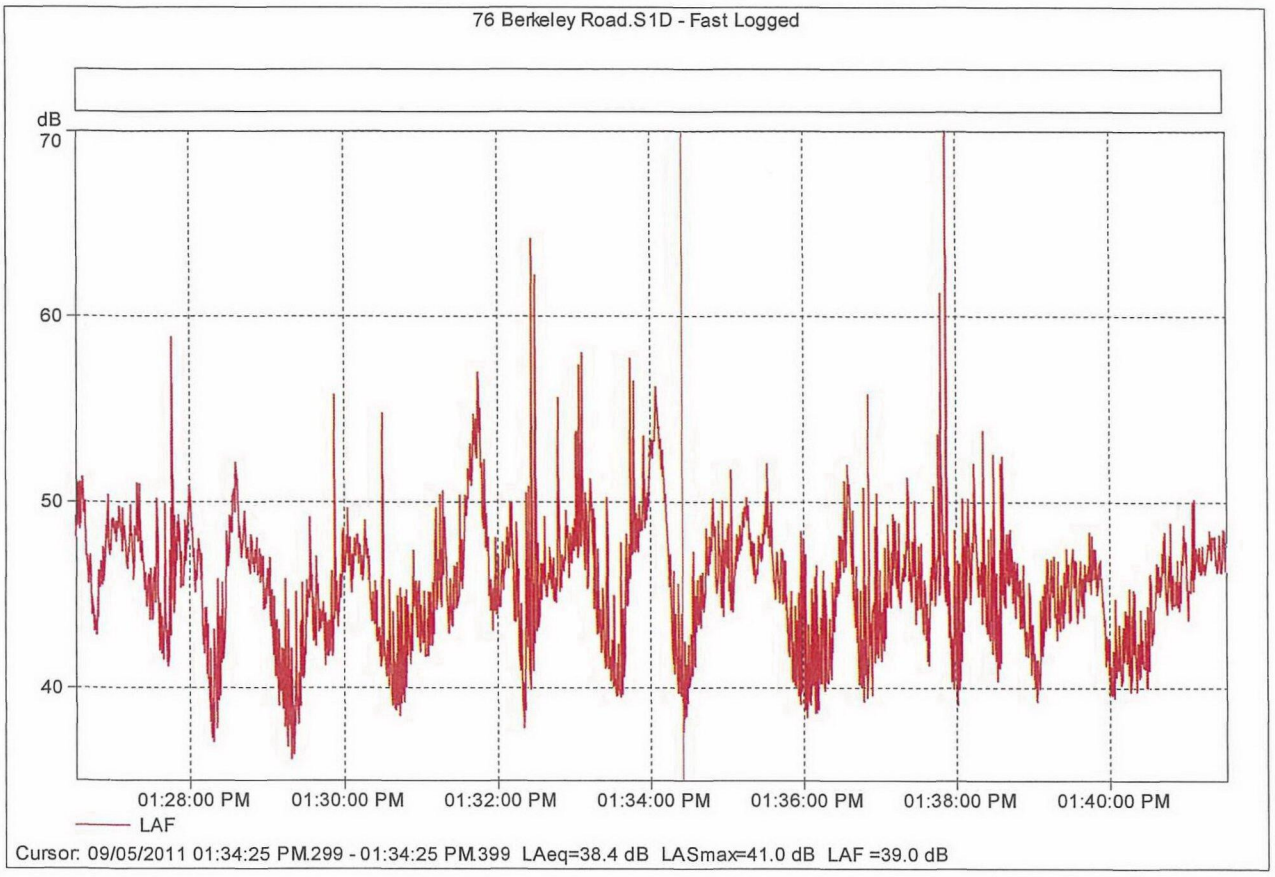

Site

Attended measurement location

Logger location

APPENDIX B: Attended Measurement Results





		A-weighted Octave Band Centre Frequency (Hz)								
	dB(A)	**31**	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
2nd May 2011										
Ambient L10	50	<24	35	39	37	40	46	44	36	27
Ambient Leq	47	<24	31	37	34	37	42	40	34	29
Ambient Background L90	39	<24	25	30	30	32	33	29	26	<24
9th May 2011										
Ambient L10	49	<24	35	37	35	37	45	43	40	31
Ambient Leq	48	11	32	36	35	37	42	42	40	32
Ambient Background L90	41	<24	25	29	27	30	35	34	31	<24

APPENDIX C: Noise Logger Results

76 Berkley Road

Job Number:	4303.R8		
Instrumentation:	SVAN 957 Logger		
Logger Location:	building alignment set back from road		
Free Field:	yes		
Monitoring Period:	Monday 2 May 2011	to	Monday 9 May 2011

BACKGROUND AND AMBIENT NOISE MONITORING RESULTS
NSW EPA's INDUSTRIAL NOISE POLICY , 2000

Day	L90 Background Noise Levels			Leq Ambient Noise Levels		
	Day 7am - 6pm	Evening 6pm - 10pm	Night 10pm - 7am	Day 7am - 6pm	Evening 6pm - 10pm	Night 10pm - 7am
Monday 2 May 2011	*	36.0	32.8	*	*	44.0
Tuesday 3 May 2011	40.8	35.6	35.6	49.1	46.0	45.2
Wednesday 4 May 2011	41.5	34.9	33.1	49.5	45.8	44.1
Thursday 5 May 2011	43.3	34.2	34.8	50.0	45.8	44.6
Friday 6 May 2011	41.5	35.8	35.5	58.6	46.6	43.3
Saturday 7 May 2011	40.7	42.3	38.5	48.4	47.0	45.1
Sunday 8 May 2011	40.0	36.8	34.3	47.9	45.9	44.9
RBL Median	**41.2**	**35.8**	**34.8**	-	-	-
Log Average	-	-	-	**52.7**	**46.2**	**44.5**

TRAFFIC NOISE MONITORING RESULTS
NSW EPA's ENVIRONMENTAL CRITERIA FOR ROAD TRAFFIC NOISE, 1999

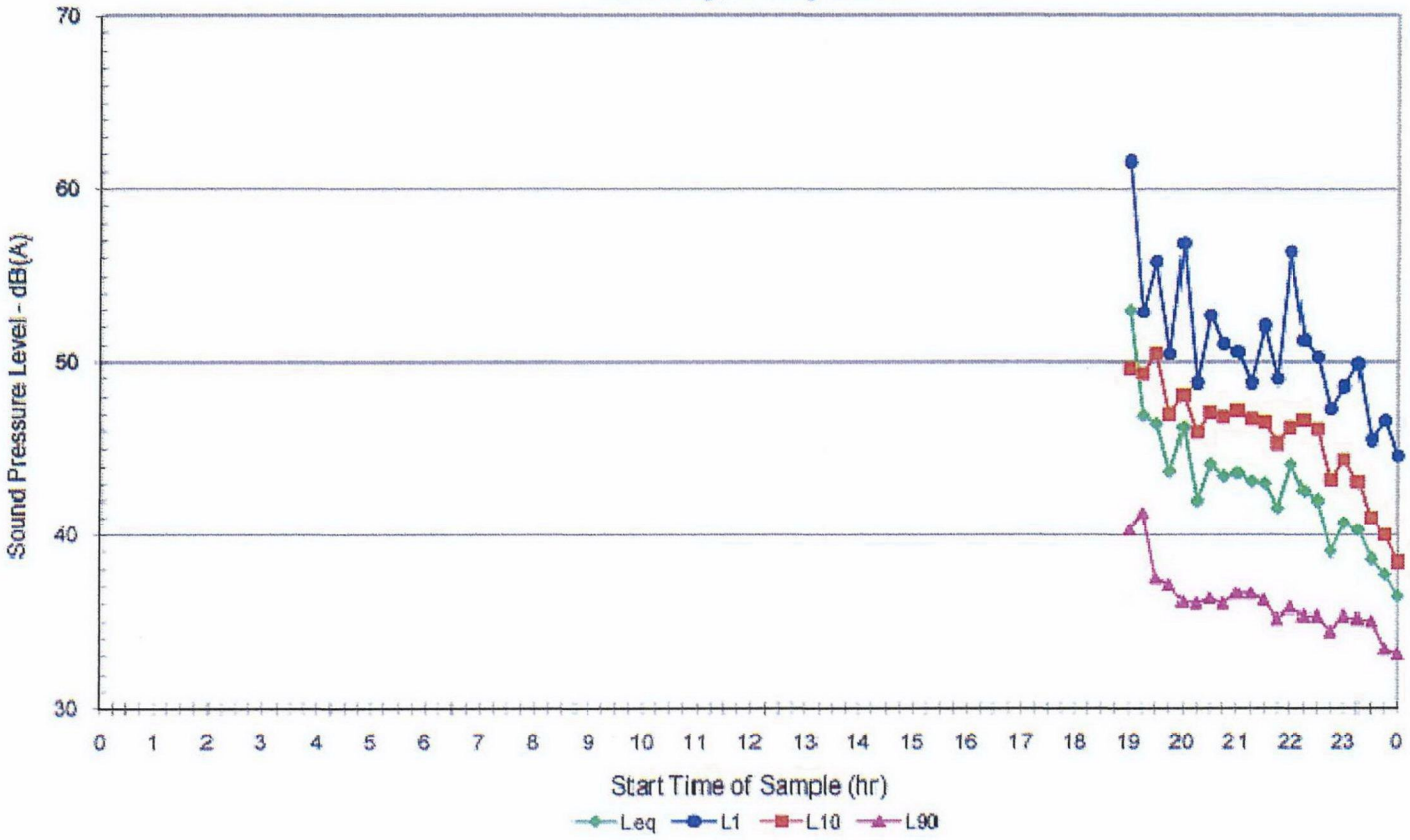
Day	Leq Ambient Noise Levels		Leq 1 Hr Noise Levels			
	Day 7am - 10pm	Night 10pm - 7am#	Day - Max	Day - Min	Night - Max	Night - Min
Monday 2 May 2011	41.7	46.5	51.5	*	51.7	39.7
Tuesday 3 May 2011	51.0	47.7	53.5	47.3	52.5	42.3
Wednesday 4 May 2011	51.3	46.6	53.5	45.8	51.8	39.4
Thursday 5 May 2011	51.7	47.1	53.9	45.5	51.3	41.3
Friday 6 May 2011	59.8	45.8	71.0	45.6	46.9	44.5
Saturday 7 May 2011	50.5	47.7	51.8	47.4	49.5	44.9
Sunday 8 May 2011	49.9	47.4	51.4	46.6	53.3	39.8
Monday 9 May 2011	48.0	*	53.3	*	*	*
Log Average	**53.2**	**47.1**	**62.4**	**46.4**	**51.4**	**42.1**

* indicates an incomplete set of data for a given time period

Nighttime for a given day continues through to the following morning

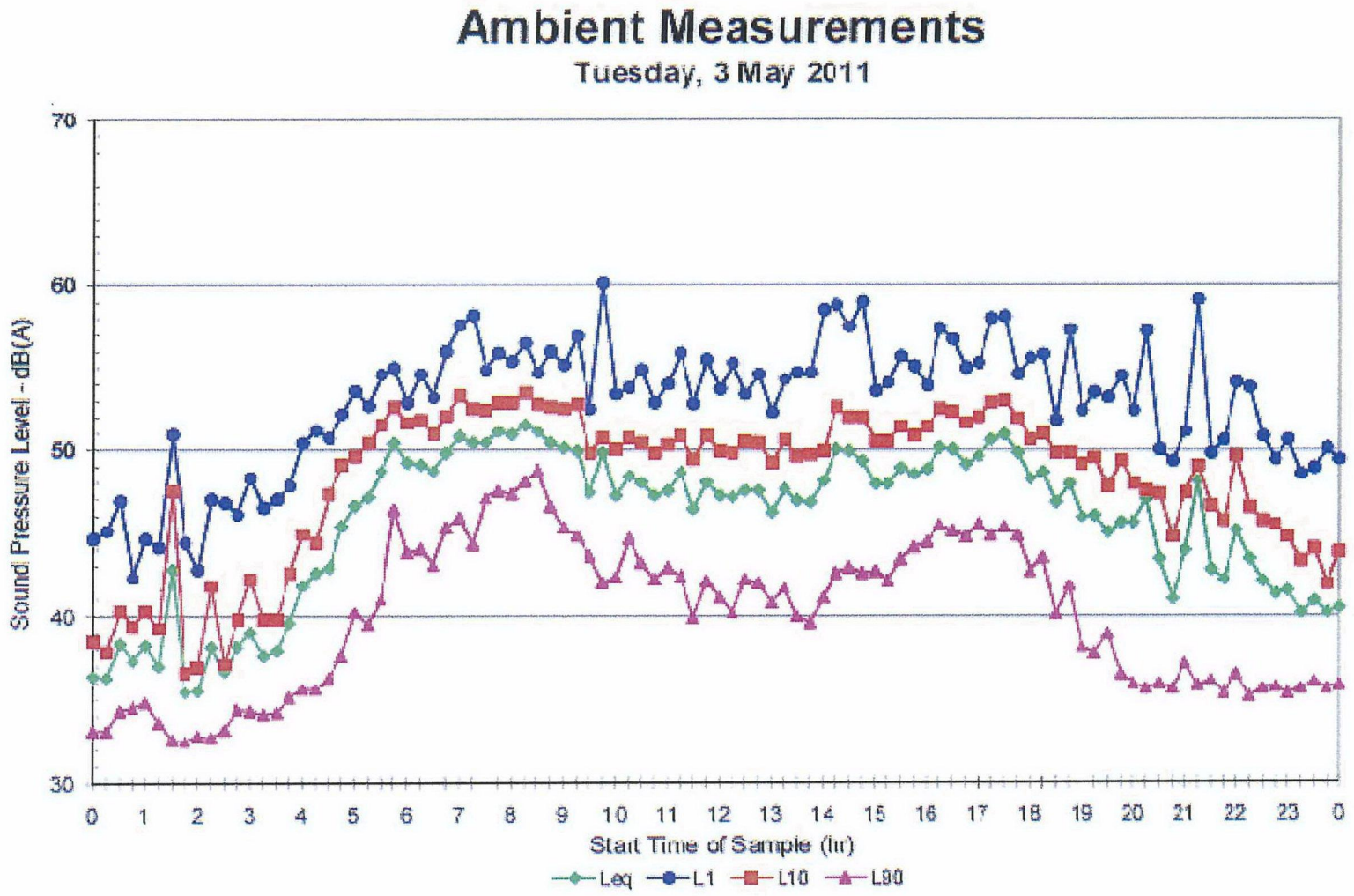
Ambient Measurements

Monday, 2 May 2011



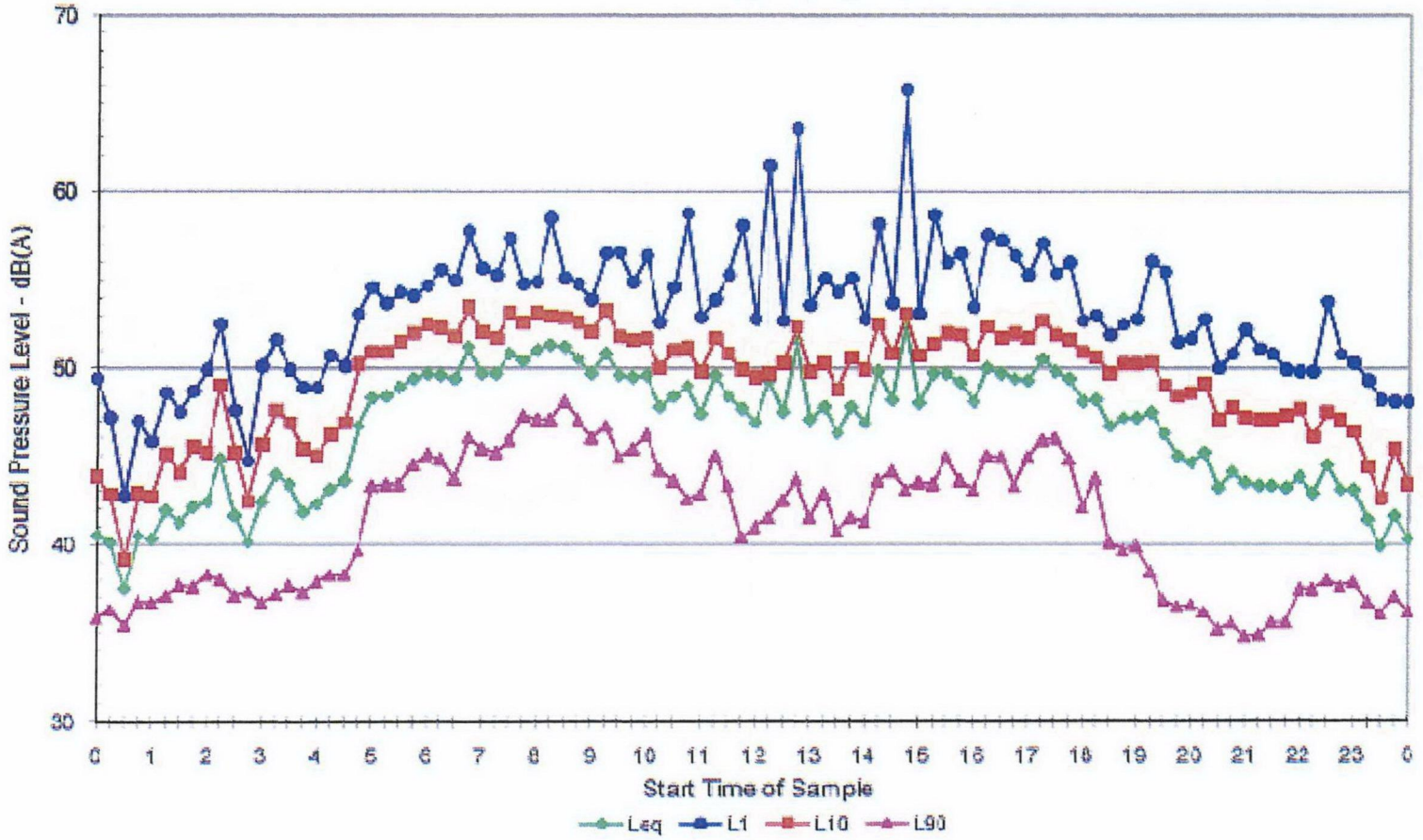
76 Berkley Road
SVAN 957 Logger

4303.R8
building alingment set back from road


Ambient Measurements
Tuesday, 3 May 2011
Sound Pressure Level - dB(A)
70
60
50
40
30
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 0
Start Time of Sample (hr)
Leq L1 L10 L90
76 Berkley Road
SVAN 957 Logger
4303.R8
building alingment set back from road

Ambient Measurements

Wednesday, 4 May 2011

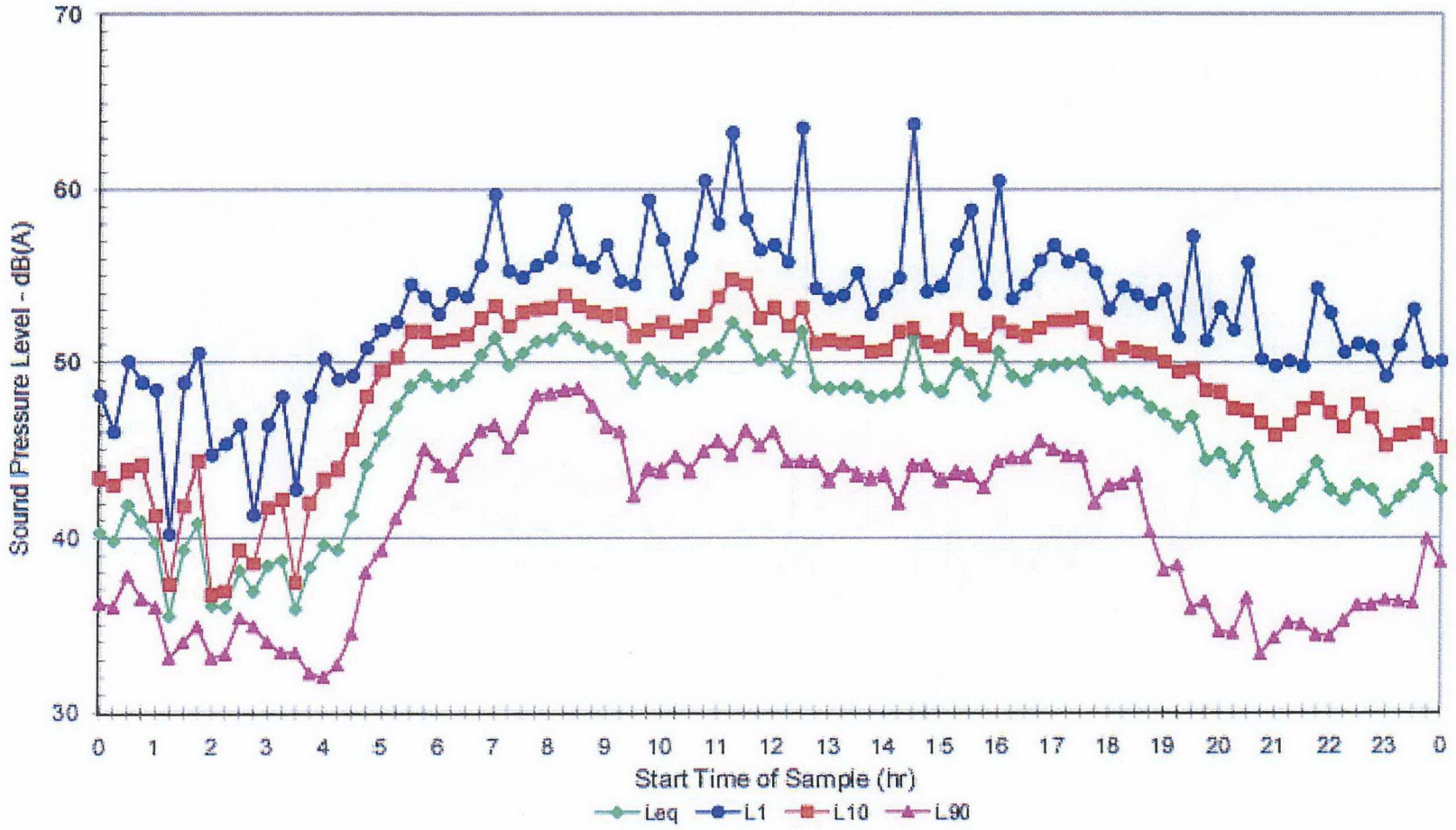


76 Berkley Road
SVAN 957 Logger

4303.R8
building alingment set back from road

Ambient Measurements

Thursday, 5 May 2011

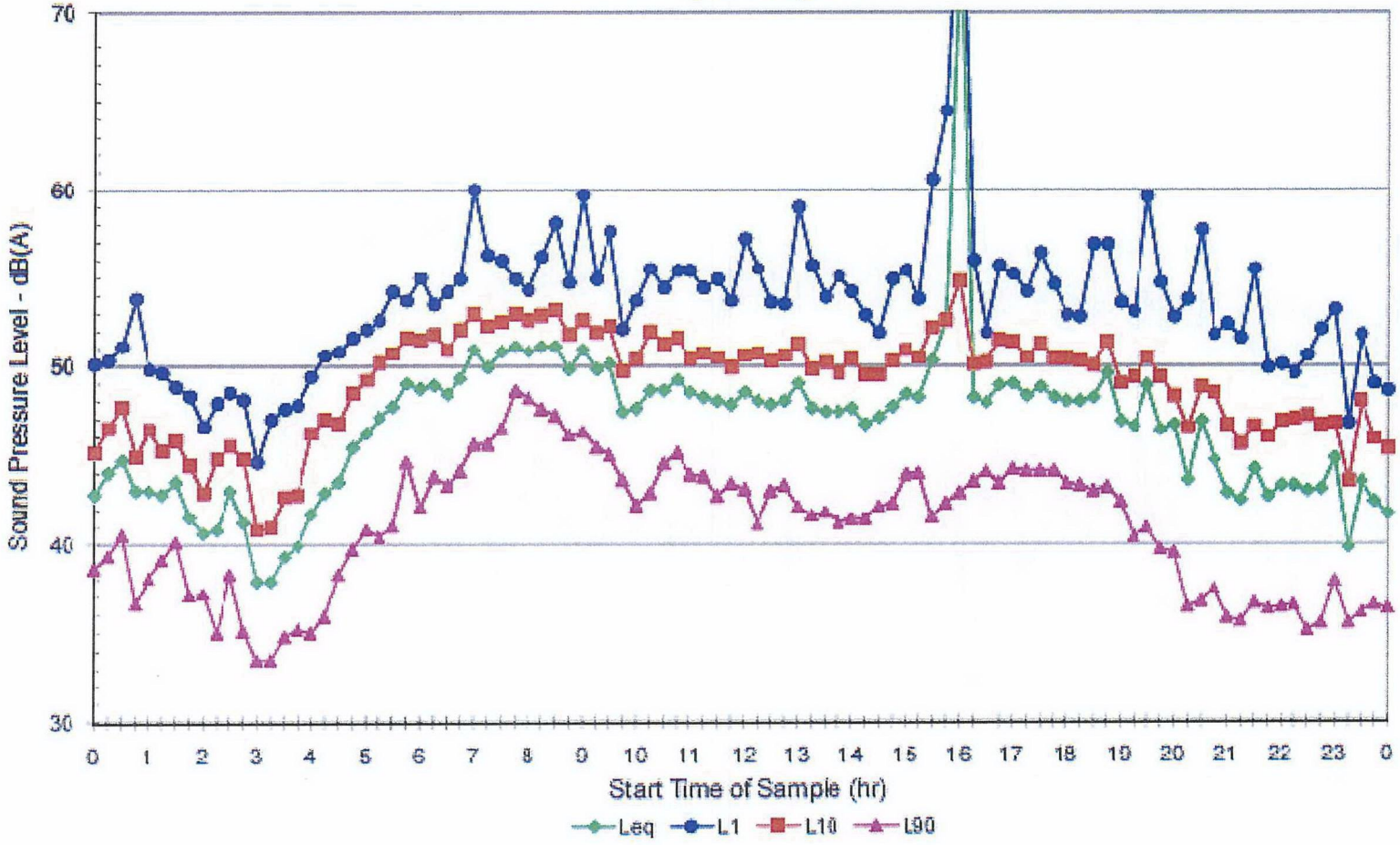


76 Berkley Road
SVAN 957 Logger

4303.R8
building alingment set back from road

Ambient Measurements

Friday, 6 May 2011

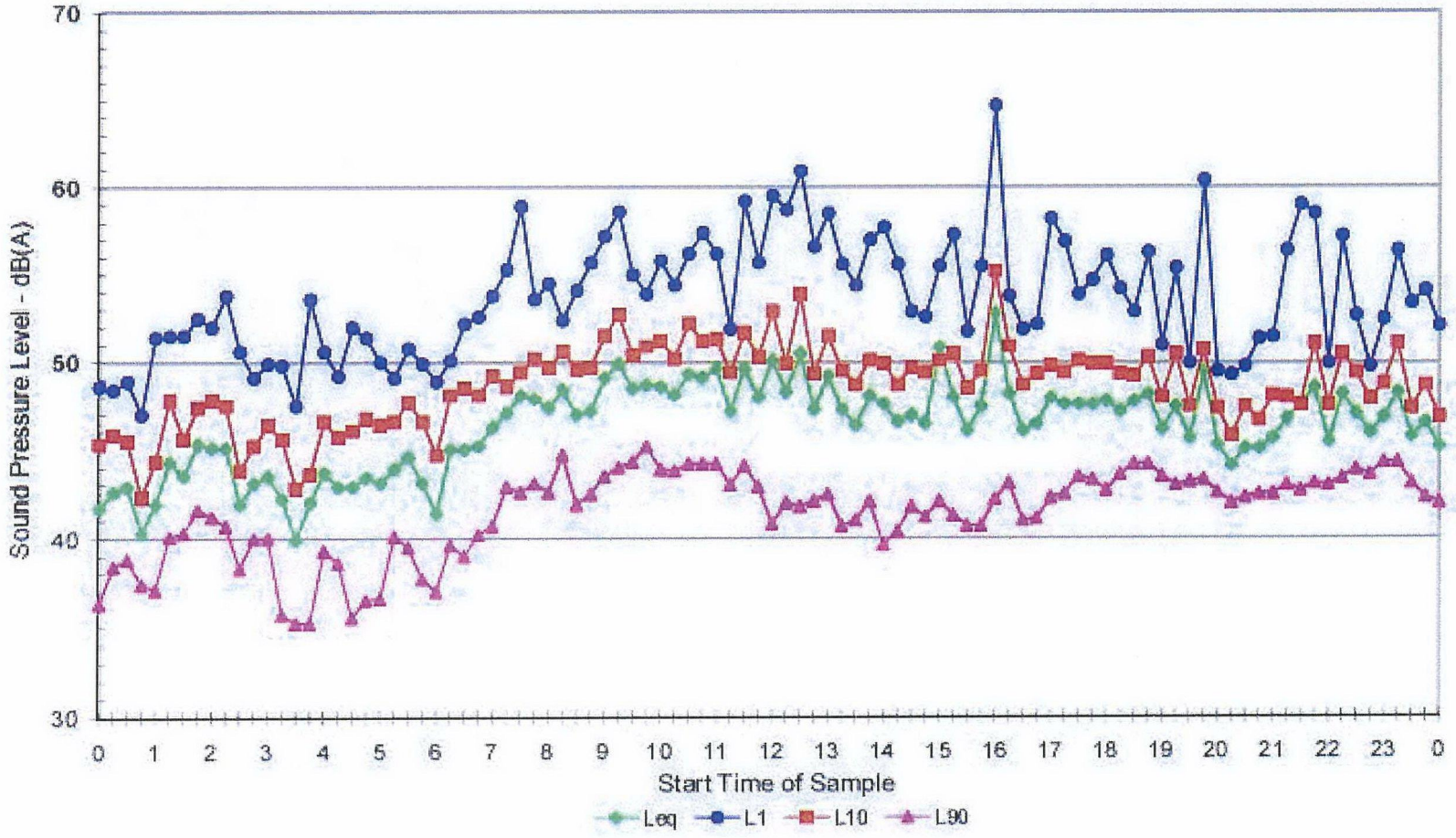


76 Berkley Road
SVAN 957 Logger

4303.R8
building alingment set back from road

Ambient Measurements

Saturday, 7 May 2011

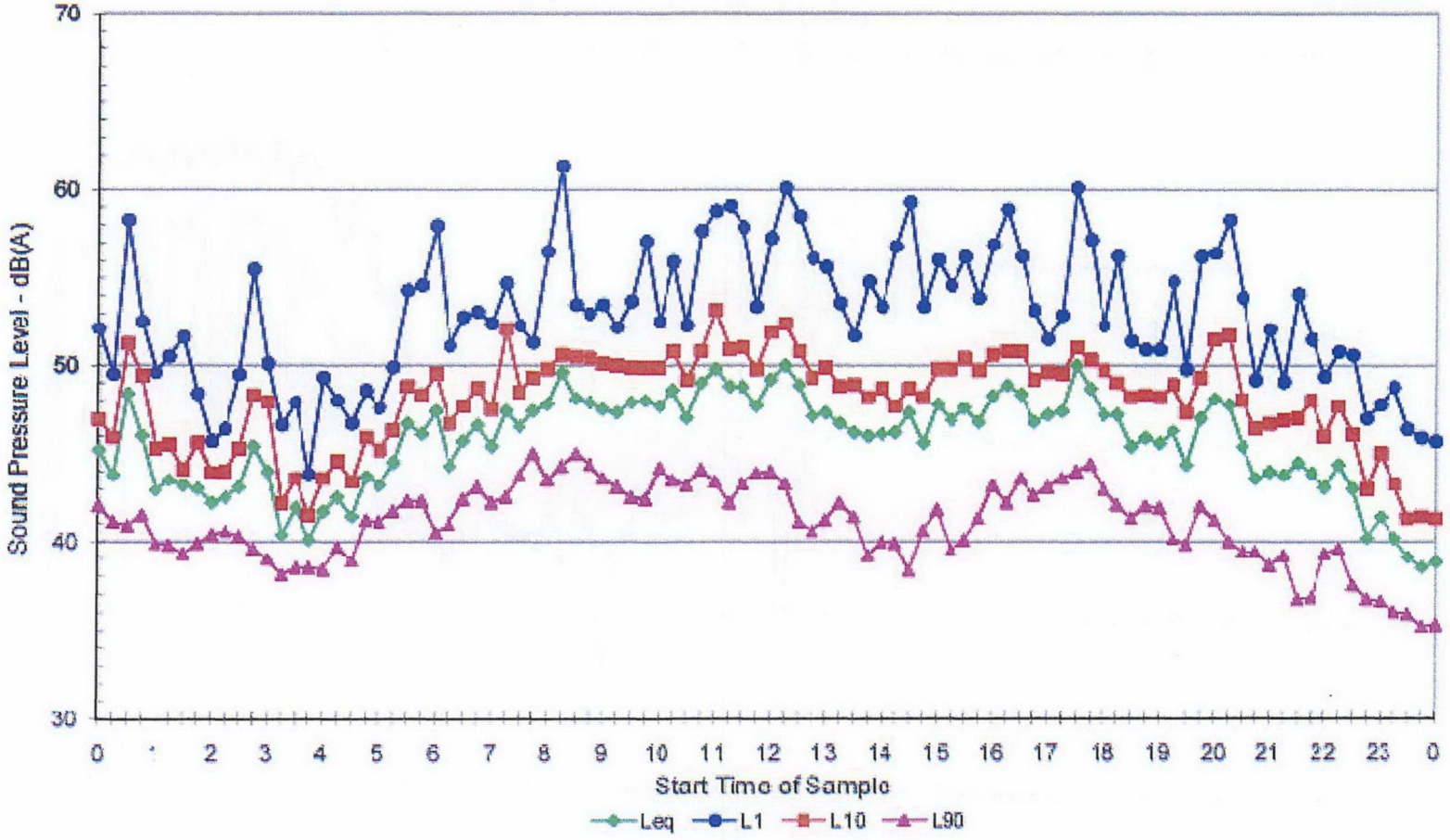


76 Berkley Road
SVAN 957 Logger

4303.R8
building alingment set back from road

Ambient Measurements

Sunday, 8 May 2011

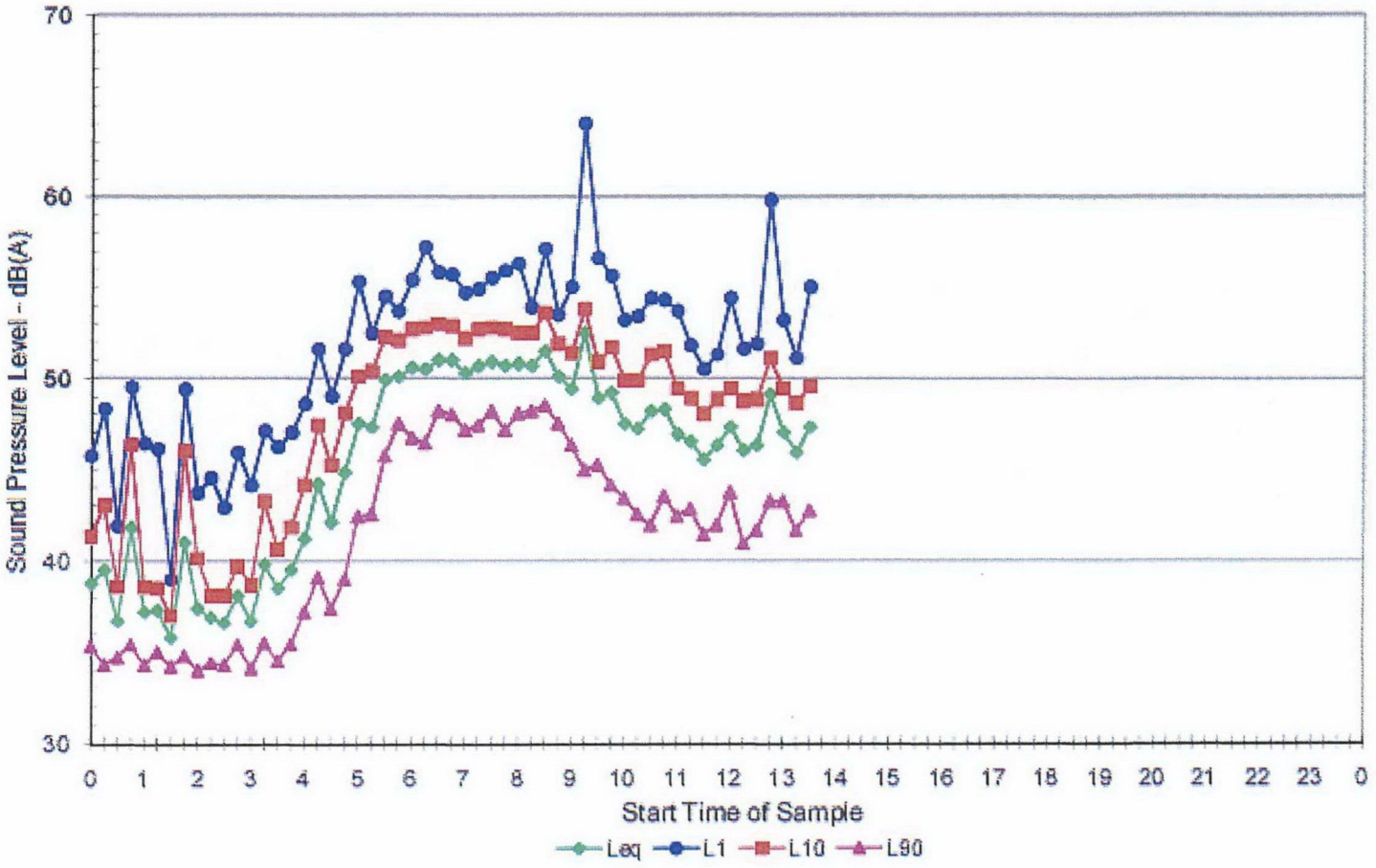


76 Berkley Road
SVAN 957 Logger

4303.R8
building alingment set back from road

Ambient Measurements

Monday, 9 May 2011

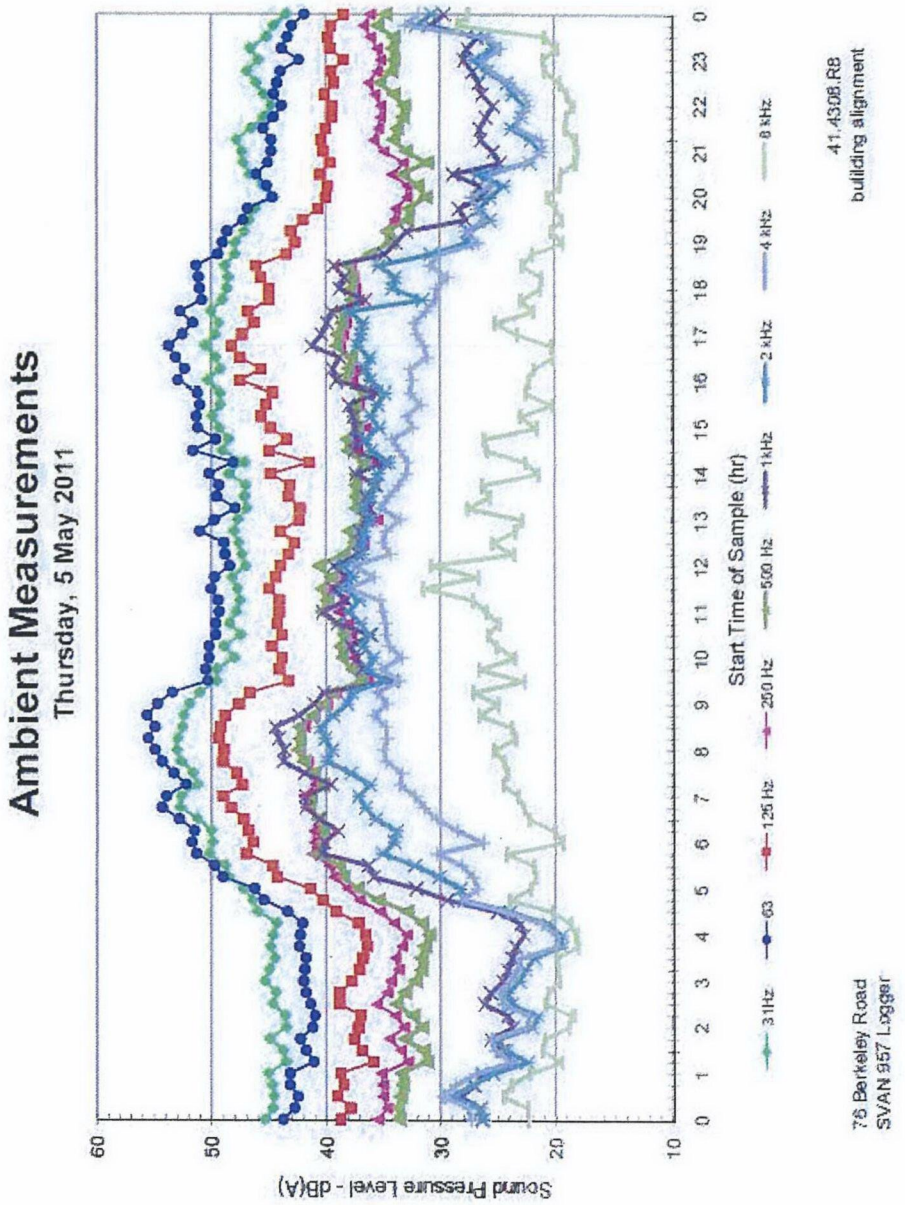


76 Berkley Road
SVAN 957 Logger

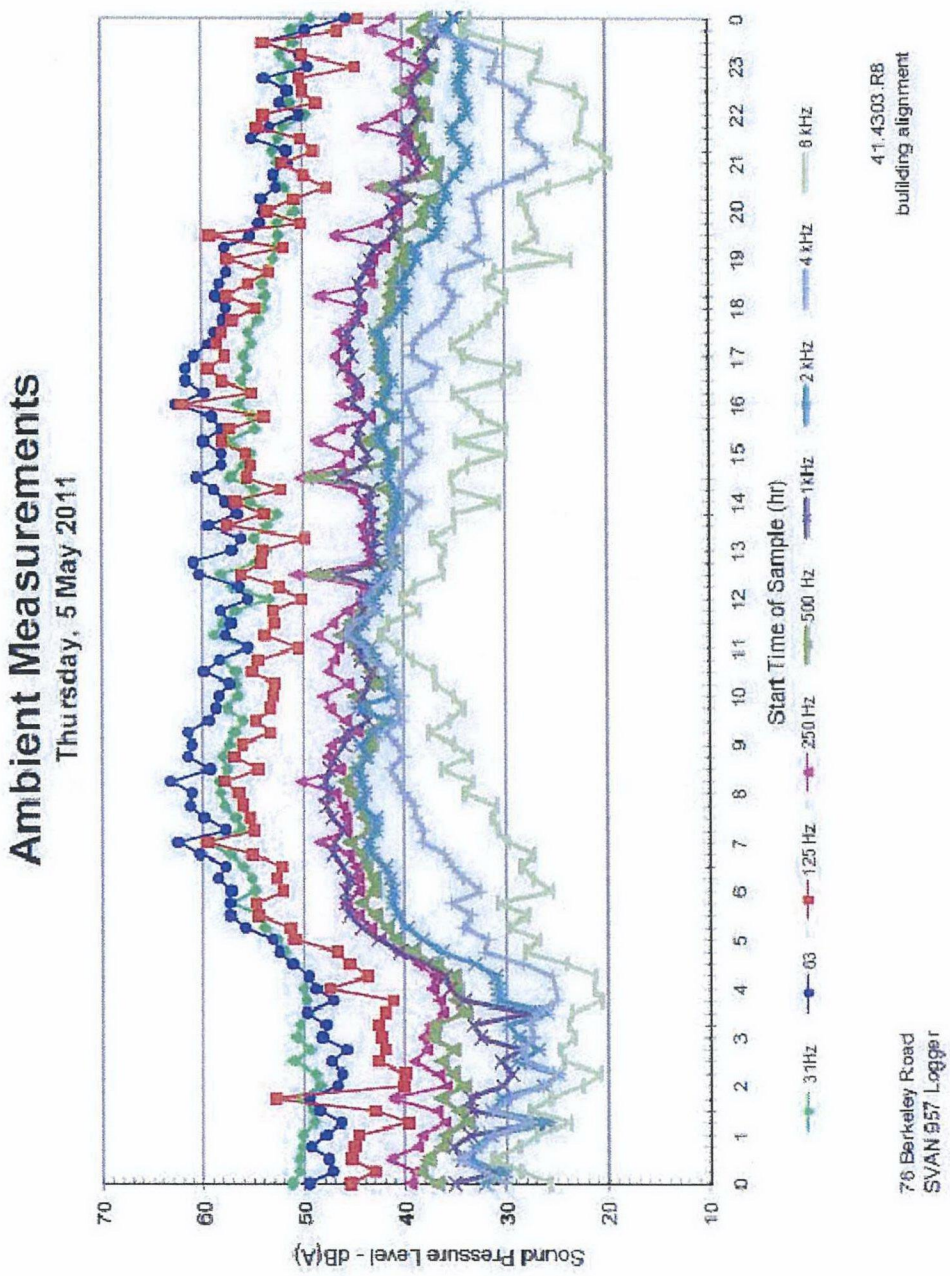
4303.R8
building alingment set back from road

APPENDIX D: Logger Octave Band Results

	Linear Octave Band Centre Frequency (Hz)								
	31	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
RBL day	47	49	42	34	37	34	31	27	18
RBL evening	46	45	40	35	34	27	22	20	18
RBL night	44	41	37	35	33	26	20	20	18



	Linear Octave Band Centre Frequency (Hz)								
	31	**63**	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
Leq day	54	56	52	43	40	42	39	35	21
Leq evening	51	53	48	40	38	38	34	26	19
Leq night	49	47	43	38	36	32	26	25	20



ATTACHMENT 6

FLOOD IMPACT ASSESSMENT PLAN

Chris Oliver

From: Darren Hoolihan [darren@hoolihan.com.au]
Sent: Thursday, 19 May 2011 4:45 PM
To: 'Chris Oliver'; info@traversecology.com.au
Cc: 'Ian Everitt'; 'Terry Moran'; 'Barney Mackenzie'; 'Ben Everitt'
Subject: RE: Flood Level Report No 76 Berkeley Rd Fountaindale
Attachments: 16323-Hapido TSM Calculated 1% aep flood plan-REVA.pdf; 16323-Hapido TSM FLOOD EXPORT.dwg

Hello Chris and Andrew,

Further to our earlier email, please find attached an amended plan detailing the 1% AEP flood levels based on a starting backwater level of 15.250 m AHD at the northern boundary of the site.

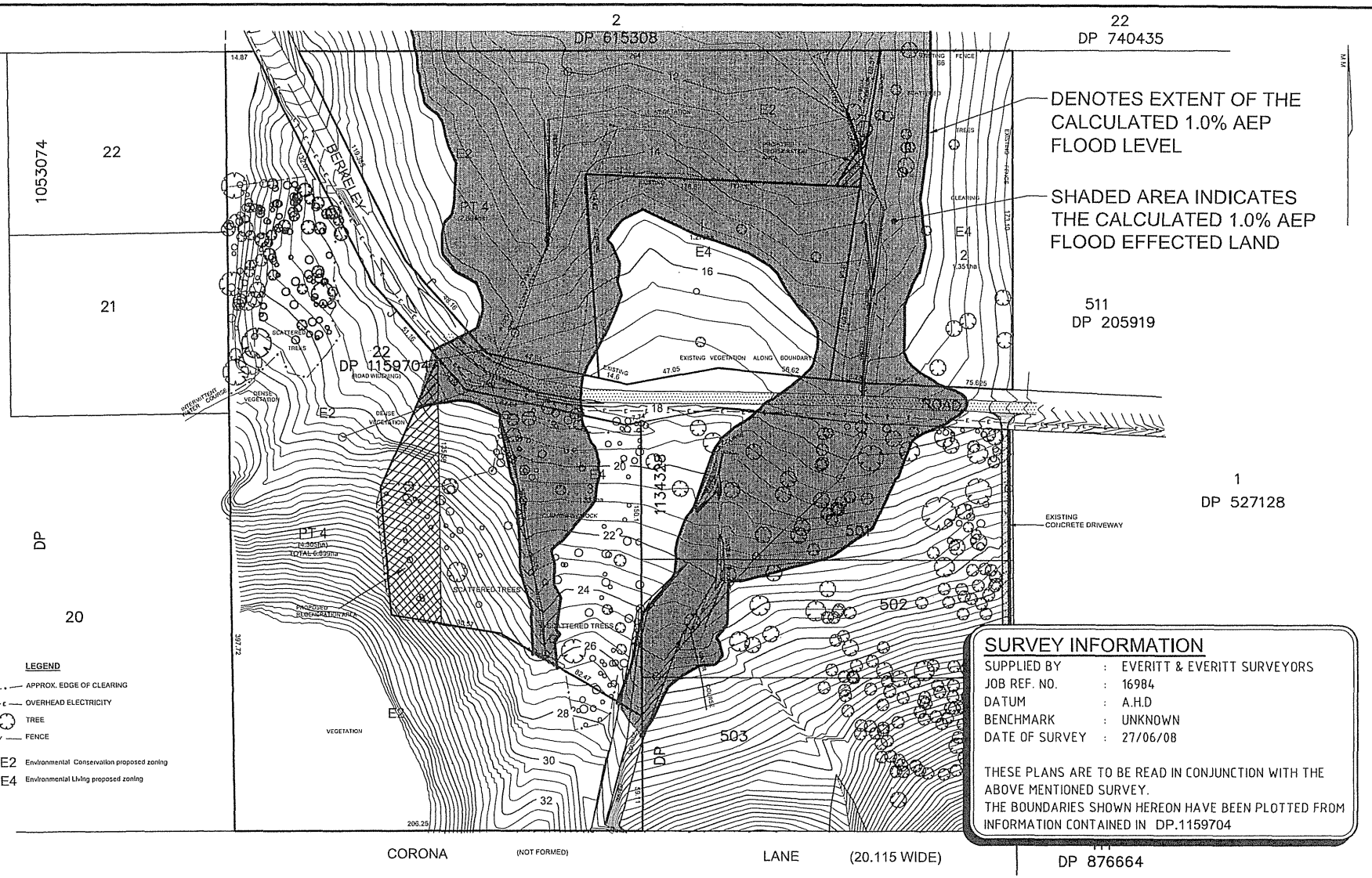
Our original computer modelling had conflicting results between the eastern and western catchments. We have now refined the model and feel confident in the attached flood plan as being more representative of the true flood regime for the site.

We reiterate our earlier comments, that the 1 in 20 year ARI flood was not modelled in the Council flood studies of Ourimbah Creek.
Therefore we don't have a starting backwater level that would allow us to model the 1 in 20 year flood levels accurately.
Could you investigate if the effluent disposal areas could be located above the 1% AEP level along with the designated building areas?

If you have any queries, please call Barney or myself.

Regards
Darren Hoolihan

HOOLIHAN PARTNERS
34-36 PACIFIC HWY, WYONG NSW.
PO BOX 158, WYONG NSW 2259.
T. (02) 4353 5352 F. (02) 4353 5354
www.hoolihan.com.au



SURVEY INFORMATION

SUPPLIED BY	:	EVERITT & EVERITT SURVEYORS
JOB REF. NO.	:	16984
DATUM	:	A.H.D
BENCHMARK	:	UNKNOWN
DATE OF SURVEY	:	27/06/08

THESE PLANS ARE TO BE READ IN CONJUNCTION WITH THE ABOVE MENTIONED SURVEY.
THE BOUNDARIES SHOWN HEREON HAVE BEEN PLOTTED FROM INFORMATION CONTAINED IN DP.1159704

REV :	DATE :	REASON FOR REVISION :	Drafted :	Checked :
O	05-05-11	ORIGINAL	BDM	
A	19-05-11	AMENDED CALCULATION OF 1% AEP	BDM	DH

HOOLIHAN PARTNERS
PTY LTD ABN 17 068 013 927
www.hoolihan.com.au
SUITE 6, 34-36 PACIFIC HWY, WYONG, NSW, 2259
PO BOX 158, WYONG, NSW, 2259
TEL (02) 4353 5352
FAX (02) 4353 5354

PROJECT DETAILS :
PROPOSED SUBDIVISION.
LOT 23 DP1159704 BERKELEY ROAD, FOUNTAINDALE.

CLIENT :
HAPIDO PTY LTD, TSM PTY LTD.

DRAWING NAME :
CALCULATED 1% AEP FLOOD PLAN

JOB No.:	SHEET No.:	REVISION :
16323	1	A
SCALES :	SET OF :	DATE :
1:2000	1	19-05-11

APPROVED :
DARREN HOOLIHAN B.E. M.I.E.Aust. C.P.Eng.

From: Darren Hoolihan <darren@hoolihan.com.au>
To: "Smith, Rodney" <SMITHR@wyong.nsw.gov.au>
Sent: Wed, 2 March, 2011 11:27:14 AM
Subject: Flood Level Report No 76 Berkeley Rd Fountaindale

Hello Rod,

Thanks for your email in relation to the above site.

Further to our discussions, we confirm our client has asked us to prepare a flood study of the site as detailed in Council's Desktop Assessment for Rezoning Request No RZ/15/2009.

In order to identify an appropriate starting backwater level for our study, we ask if Council could supply or make available any previous flood study information on downstream or adjoining properties. We understand that a study was carried out in 1992 on the area around Enterprise Drive, just north of our client's site.

We trust you may be able to help in this instance.
Please call me if you require any further information.

Regards

Darren Hoolihan

HOOLIHAN PARTNERS

34-36 PACIFIC HWY, WYONG NSW.

PO BOX 158 , WYONG NSW 2259.

T. (02) 4353 5352 F. (02) 4353 5354

www. hoolihan.com.au

-----Original Message-----
From: Smith, Rodney [mailto:SMITHR@wyong.nsw.gov.au]
Sent: Tuesday, 1 March 2011 10:23 AM
To: 'admin@hoolihan.com.au'
Subject: Flood Level Report No76 Berkeley Rd Fountaindale

Dear Sir / Madam,

Council records do not indicate a flood level for the above site, although it is affected by 2 designated creeks and a significant flow path and is obviously flood affected. Council recommends that you make your own further enquiries / assessment to determine the flood level applicable to the site. The fee paid for the above information will be refunded.

Regards,

Rodney Smith
Development Engineer
Development Engineering
Wyong Shire Council
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