Section 92 Response Attachments

Attachment 7 - Noise

29 November 2012

Watercare Services Ltd
C/- Central Interceptor Project Team
Tonkin & Taylor
PO Box 5271
Wellesley Street
Auckland 1141

Attention: Alia Cederman

Dear Alia

RESPONSE TO SECTION 92 REQUEST – CENTRAL INTERCEPTOR SCHEME– MAIN PROJECT WORKS

This letter details Marshall Day Acoustics' (MDA) response to the Auckland Council Section 92 request for further information dated 2 October 2012. The request references a letter from Styles Group dated 24 September 2012 (referred to below as "the request"). The numbering in this response follows the format of the Styles Group letter. This response relates to the information requested in relation to sound. Responses in relation to vibration have been provided separately by others.

(1) The request states that "*the report does not provide an indication of the likely noise effects that the nearby receivers will be exposed to…*"

Sound generated by construction is inherently noisy and is superimposed on the background sound level at a given location. The effects from sound generated by construction activities are considered to generally be significant, and short-term effects will be high, even after mitigation, due to the disparity in level between background sound and sound generated by construction activities. It should be noted that the levels of sound predicted in the MDA Noise Impact Assessment report submitted with the AEE are based on the loudest short-term construction activities proposed to be used at a given site, and would not represent general day-to-day construction sound levels, which would be significantly lower.

Refer to Attachment 1 which gives a table of affected dwellings for the construction and operation phases of the project. The 'effects' comment relates to after mitigation treatment and considers the background sound level in the area.

(2) The request recommends that additional information be provided in relation to site-specific ambient sound measurements.

Refer to Attachment 2 of this letter for further information. All measurements were carried out using Brüel & Kjær Type 2250/2260 sound level meters. All available measurement descriptors have been provided however it is noted that for some of the measurement positions, the 'L_{10}' and 'L_{max}' descriptors were not recorded.

(3) The request asks for a full set of monitoring results for sites where ongoing operational noise effects are likely. Justification should also be provided as to the reasonableness of the limits selected for each site.

Long-term background sound monitoring was carried out from 9 – 19 November 2012 in the vicinity of the closest dwelling for the Western Springs (WS1), May Road (WS2), PS23 (Frederick Street) (AS6) & PS25 (Miranda Reserve) (L3S1) sites. At these sites operation sound could be generated by the mechanical ventilation systems used at the air treatment facilities. Monitoring was also carried out at Keith Hay Park (AS5), Norgrove Avenue (L2S2) and Haycock Avenue (L3S5) based on the proposed drop shafts being located approximately 10 metres from the closest dwelling. At these sites operation sound could be generated by water movement through the drop shaft. The results are presented in full in Attachment 3.

Acceptability of proposed operation sound limit

The Main Project Works Noise Impact Assessment proposed a blanket operation phase sound limit for all sites to be designated, when measured within the boundary of sites zoned Residential, as follows:

Time		***Noise Limit***
Any day	*0700 – 2200 hrs*	*50 dB L_{Aeq}*
	2200 – 0700 hrs	*40 dB L_{Aeq}*
		75 dB L_{Amax}

MDA notes that the proposed limits generally align with the underlying zone controls for the Residential zone within the Auckland City District Plan – Isthmus Section.

MDA considers that an external sound level of 40 dB L_{Aeq} is an appropriate sound level to avoid adverse effects on people located inside and outside dwellings, particularly given that all proposed sites are located in the urban environment. Assuming a conservative loss of 10 decibels through an open window, a resulting indoor level of 30 dB L_{Aeq} concurs with the WHO[1] recommendation of 30 dB L_{Aeq} as a desirable continuous indoor sound level designed to protect against sleep disturbance.

Given the results of the long-term monitoring at all locations with the exception of L2S2, it is considered that the proposed limits are appropriate for the Project and offer a suitable degree of amenity protection to residents, whilst still allowing sound generating activities to occur, as would be expected in an urban environment.

In regards to Norgrove Avenue (L2S2), MDA notes that the sound logging device was located in the vicinity of the closest dwelling to the proposed drop shaft and consequently proximate to Meola Creek. Therefore, the creek was considered to be the controlling sound source at the monitoring location and resulted in the elevated level of recorded background sound. Given the nature and level of sound from the drop shaft would likely be similar to sound from Meola Creek, MDA considers the effects on adjacent receivers to be no more than minor. Therefore the proposed limit is considered to be appropriate.

[1] World Health Organisation (WHO) *Guidelines for Community Noise* (1999)

(4) The request states that *"…report appears to underestimate the predicted noise levels for a number of activities and locations…".*

With regard to the predicted sound level for the dwelling located at 16 Norgrove Avenue (Norgrove Avenue L2S2), MDA confirms that the performance of the nominated barrier has been overstated. A revised prediction indicates that there would still be some worthwhile benefit in erecting the recommended barrier to screen ground-based sources. Refer to Attachment 1 for revised sound level predictions for dwellings associated with this site.

With regard to the predicted sound level for the dwelling located at 18 Gregory Place (Keith Hay Park AS5), MDA has reviewed the prediction and notes that there is a difference in the minimum propagation distance between the predictive model and the distance stated by the Styles Group review. This would account for some of the discrepancy in prediction result - approximately 3 decibels. The remaining difference is explained by the fact that the receiver, located between the dwelling and the recommended 3 metre high acoustic barrier, is in the shadow zone of the barrier, and therefore significantly screened from sound generated by the site. MDA notes that the report also includes a first floor receiver, due to the floor layout of this dwelling, and predicts and sound level of 79 dB L_{Aeq}, which generally aligns with the Styles Group prediction.

Once again it should be emphasised that because the project is still in the planning stage, detailed construction plans which specify the equipment and processes that will be used at each site are not available, therefore predictions can only be indicative, and based on appropriate assumptions. The measured sound levels therefore have the potential to differ from predicted levels due to the variation in generated sound for different plant and construction methods. Once the plans are available, they will be incorporated into the Main Works CNMP.

(5) The request asks for further information in relation to source data used in predicting operation sound levels.

The prediction of operation sound has been carried out at the sites considered to have the potential to generate long-term effects, specifically from air treatment facilities. The sites identified as having potential long-term effects are Western Springs (WS1), May Road (WS2), PS23 (Frederick Street) (AS6) & PS25 (Miranda Reserve) (L3S1). At these sites operation sound could be generated by the mechanical ventilation systems used to treat the air. At this stage of the project the sound levels generated by the proposed activities can be considered indicative only, as they are based on concept designs and estimated operational duties. Notwithstanding this, MDA's sound level predictions are based on source data detailed in Table 4.2 of Appendix 4 of the Noise Impact Assessment report submitted with the AEE. These are based on source level data from manufacturer specification sheets as well as sound level measurements carried out by MDA from other projects of a similar nature.

Operation sound from drop shafts and pump stations is now given further consideration.

MDA has measured sound from the drop shaft located off Victoria Avenue on the shoreline of Hobson Bay. A level of 52dB L_{Aeq} was measured at a distance of 5 metres from the drop shaft. A sound power level of 74 dB L_{WA} has been derived from this measurement. Refer to Attachment 1 Table 2 for the results of predictions to the nearest dwelling for each site assessed in (3).

(6) The request states that the CNMP proposed by MDA is *"…insufficient in terms of detail and management methods…and does not in my view satisfy the requirements of Annex E of NZS6803: 1999…".*

The CNMP contained in Appendix F of the report has been provided as a draft only and is not intended to be definitive. As the detailed design has not yet been undertaken, a Contractor has not been appointed to the project, and the commencement of construction is a number of years away, a project-specific CNMP could not be included in the report. It is likely that the Contractor may have its own CNMP as a template to draw upon.

Once the Contractor has been appointed and the construction plans for each site are made available, additional information would be incorporated into the CNMP and should, as a minimum, satisfy the requirements of Annex E of NZS6803. A *"…robust set of definitive triggers for mitigation measures…"* would also be developed at this time.

We trust this information is satisfactory. If you have any further questions please do not hesitate to contact us.

Yours faithfully

MARSHALL DAY ACOUSTICS LTD

Consultant

Mathew Cottle

ATTACHMENT 1

Table 1: Table of effects for Construction

Site Location	Most Affected Dwellings	Predicted Sound Level Without Mitigation dB L_{Aeq}	Main Sound-generating Activities	Potential Mitigation Options	Predicted Sound Level With Mitigation dB L_{Aeq}	Effects After Mitigation*
Western Springs (WS1) – night-time	3 Bullock Track & 42 Sefton Ave	Up to 57	Activities associated with tunnelling incl. truck deliveries and tunnel ventilation	Insulation of shed. Doors closed at night. No trucks in night-time period. Silencing of tunnel vent outlets.	45	Would comply with NZS6803
	6, 8, 10, 12 & 14 Old Mill Road	Up to 52	Activities associated with tunnelling incl. truck deliveries and tunnel ventilation	Insulation of shed. Doors closed at night. No trucks in night-time period. Silencing of tunnel vent outlets.	40	Would comply with NZS6803
	736 & 744 Great North Road	Up to 51	Activities associated with tunnelling incl. truck deliveries and tunnel ventilation	Insulation of shed. Doors closed at night. No trucks in night-time period. Silencing of tunnel vent outlets.	40	Would comply with NZS6803
Mt. Albert War Memorial (AS1)	2-4/9, 11A, 13A Wairere Ave	Up to 79	Rock breaking/drilling	Site acoustic barrier. Management through CNMP.	73	Significant short-term disturbance. No health risk.
	65B & C Asquith Ave (First floor)	Up to 77	Bored piling rig, rock breaking/drilling	Management through CNMP.	77	Significant short-term disturbance. No health risk.
Lyon Ave (AS2)	11-27 Morningstar Place	Up to 73	Bored piling rig, rock	Management through	73	Significant short-term

Site Location	Most Affected Dwellings	Predicted Sound Level Without Mitigation dB L_{Aeq}	Main Sound-generating Activities	Potential Mitigation Options	Predicted Sound Level With Mitigation dB L_{Aeq}	Effects After Mitigation*
			breaking/drilling	CNMP.		disturbance. No health risk.
	12-28 Morningstar Place	Up to 80	Bored piling rig, rock breaking/drilling	Management through CNMP.	80	Significant short-term disturbance. No health risk.
Haverstock Rd (AS3)	7 Camden Rd	Up to 69	Bored piling rig, rock breaking/drilling	-	69	Would comply with NZS6803
	96 Haverstock Rd	Up to 74	Rockbreaking/drilling	Site acoustic barrier. Management through CNMP.	70	Would comply with NZS6803
	98 – 102 Haverstock Rd (First floor)	Up to 76	Rockbreaking/drilling	Management through CNMP.	76	Significant short-term disturbance. No health risk
Walmsley Park (AS4)	734 Sandringham Rd Ext (First floor)	69	Sheet piling, rockbreaking/drilling	-	69	Would comply with NZS6803
	725 Sandringham Rd Ext	71	Sheet piling, rockbreaking/drilling	Management through CNMP.	71	Significant short-term disturbance. No health risk
	7, 9 & 11 O'Donnell Ave	Up to 77	Sheet piling, rockbreaking/drilling	Site acoustic barrier. Use an alternative form of piling such as bored piling. Management through CNMP.	73	Significant short-term disturbance. No health risk
	3 O'Donnell Ave	82	Sheet piling, rockbreaking/drilling	Site acoustic barrier. Use an alternative form of piling such as bored piling. Management	76	Significant short-term disturbance. No health risk.

Site Location	Most Affected Dwellings	Predicted Sound Level Without Mitigation dB L_{Aeq}	Main Sound-generating Activities	Potential Mitigation Options	Predicted Sound Level With Mitigation dB L_{Aeq}	Effects After Mitigation*
				through CNMP.		
May Road (WS2) - Daytime	2/49, 2/51, 53A, 55 Marion Ave	Up to 80	Rockbreaking/drilling	Site acoustic barrier. Management through CNMP.	73	Significant short-term disturbance. No health risk.
	2/49, 2/51, 53A, 55 Marion Ave	Up to 74	Bored piling	Site acoustic barrier. Management through CNMP.	70	Would comply with NZS6803
May Road (WS2) – Night-time	2/49, 2/51, 53A, 55 Marion Ave	Up to 56	Activities associated with tunnelling incl. truck deliveries and tunnel ventilation	Insulation of shed. Doors closed at night. No trucks in night-time period. Silencing of tunnel vent outlets.	43	Would comply with NZS6803
Keith Hay Park (AS5)	18 Gregory Place (first floor)	79	Piling	Management through CNMP.	79	Significant short-term disturbance. No health risk.
	19 Gregory Place (first floor)	85	Piling	Management through CNMP.	85	Significant short-term disturbance. No health risk.
	47 Arundel Street (first floor)	80	Piling	Management through CNMP.	80	Significant short-term disturbance. No health risk.
PS23 (AS6)	33A Frederick Street (first floor)	76	Site establishment incl demolition, piling	Management through CNMP.	76	Significant short-term disturbance. No health risk.
	6/41 Frederick Street (first floor)	78	Site establishment incl demolition, piling	Management through CNMP.	78	Significant short-term disturbance. No health risk.

Site Location	Most Affected Dwellings	Predicted Sound Level Without Mitigation dB L_{Aeq}	Main Sound-generating Activities	Potential Mitigation Options	Predicted Sound Level With Mitigation dB L_{Aeq}	Effects After Mitigation*
	33 Frederick Street (first floor)	77	Trucks/heavy equipment traversing site access road	Management through CNMP.	77	Significant short-term disturbance. No health risk.
	25 Frederick Street (first floor)	71	Site establishment incl demolition	Management through CNMP.	71	Significant short-term disturbance. No health risk.
	27 & 29 Frederick Street	69	Site establishment incl demolition	-	69	Would comply with NZS6803
Kiwi Esplanade (AS7)	87 Kiwi Esplanade	65	Sheet piling/rockbreaking/drilling	-	65	Would comply with NZS6803
	85 Kiwi Esplanade (first floor)	66	Sheet piling/rockbreaking/drilling	-	66	Would comply with NZS6803
	Yorkton Rise dwellings	67	Trenching	-	67	Would comply with NZS6803
Motions Rd (L1S1)	All receivers	≤70	Rock breaking/drilling	-	≤70	Would comply with NZS6803
Western Springs Depot (L1S2)	All receivers	≤51	Rock breaking/drilling	-	≤51	Would comply with NZS6803
Rawalpindi Ave	29 Rawalpindi Street	63	Bored piling	-	58	Would comply with NZS6803
	11 Rawalpindi Street (first floor)	67	Trucks on access road, bored piling	-	67	Would comply with NZS6803

Site Location	Most Affected Dwellings	Predicted Sound Level Without Mitigation dB L_{Aeq}	Main Sound-generating Activities	Potential Mitigation Options	Predicted Sound Level With Mitigation dB L_{Aeq}	Effects After Mitigation*
	46 Parkdale Rd	67	Bored Piling	-	67	Would comply with NZS6803
	19 Rawalpindi Street	76	Bored Piling	Site acoustic barrier	69	Would comply with NZS6803
Norgrove Ave (L2S2)	16 Norgrove Ave	79	Bored piling	Site acoustic barrier	73	Significant short-term disturbance. No health risk.
	12 Norgrove Ave	72	Bored piling	Site acoustic barrier	65	Would comply with NZS6803
	14 Norgrove Ave	75	Bored piling	Site acoustic barrier	68	Would comply with NZS6803
	21 & 23 Verona Ave	Up to 73	Bored piling	Site acoustic barrier	64	Would comply with NZS6803
	20 Burnside Ave	69	Bored piling	-	69	Would comply with NZS6803
PS25 (L3S1)	16 Pitfire Place	67	Site establishment incl. demolition	-	67	Would comply with NZS6803
	29 Temuka Gardens	69	Site establishment incl. demolition	-	69	Would comply with NZS6803
	11/20 & 3/28 Taylor Close	Up to 71	Site establishment incl. demolition	Management through CNMP.	71	Significant short-term disturbance. No health risk.

Site Location	Most Affected Dwellings	Predicted Sound Level Without Mitigation dB L_{Aeq}	Main Sound-generating Activities	Potential Mitigation Options	Predicted Sound Level With Mitigation dB L_{Aeq}	Effects After Mitigation*
	32A Miranda St.	Up to 79	Trenching	Mobile screening. Management through CNMP.	74	Significant short-term disturbance. No health risk.
Miranda Reserve (L3S2)	337 Blockhouse Bay Road	74	Bored piling	Site acoustic barrier.	67	Would comply with NZS6803
	356 Blockhouse Bay Road	68	Bored piling	-	68	Would comply with NZS6803
	3 Fran Andrews Drive	66	Bored piling	-	66	Would comply with NZS6803
Whitney Street (L3S3)	115 Whitney St.	71	Bored piling	Management through CNMP.	71	Significant short-term disturbance. No health risk.
	124 & 126 Whitney St.	Up to 73	Bored piling	Management through CNMP.	73	Significant short-term disturbance. No health risk.
	56 Margate Rd	72	Bored piling, trenching	Management through CNMP.	72	Significant short-term disturbance. No health risk.
Dundale Ave (L3S4)	66C & D Dundale Ave	Up to 73	Bored piling	Site acoustic barrier	68	Would comply with NZS6803
	71 & 73 Dundale Ave	Up to 65	Bored piling	-	65	Would comply with NZS6803
Haycock Ave (L3S5)	1 & 3 Haycock Ave	Up to 73	Site establishment incl demolition	Management through CNMP.	73	Significant short-term disturbance. No health risk.

Site Location	Most Affected Dwellings	Predicted Sound Level Without Mitigation dB L_{Aeq}	Main Sound-generating Activities	Potential Mitigation Options	Predicted Sound Level With Mitigation dB L_{Aeq}	Effects After Mitigation*
	2 Haycock Ave	79	Site establishment incl demolition, crawler crane, piling	Site acoustic barrier. Management through CNMP.	75	Significant short-term disturbance. No health risk.
	6 Haycock Ave	80	Site establishment incl demolition, crawler crane, piling	Site acoustic barrier. Management through CNMP.	76	Significant short-term disturbance. No health risk.
	83B White Swan Road	73	Site establishment incl demolition, trenching	Management through CNMP.	73	Significant short-term disturbance. No health risk.

Note: A typical CNMP approach in managing significant effects would be through communicating with affected parties, advising duration of event, scheduling noisy activities to occur whilst potentially affected parties are away from home etc. In certain cases, providing temporary alternative accommodation arrangements may be required.

Table 2: Table of effects for Night-time Operation

Site Location	Night-time Background Sound Level dB L_{A95}	Most Affected Dwellings	Predicted Sound Level Without Mitigation dB L_{Aeq}	Main Sound-generating Activities	Potential Mitigation Options	Predicted Sound Level With Mitigation dB L_{Aeq}	Effects After Mitigation
Western Springs (WS1)	37	3 Bullock Track & 42 Sefton Ave	Up to 52	Air treatment exhaust outlets and louvers		40	No more than minor. Sound from ATF would be audible and above background level.
		6, 8, 10, 12 & 14 Old Mill Road	Up to 46	Air treatment exhaust outlets and louvers	Fit acoustically rated silencers. Minimum sound reduction specification through façade elements.	35	No more than minor. Sound from ATF would be audible although generally below background level. May at times be inaudible.
		736 & 744 Great North Road	Up to 45	Air treatment exhaust outlets and louvers		34	No more than minor. Sound from ATF would be audible although below background level. May at times be inaudible.
		42 Sefton Ave	25	Drop shaft at 106m distance	-	25	Less than minor. Sound from drop shaft would be generally inaudible.
May Road (WS2)	37	2/49, 2/51, 53A, 55 Marion Ave	Up to 56	Air treatment exhaust outlets and louvers	Fit acoustically rated silencers. Minimum sound reduction rating required through façade elements.	39	No more than minor. Sound from ATF would be audible and above background level.
		41, 43 & 45 Marion Ave	Up to 52	Air treatment exhaust outlets and louvers		30	No more than minor. Sound from ATF would generally be inaudible and on occasion audible.

Site Location	Night-time Background Sound Level dB L_{A95}	Most Affected Dwellings	Predicted Sound Level Without Mitigation dB L_{Aeq}	Main Sound-generating Activities	Potential Mitigation Options	Predicted Sound Level With Mitigation dB L_{Aeq}	Effects After Mitigation
		53A Marion Avenue	38	Drop shaft at 25m distance	-	38	No more than minor. Sound from drop shaft would be audible and above background level.
Keith Hay Park (AS5)	34	19 Gregory Place	48	Drop shaft at 8m distance	Screening	38	No more than minor. Sound from drop shaft would be audible and above background level.
PS23 (AS6)	32	33A Frederick Street (first floor)	60	Air treatment exhaust outlets and louvers		37	More than minor. Sound from ATF would be audible and above background level.
		6/41 Frederick Street (first floor)	64	Air treatment exhaust outlets and louvers	Fit acoustically rated silencers. Minimum sound reduction specification through façade elements.	40	More than minor. Sound from ATF would be audible and above background level. .
		25 Frederick Street (first floor)	54	Air treatment exhaust outlets and louvers		32	No more than minor. Sound from ATF would generally be audible. May at times be inaudible.
		33 Frederick Street	39	Drop shaft at 22m distance	-	39	More than minor. Sound from drop shaft would be audible and above background level.

Site Location	Night-time Background Sound Level dB L_{A95}	Most Affected Dwellings	Predicted Sound Level Without Mitigation dB L_{Aeq}	Main Sound-generating Activities	Potential Mitigation Options	Predicted Sound Level With Mitigation dB L_{Aeq}	Effects After Mitigation
Norgrove Ave (L2S2)	44	16 Norgrove Ave & 27 Verona Ave	44	Drop shaft at 12m distance	-	44	No more than minor. Sound from drop shaft would generally be audible. May at times be inaudible.
PS25 (L3S1)	35	16 Pitfire Place	52	Air treatment exhaust outlets and louvers		33	No more than minor. Sound from ATF would be audible although below background level. May at times be inaudible.
		29 Temuka Gardens	53	Air treatment exhaust outlets and louvers	Fit acoustically rated silencers. Minimum sound reduction specification through façade elements.	34	No more than minor. Sound from ATF would be audible although below background level. May at times be inaudible.
		11/20 & 3/28 Taylor Close	56	Air treatment exhaust outlets and louvers		37	No more than minor. Sound from ATF would be audible and above background level.
		32A Miranda St.	55	Air treatment exhaust outlets and louvers		35	No more than minor. Sound from ATF would generally be audible. May at times be inaudible.
		29 Temuka Gardens	30	Drop shaft at 63m distance	-	30	No more than minor. Sound from drop shaft would be audible although below background level. May at

Site Location	Night-time Background Sound Level dB L_{A95}	Most Affected Dwellings	Predicted Sound Level Without Mitigation dB L_{Aeq}	Main Sound-generating Activities	Potential Mitigation Options	Predicted Sound Level With Mitigation dB L_{Aeq}	Effects After Mitigation
							times be inaudible.
Haycock Ave (L3S5)	32	2 Haycock Ave	48	Drop shaft at 8m distance	Screening	38	More than minor. Sound from drop shaft would be audible and above background level.

ATTACHMENT 2: DAYTIME AMBIENT SOUND SURVEY RESULTS

Location	Measurement		Measured Level (dBA)				Description of Sound Sources
	Date Start/Finish	Duration (min:sec)	L_{Aeq}	L_{Amax}	L_{A10}	L_{A95}	
WS1 – Bullock Track	12/5/2011 11:12 / 11:22	10:00	65	-	-	51	Gt. Nth road & Bullock Track traffic controlling sound sources.
AS1/L2S3 – Mt Albert War Memorial	12/5/2011 12:00 – 15:00pm	10:00	47	-	-	45	General urban 'hum', bird call & some sound from building activities. Cars parking in car park excluded.
AS2 – 28 Morning Star Pl	12/5/2011 12:00 – 15:00pm	10:00	46	-	-	42	Sound from traffic on St Lukes Road controlling source. Some sound from construction of Block H, incl reverse beeper.
AS3 – Western end of Camden Rd	12/5/2011 12:00 – 15:00pm	10:00	44	-	-	42	Sound from building plant/extract fan audible throughout measurement. Assumed to be from Plant & Food Research Facility. Bird call audible.
AS4 – SE end of Walmsley Park	12/5/2011 12:00 15:00pm	10:00	55	-	-	49	Sound from traffic on Sandringham Rd Ext controlling source of sound. Lawnmower audible.
WS2 – 33 Marion Ave	12/5/2011 11:07 / 11:13	5:29	43	52	45	42	Sound from traffic on May Road audible. Cars passing directly in front of measurement position excluded.
AS5 – 18-22 Gregory Pl	27/7/2011 11:12 / 11:24am	9:16	47	55	50	43	Sound from SH20 traffic audible. Cars passing directly in front of measurement position excluded.
AS6 – Farnol Street	27/7/2011 11:39 / 11:50	10:01	47	59	50	43	Sound from traffic on surrounding roads controlling source of sound. Cars on Farnol street excluded.
AS7 – 93 Kiwi Esp	12/5/2011 14:12 / 14:18	5:30	40	49	42	38	Occasional vehicle pass-by measurement position excluded.
L1S1 – in Pasadena Reserve behind 47A Premier Ave	12/5/2011 10:30 / 10:40	10:00	41	-	-	35	Vehicles on Motions Road. Bird call.
L1S2 – 15 West View Road	12/5/2011 10:50 / 11:00	10:00	44	-	-	40	Bird call. General urban 'hum'.
L2S1 – 26 Rawalpindi St	12/5/2011 11:30 – 12:00	10:00	47	-	-	45	Sound from traffic on SH16. Distant lawnmower.
L2S2 – 16 Norgrove Ave	12/5/2011 11:30 – 12:00	10:00	47	-	-	45	Sound from traffic on SH16. Sound from water in stream.
L3S1 – 8A Otira St	12/5/2011 13:41 / 13:46	5:20	49	63	52	44	Miranda Street traffic controlling source. Cars on Otira St excluded.
L3S2 – Miranda Reserve	12/5/2011 13:21 / 13:27	6:10	51	67	53	44	Blockhouse Bay Rd traffic controlling source.
L3S3 – 120 Whitney St	12/5/2011 12:56 / 13:01	5:00	51	67	54	37	Whitney St traffic controlling source.
L3S4 – 73 Dundale Ave	12/5/2011 12:22 /	5:10	44	60	47	39	Dundale Ave traffic controlling source.

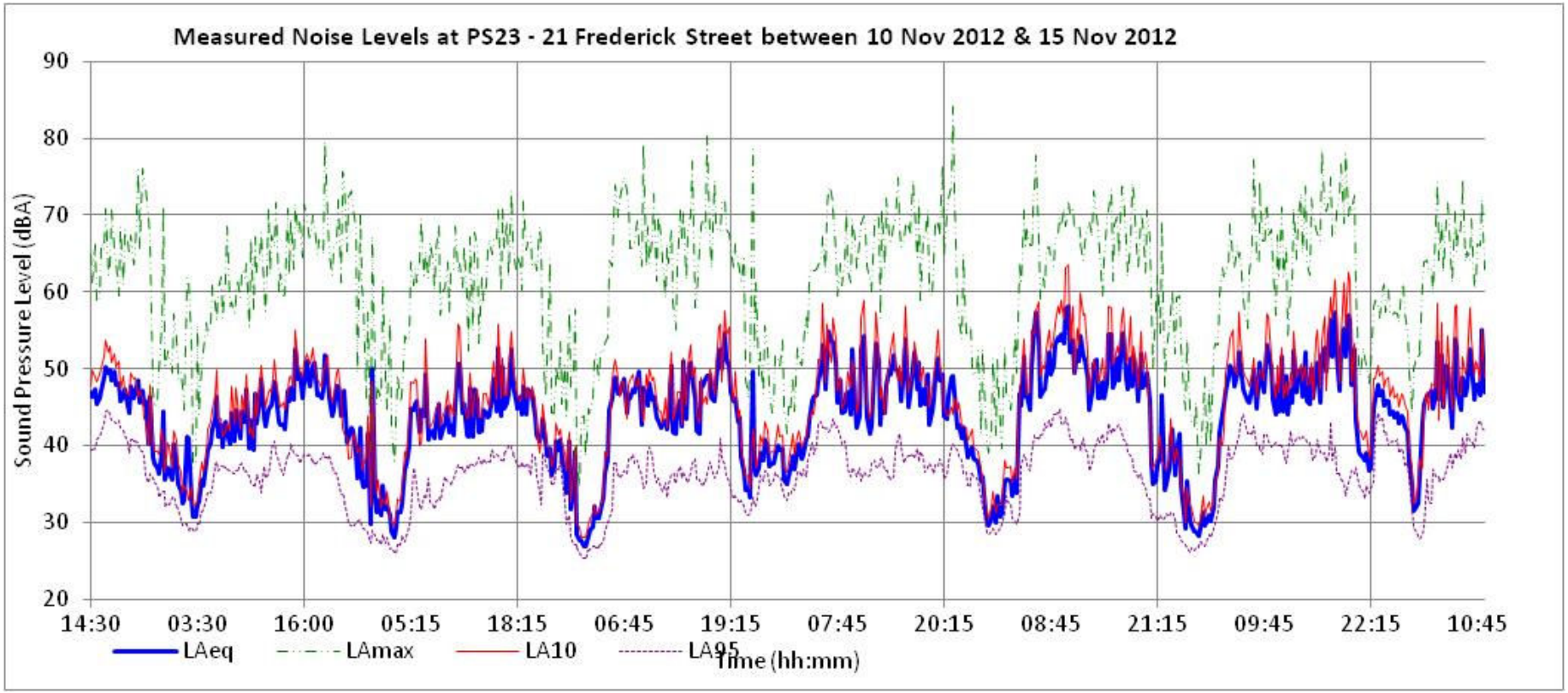
	12:27						
L3S5 – 2 Haycock Ave	12/5/2011 11:58 / 12:04	5:20	47	55	50	43	Sound from traffic on surrounding roads controlling.

ATTACHMENT 3: AVERAGED SOUND LEVEL BY PERIOD[2]

PS23

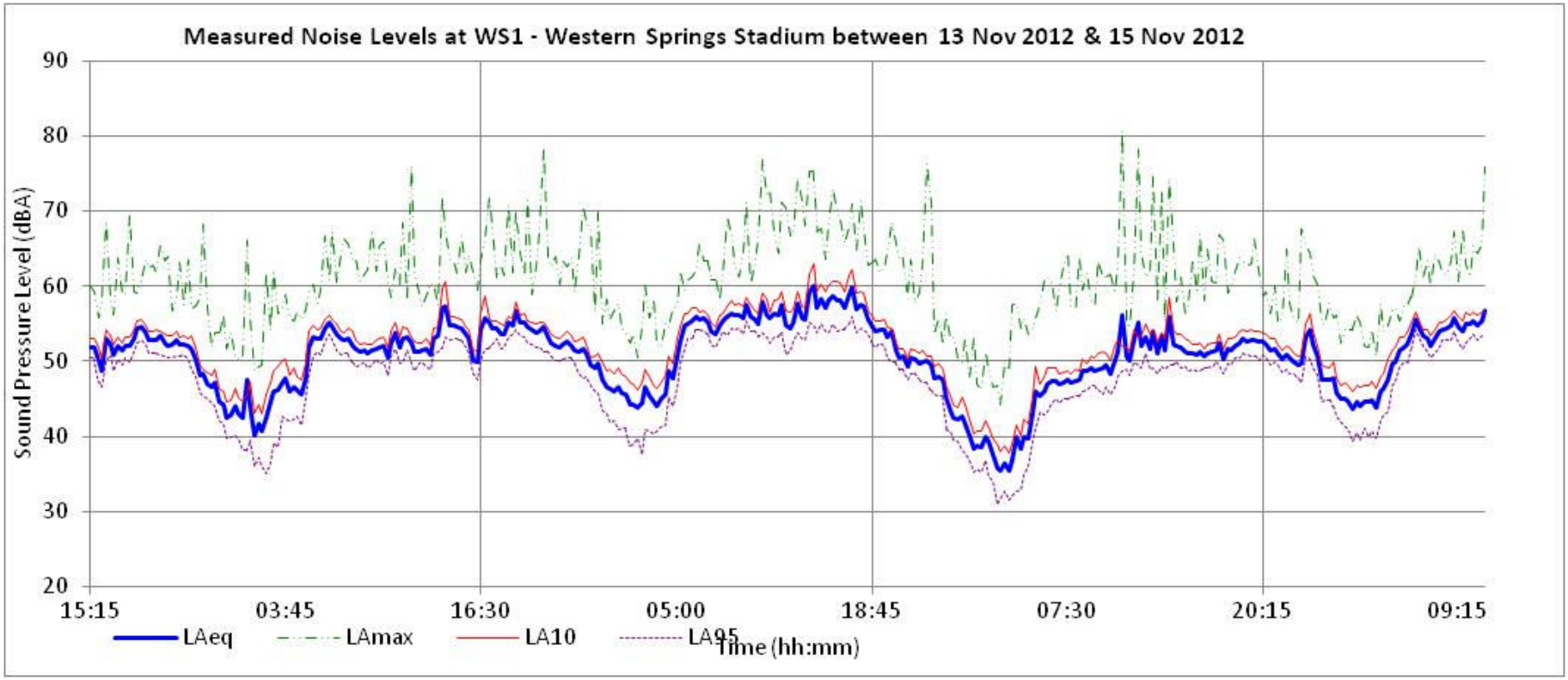
		Average Sound Level, dB			
Date	**Period**	L_{Aeq}	L_{A10}	L_{A95}	L_{Amax}
Saturday 10 November 2012	Day - 7.00am - 10.00pm	43	44	37	69
	Night - 10.00pm - 7.00am	41	38	29	73
Sunday 11 November 2012	Day - 7.00am - 10.00pm	44	45	35	70
	Night - 10.00pm - 7.00am	42	38	31	75
Monday 12 November 2012	Day - 7.00am - 10.00pm	47	47	36	80
	Night - 10.00pm - 7.00am	45	43	37	73
Tuesday 13 November 2012	Day - 7.00am - 10.00pm	49	49	38	73
	Night - 10.00pm - 7.00am	-	-	-	-
Wednesday 14 November 2012	Day - 7.00am - 10.00pm	-	-	-	-
	Night - 10.00pm - 7.00am	44	38	31	69
Thursday 15 November 2012	Day - 7.00am - 10.00pm	50	51	41	77
	Night - 10.00pm - 7.00am	-	-	-	-
Daily averages over entire period	Day - 7.00am - 10.00pm	48	50	37	80
	Night - 10.00pm - 7.00am	43	46	32	75

[2] Periods of rainfall greater than 6mm/h and wind speeds greater than 5m/s have been excluded from data where deemed necessary.



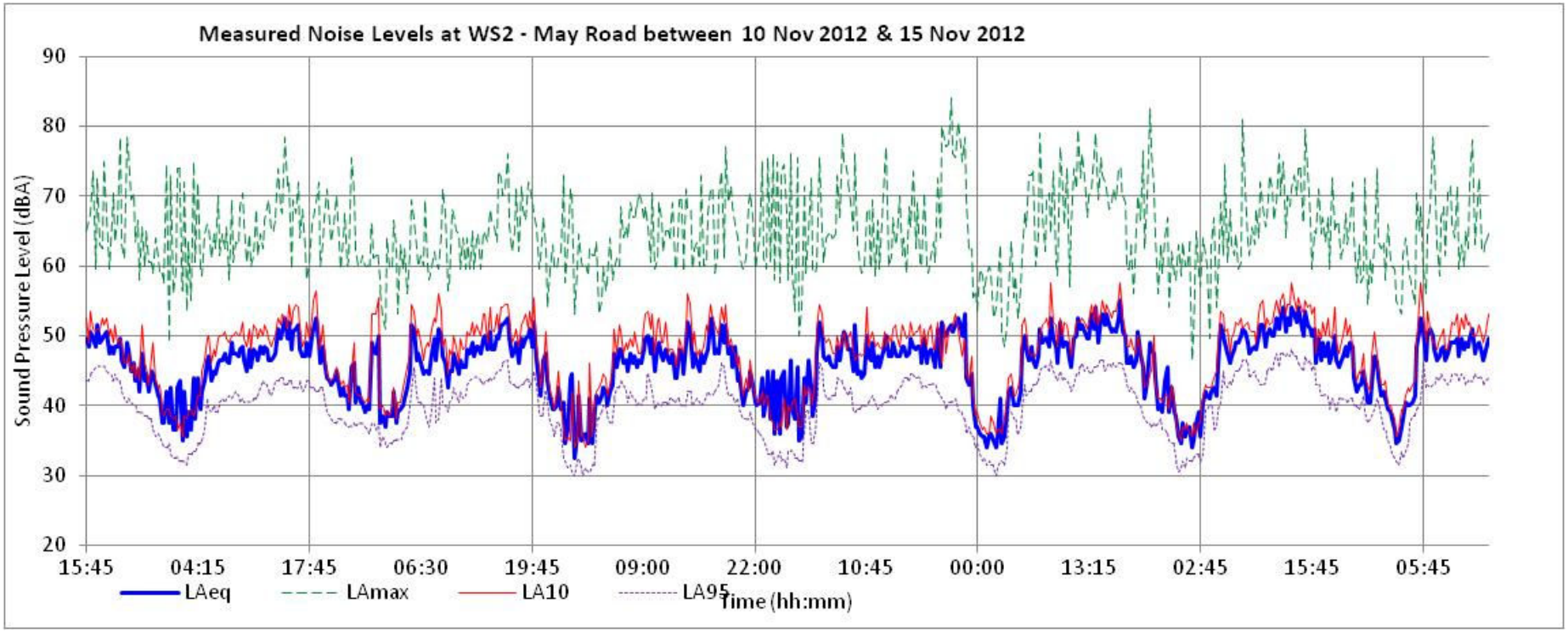
WS1

Date	Period	Average Sound Level, dB L_{Aeq}	L_{A10}	L_{A95}	L_{Amax}
Tuesday 13 November 2012	Day - 7.00am - 10.00pm	52	54	50	76
	Night - 10.00pm - 7.00am	-	-	-	-
Wednesday 14 November 2012	Day - 7.00am - 10.00pm	-	-	-	-
	Night - 10.00pm - 7.00am	42	45	37	61
Thursday 15 November 2012	Day - 7.00am - 10.00pm	49	51	46	67
	Night - 10.00pm - 7.00am	-	-	-	-
Daily averages over entire period	Day - 7.00am - 10.00pm	51	52	48	76
	Night - 10.00pm - 7.00am	42	45	37	61



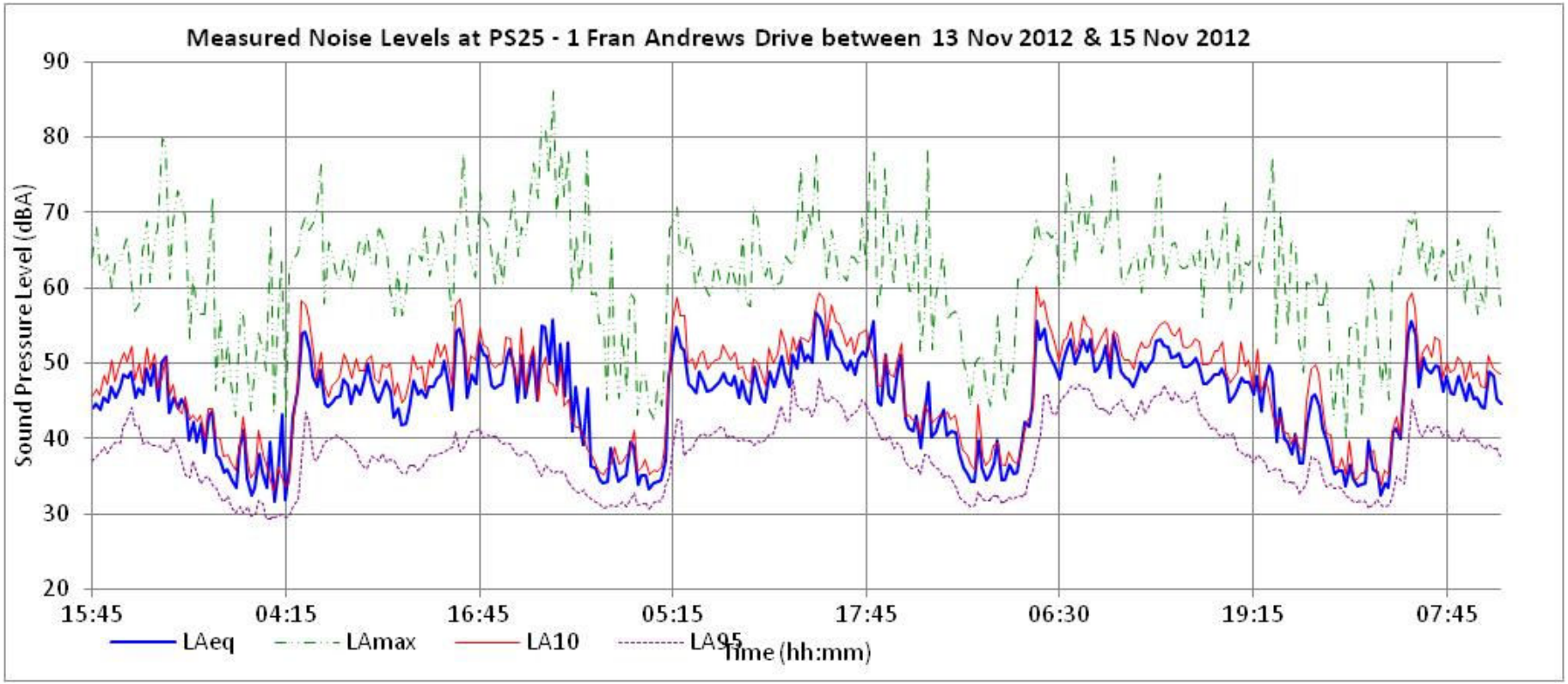
WS2

Date	Period	Average Sound Level, dB L_{Aeq}	L_{A10}	L_{A95}	L_{Amax}
Saturday 10 November 2012	Day - 7.00am - 10.00pm	47	50	40	71
	Night - 10.00pm - 7.00am	45	48	37	76
Sunday 11 November 2012	Day - 7.00am - 10.00pm	47	50	40	71
	Night - 10.00pm - 7.00am	43	45	36	73
Monday 12 November 2012	Day - 7.00am - 10.00pm	48	50	41	77
	Night - 10.00pm - 7.00am	44	46	36	76
Tuesday 13 November 2012	Day - 7.00am - 10.00pm	48	49	41	79
	Night - 10.00pm - 7.00am	-	-	-	-
Wednesday 14 November 2012	Day - 7.00am - 10.00pm	-	-	-	-
	Night - 10.00pm - 7.00am	45	47	37	75
Thursday 15 November 2012	Day - 7.00am - 10.00pm	49	52	44	81
	Night - 10.00pm - 7.00am	-	-	-	-
Daily averages over entire period	Day - 7.00am - 10.00pm	48	50	41	81
	Night - 10.00pm - 7.00am	44	47	37	76



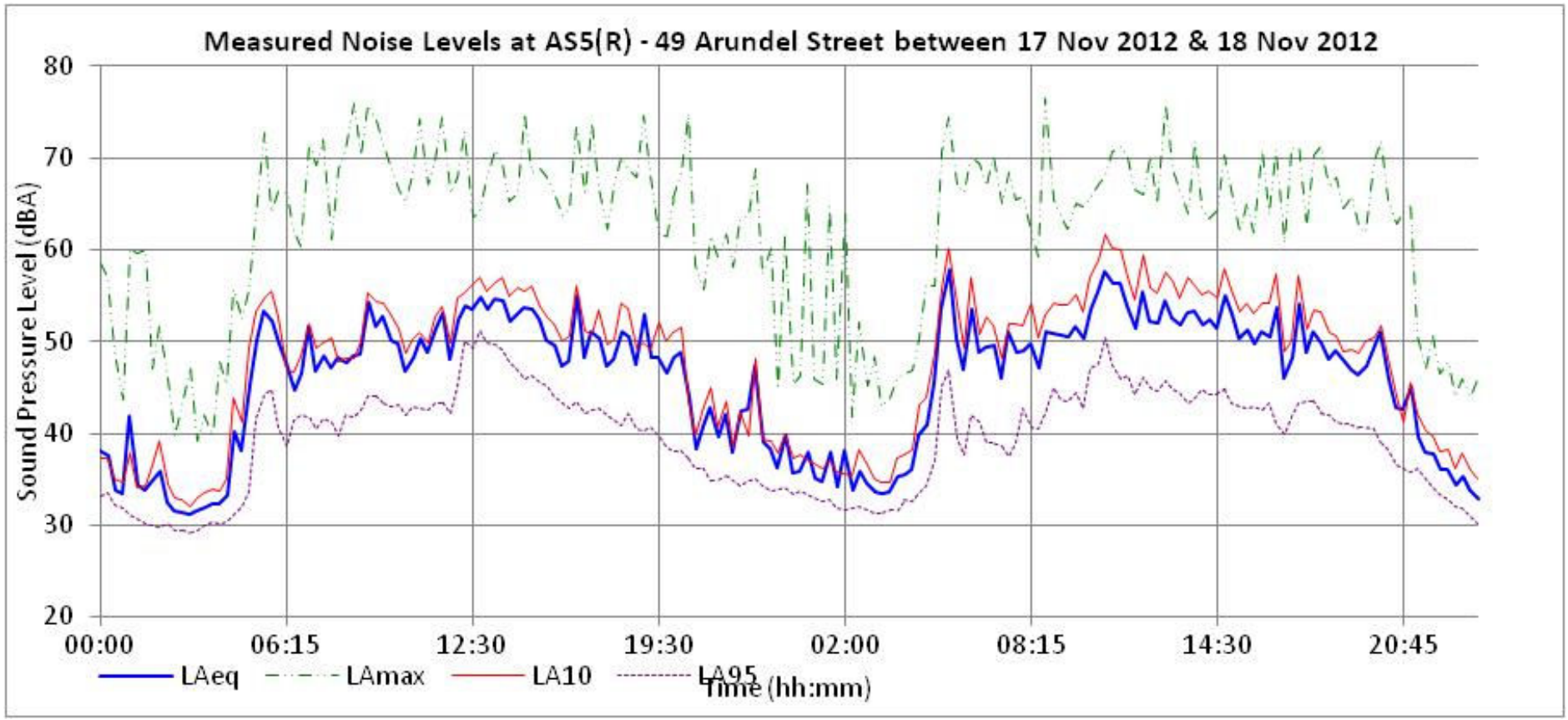
PS25

Date	Period	Average Sound Level, dB L_{Aeq}	L_{A10}	L_{A95}	L_{Amax}
Tuesday 13 November 2012	Day - 7.00am - 10.00pm	46	49	38	68
	Night - 10.00pm - 7.00am	-	-	-	-
Wednesday 14 November 2012	Day - 7.00am - 10.00pm	-	-	-	-
	Night - 10.00pm - 7.00am	47	51	35	69
Thursday 15 November 2012	Day - 7.00am - 10.00pm	51	53	44	77
	Night - 10.00pm - 7.00am	-	-	-	-
Daily averages over entire period	Day - 7.00am - 10.00pm	49	51	41	77
	Night - 10.00pm - 7.00am	47	51	35	69



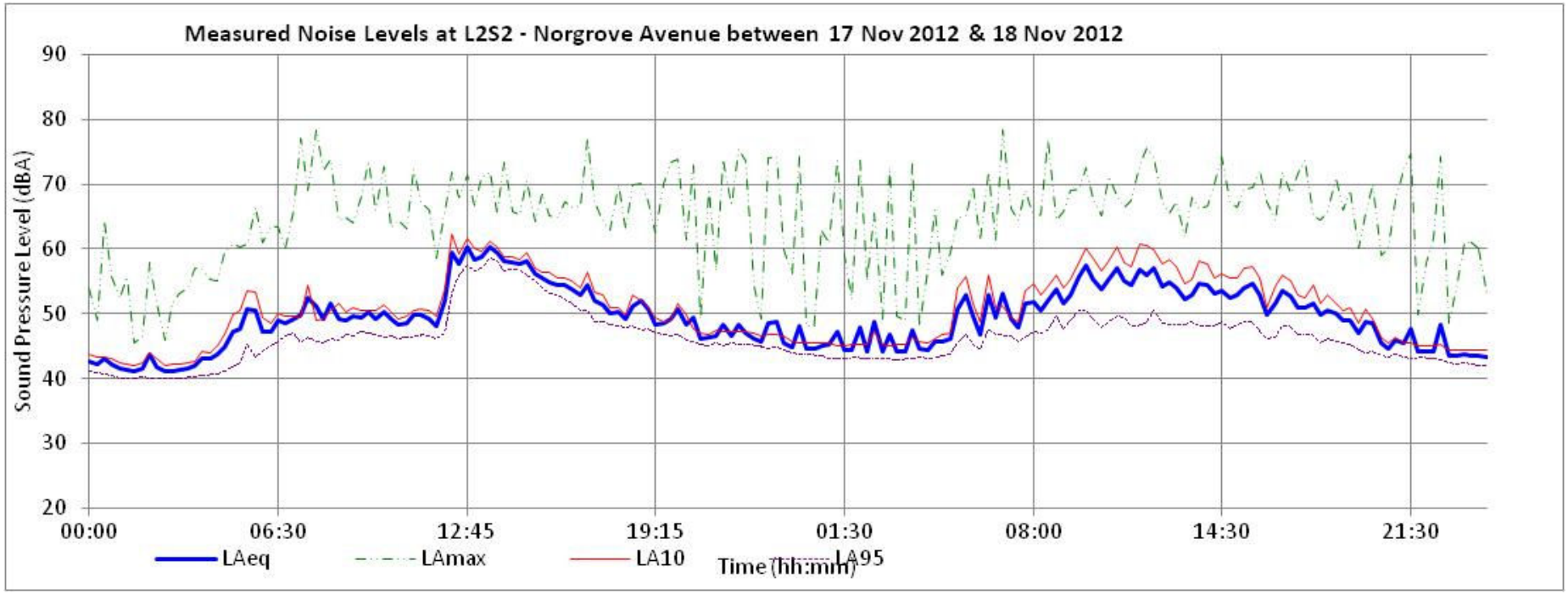
AS5

Date	Period	Average Sound Level, dB L_{Aeq}	L_{A10}	L_{A95}	L_{Amax}
Saturday 17 November 2012	Day - 7.00am - 10.00pm	51	52	42	76
	Night - 10.00pm - 7.00am	47	49	35	75
Sunday 18 November 2012	Day - 7.00am - 10.00pm	52	55	43	77
	Night - 10.00pm - 7.00am	43	46	33	72
Daily averages over entire period	Day - 7.00am - 10.00pm	51	54	43	77
	Night - 10.00pm - 7.00am	45	48	34	75



L2S2

Date	Period	Average Sound Level, dB L_{Aeq}	L_{A10}	L_{A95}	L_{Amax}
Saturday 17 November 2012	Day - 7.00am - 10.00pm	54	55	49	78
	Night - 10.00pm - 7.00am	48	49	44	79
Sunday 18 November 2012	Day - 7.00am - 10.00pm	53	56	47	79
	Night - 10.00pm - 7.00am	46	47	43	74
Daily averages over entire period	Day - 7.00am - 10.00pm	53	55	48	79
	Night - 10.00pm - 7.00am	47	48	44	79



L3S5

Date	Period	Average Sound Level, dB L_{Aeq}	L_{A10}	L_{A95}	L_{Amax}
Saturday 17 November 2012	Day - 7.00am - 10.00pm	53	55	45	84
	Night - 10.00pm - 7.00am	47	47	34	80
Sunday 18 November 2012	Day - 7.00am - 10.00pm	52	54	42	83
	Night - 10.00pm - 7.00am	50	46	30	82
Daily averages over entire period	Day - 7.00am - 10.00pm	53	54	44	84
	Night - 10.00pm - 7.00am	49	47	32	82