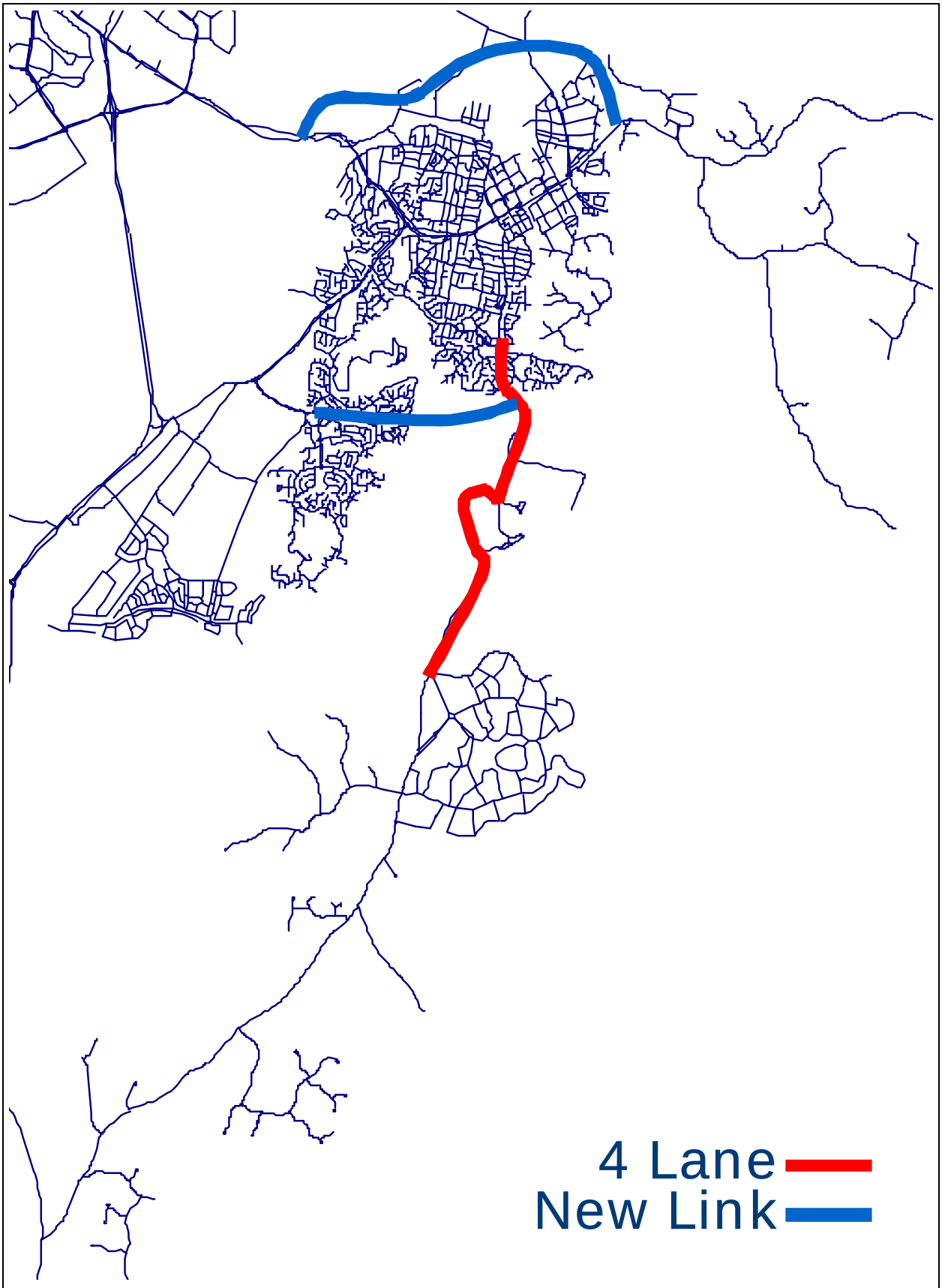
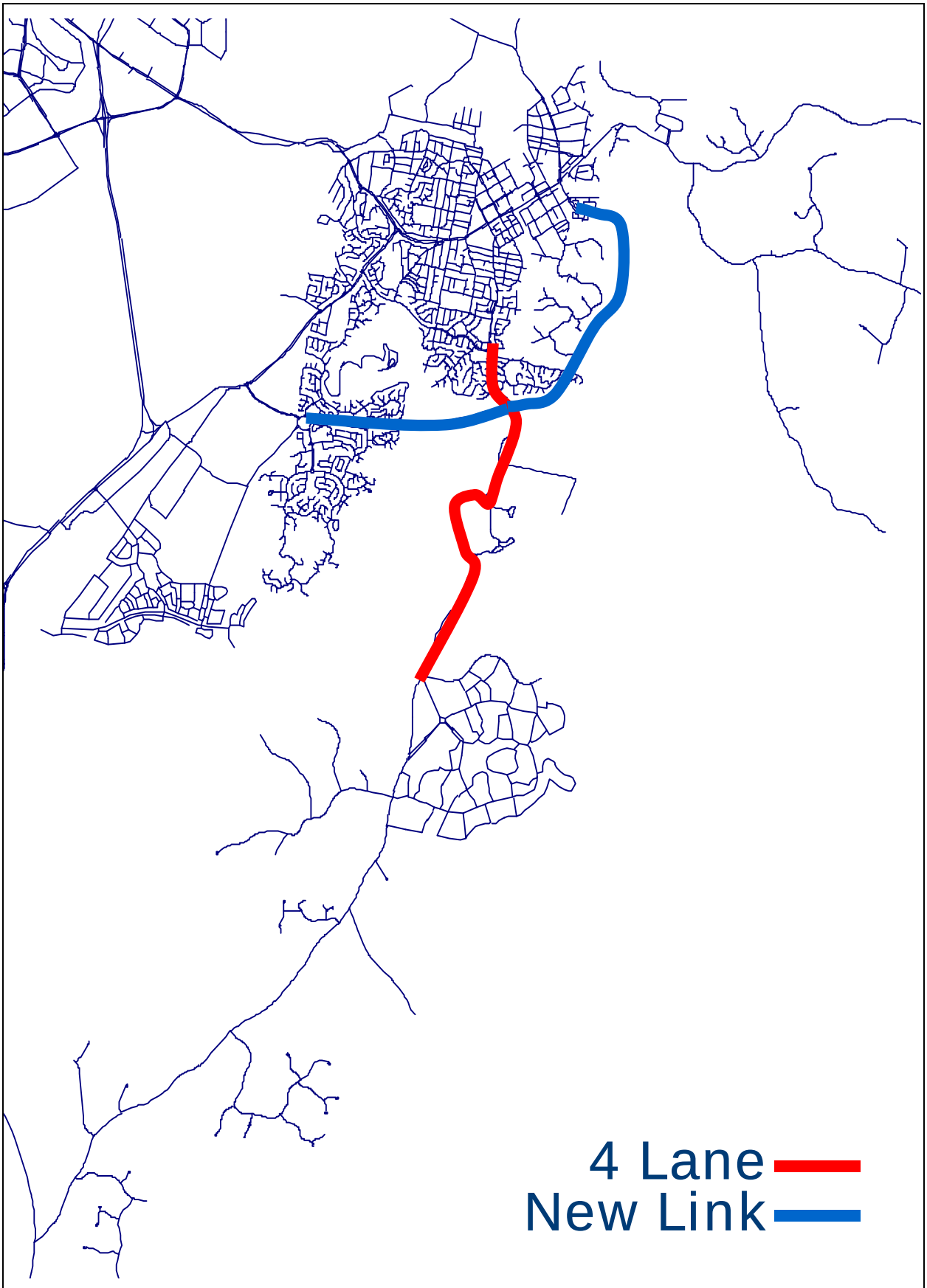
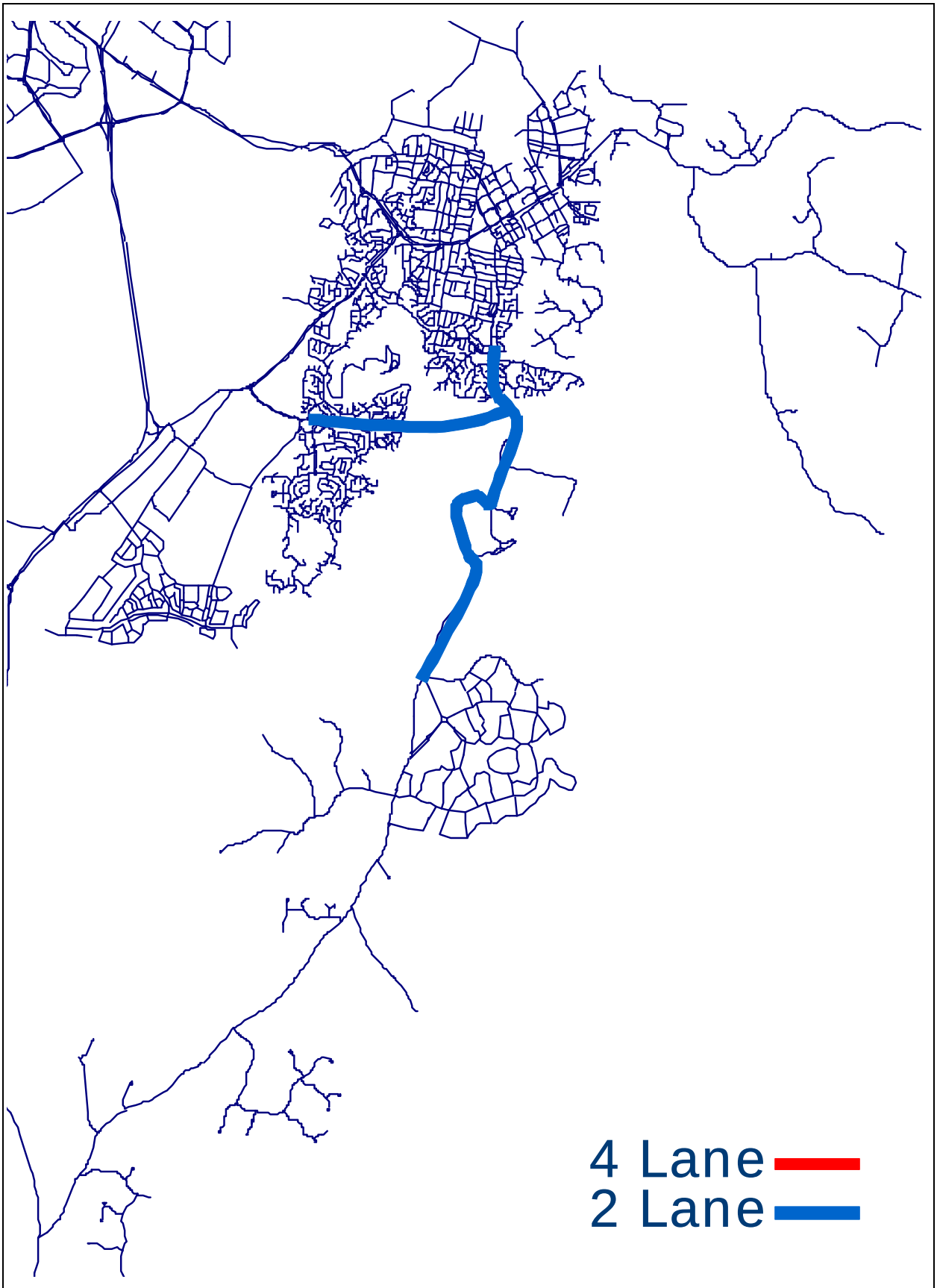


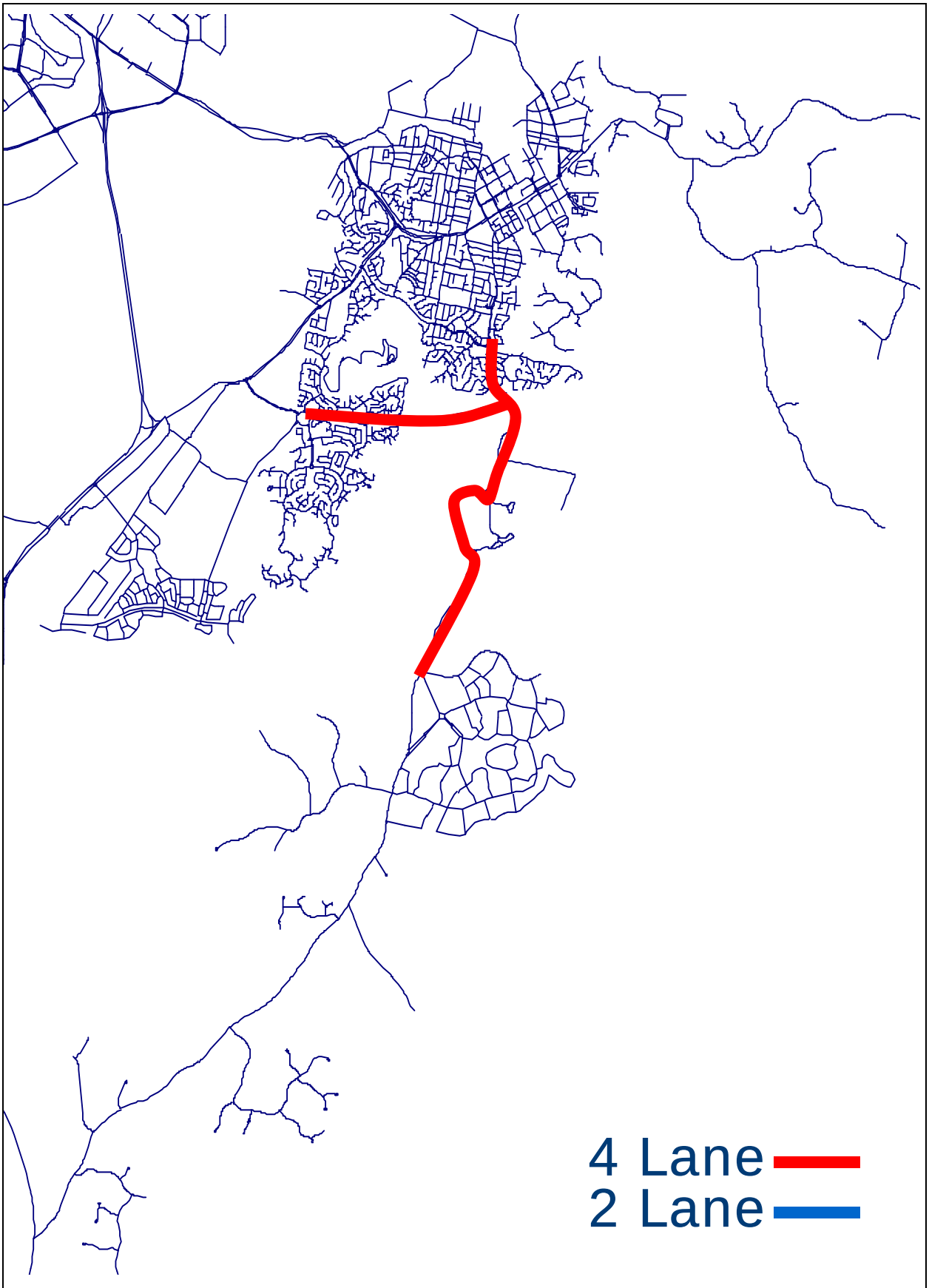
Googong and Tralee Traffic Study (2031)	**2031 Proposed Project Option Improvement 004**	**Figure 13**
Gabites Porter Consultants		



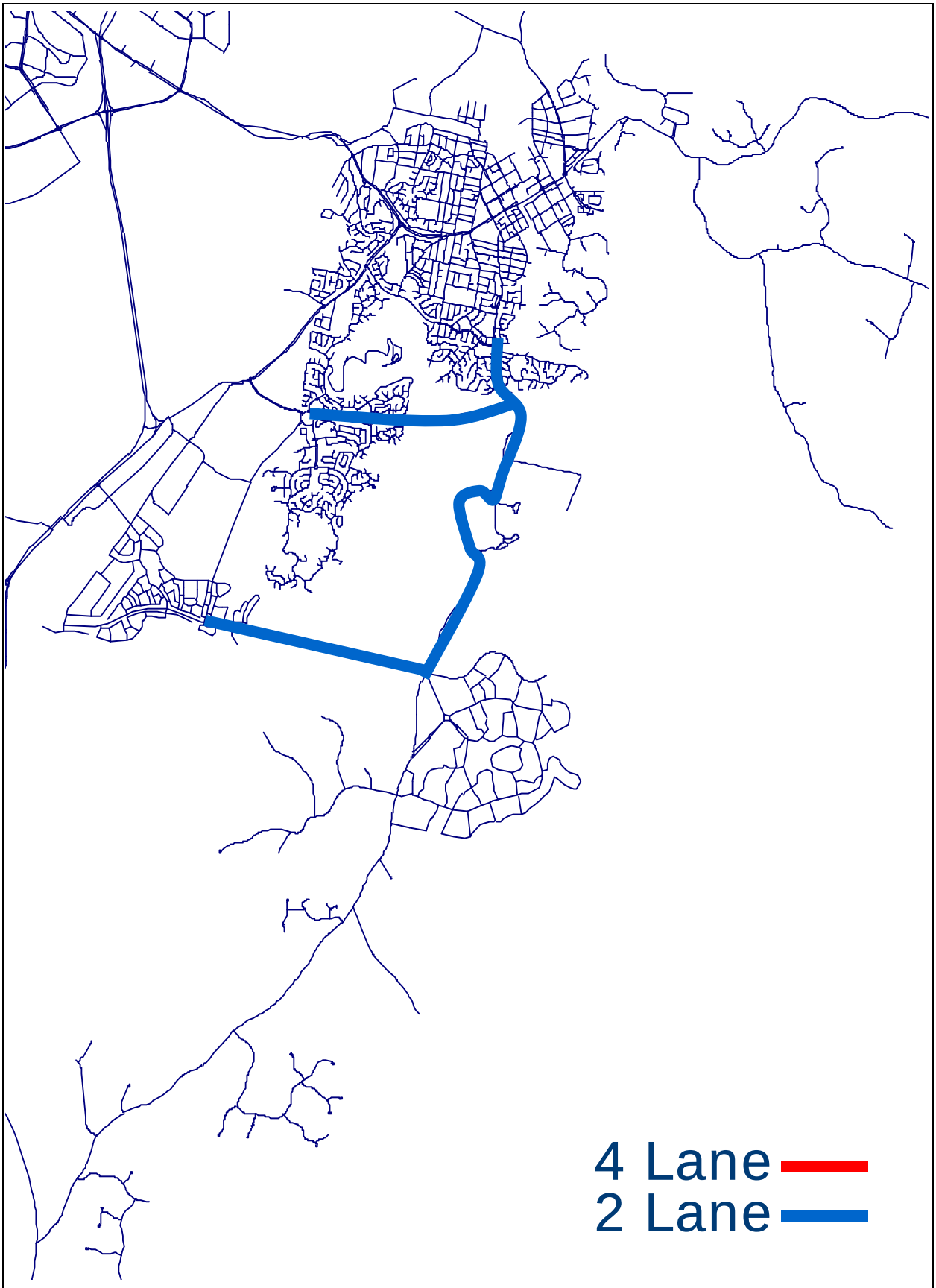
Googong and Tralee Traffic Study (2031)	**2031 Proposed Project Option Improvement 005**	**Figure 14**
Gabites Porter Consultants		



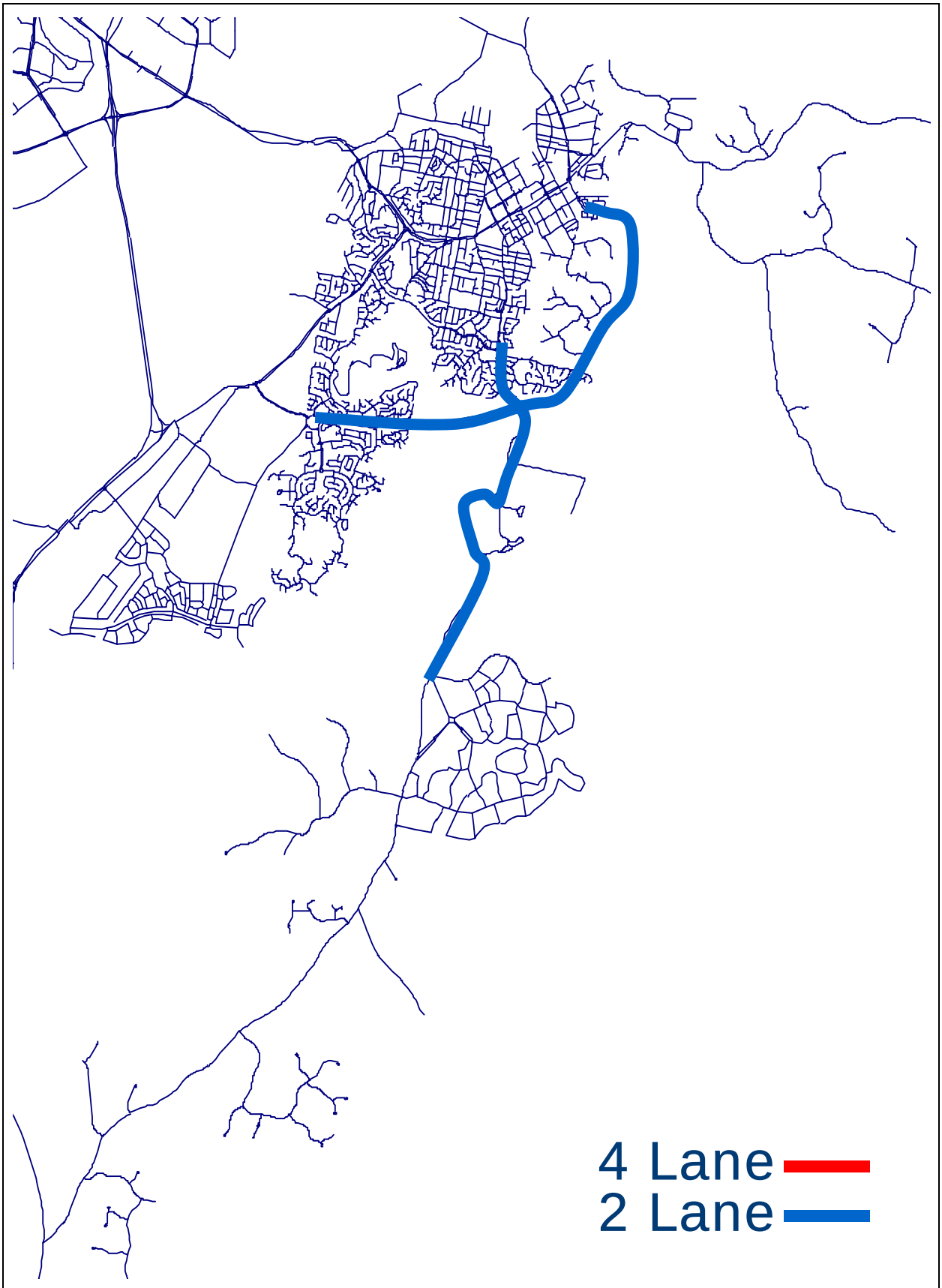
Googong and Tralee Traffic Study (2031)	**2031 Proposed Project Option Improvement CIC 1A**	**Figure 15**
Gabites Porter Consultants		



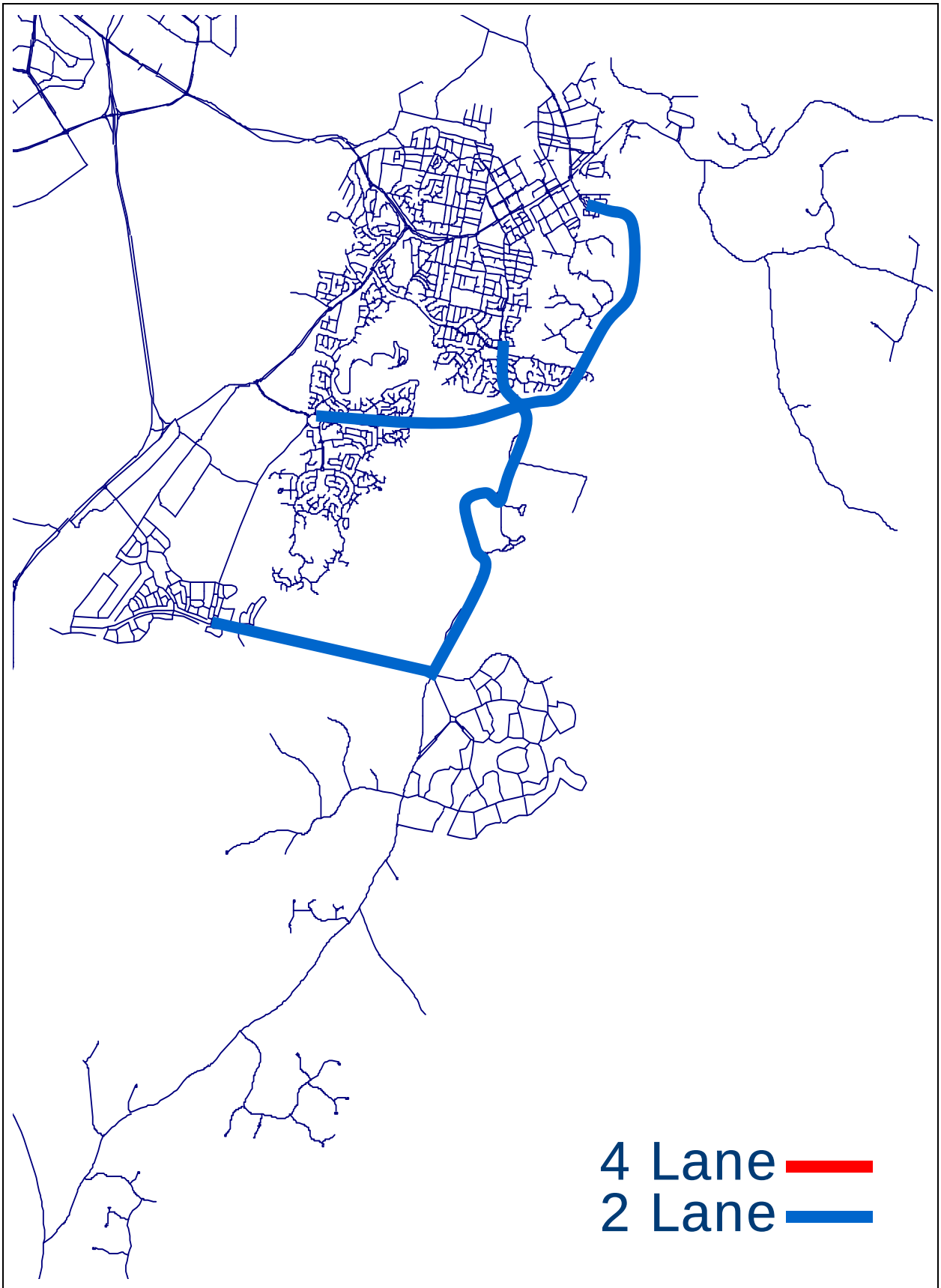
Googong and Tralee Traffic Study (2031)	**2031 Proposed Project Option Improvement CIC 1B**	**Figure 16**
Gabites Porter Consultants		



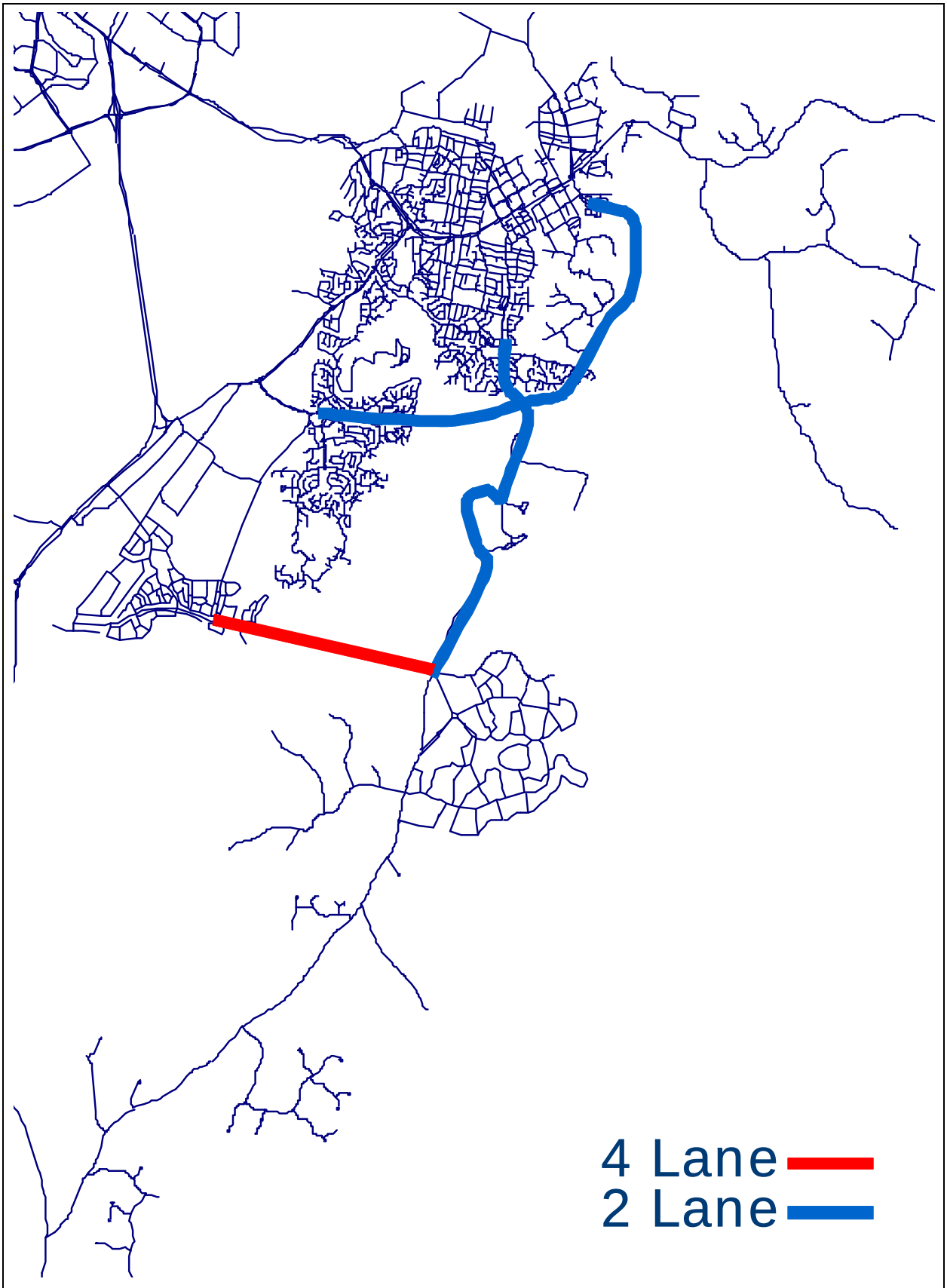
Googong and Tralee Traffic Study (2031)	**2031 Proposed Project Option Improvement CIC 2**	**Figure 17**
Gabites Porter Consultants		



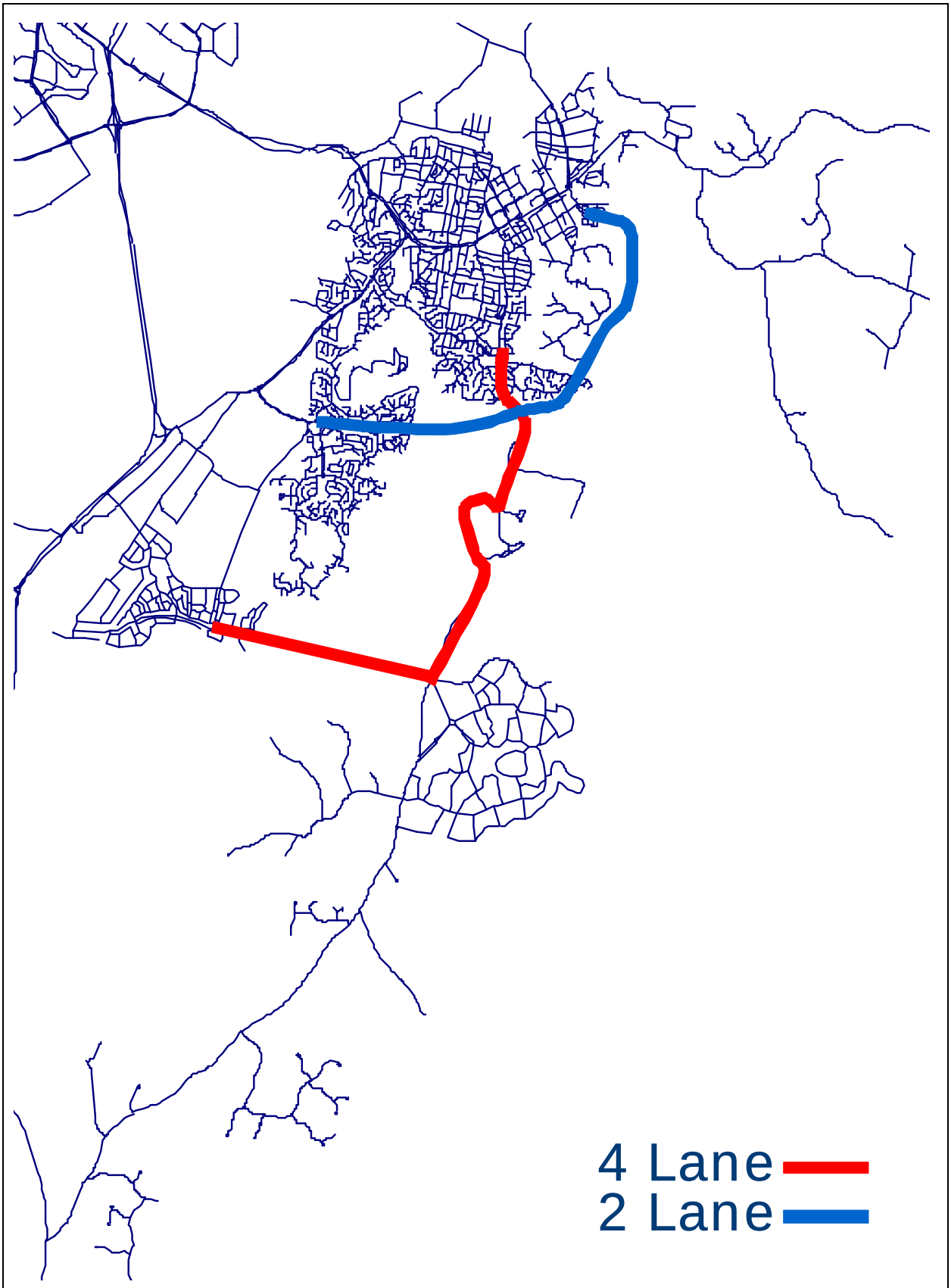
Googong and Tralee Traffic Study (2031)	**2031 Proposed Project Option Improvement CIC 3**	**Figure 18**
Gabites Porter Consultants		



Googong and Tralee Traffic Study (2031)	**2031 Proposed Project Option Improvement CIC 4**	**Figure 19**
Gabites Porter Consultants		



Googong and Tralee Traffic Study (2031)	**2031 Proposed Project Option Improvement VBC 5**	**Figure 20**
Gabites Porter Consultants		



Googong and Tralee Traffic Study (2031)	**2031 Proposed Project Option Improvement VBC 6**	**Figure 21**
Gabites Porter Consultants		

Each of these 12 project options were analysed using the transportation model developed for Queanbeyan. The projected 2031 traffic volumes and level of service results are shown in **Appendix 4 – 2031 Full Development Options AM Peak** and **Appendix 5 – 2031 Full Development Options PM Peak**.

Travel summary statistics, shown in **Table 12** and **Table 13,** were obtained for each Option so that a direct comparison of the overall impacts could be compared. This comparison would help in determining the relative merits of each option.

Travel Summaries of the Modelled Queanbeyan Option for 2031 – Part 1							Table 12
	Variable	BASE	001	002	003	004	005
2031 AM PEAK	Total Vehicle Kilometres	152010	146399	145956	147077	149283	150354
	Total Vehicle Minutes	220632	200542	205729	204193	211198	207534
	Vehicles subject to I/S Delay	263945	245647	250831	262613	248552	264992
	Total Vehicle I/S Delay (mins)	48782	39517	43099	40514	43889	40461
	I/S Delay per delayed veh (secs)	11.1	9.7	10.3	9.3	10.6	9.2
2031 PM PEAK	Total Vehicle Kilometres	160570	155403	154741	155700	159167	160108
	Total Vehicle Minutes	243726	215708	220082	220556	222397	223534
	Vehicles subject to I/S Delay	300836	279419	285442	290978	285890	295117
	Total Vehicle I/S Delay (mins)	60952	43034	45595	45255	46453	46056
	I/S Delay per delayed veh (secs)	12.2	9.2	9.6	9.3	9.7	9.4

Travel Summaries of the Modelled Queanbeyan Option for 2031 – Part 2									Table 13
	Variable	BASE	C1A	C1B	C02	C03	C04	V05	V06
2031 AM PEAK	Total Vehicle Kilometres	152010	149584	149787	146407	150123	146959	146399	147055
	Total Vehicle Minutes	220632	239646	211998	214069	234080	207558	200542	203002
	Vehicles subject to I/S Delay	263945	268539	264007	264676	268151	263535	245647	262361
	Total Vehicle I/S Delay (mins)	48782	52146	42914	44865	51497	42914	39517	40020
	I/S Delay per delayed veh (secs)	11.1	11.7	9.8	10.2	11.5	9.8	9.7	9.2
2031 PM PEAK	Total Vehicle Kilometres	160570	159637	159469	154889	159726	155597	155468	155685
	Total Vehicle Minutes	243726	254830	227766	230377	251840	223973	220254	217922
	Vehicles subject to I/S Delay	300836	300776	300847	298963	296579	293103	292685	292163
	Total Vehicle I/S Delay (mins)	60952	61482	48277	51336	58743	48257	46542	44664
	I/S Delay per delayed veh (secs)	12.2	12.3	9.6	10.3	11.9	9.9	9.5	9.2

8.3 Option Elimination

After examining the results of the analysis, it became clear that a number of these options either did not fulfil the role intended, did not improve the future network deficiencies or were too expensive.

Options 001, 002 and 004 which included the Northern Bypass were not proceeded with. The Northern Bypass successfully diverted traffic around the busy Queanbeyan CBD and therefore reduced congestion issues along Monaro St. However, the Roads and Traffic Authority (RTA) advised that alignment issues made the bypass too expensive at this time. The benefits gained by the traffic diversion were currently insufficient to warrant any project including the Northern Bypass.

A comparison of the volumes along the Edwin Land Parkway Extension between Option C1A and other options indicated that the four laning of the Edwin Land Parkway Extension from Jerrabomberra to Old Cooma Rd produced no difference in traffic flow when compared to a two lane version. This therefore produced no real benefit to the network for the additional expense and was not proceeded with.

Options CIC 1A, CIC 2, CIC 3, CIC 4 and VBC 5 which did not include the four laning of Old Cooma Rd were also eliminated. The level of congestion along Old Cooma Rd as a result of the Googong development requires four laning in order to maintain a suitable level of service during peak periods. No alternative roading project reduced flow along the two lane Old Cooma Rd alignment sufficiently to maintain the suitable level of service. Whilst options that included Dunns Creek reduced the flow along Old Cooma Rd they did not do so sufficiently to reduce volumes to LOS D level.

Options 001, 002, 003, CIC 4, VBC 5 and VBC 6 which involving the construction of the Dunns Creek link were also eliminated. The Dunns Creek link between the Tralee and Googong developments was seen by the Technical Working Group as being a useful inclusion in the future Queanbeyan network but would not likely be required within the current 2031 planning horizon. The ability of the Dunns Creek link to reduce traffic flow along Old Cooma Rd and the Edwin Land Parkway Extension was seen as being valuable in the future but could not be justified at this time.

The four laning of the Dunns Creek link as shown in Options VBC 5 and VBC 6 made no difference to the volume of traffic expected to use the link and was therefore believed to be required some years after the construction of the two lane link.

This process eliminated all but Project Option 005. Discussion within the Technical Working Group concluded that variations in a number of the other Project Options should also be included in further analysis for both comparison purposes and because a number of options contained elements that showed promise.

8.4 Initial Shortlisted Options

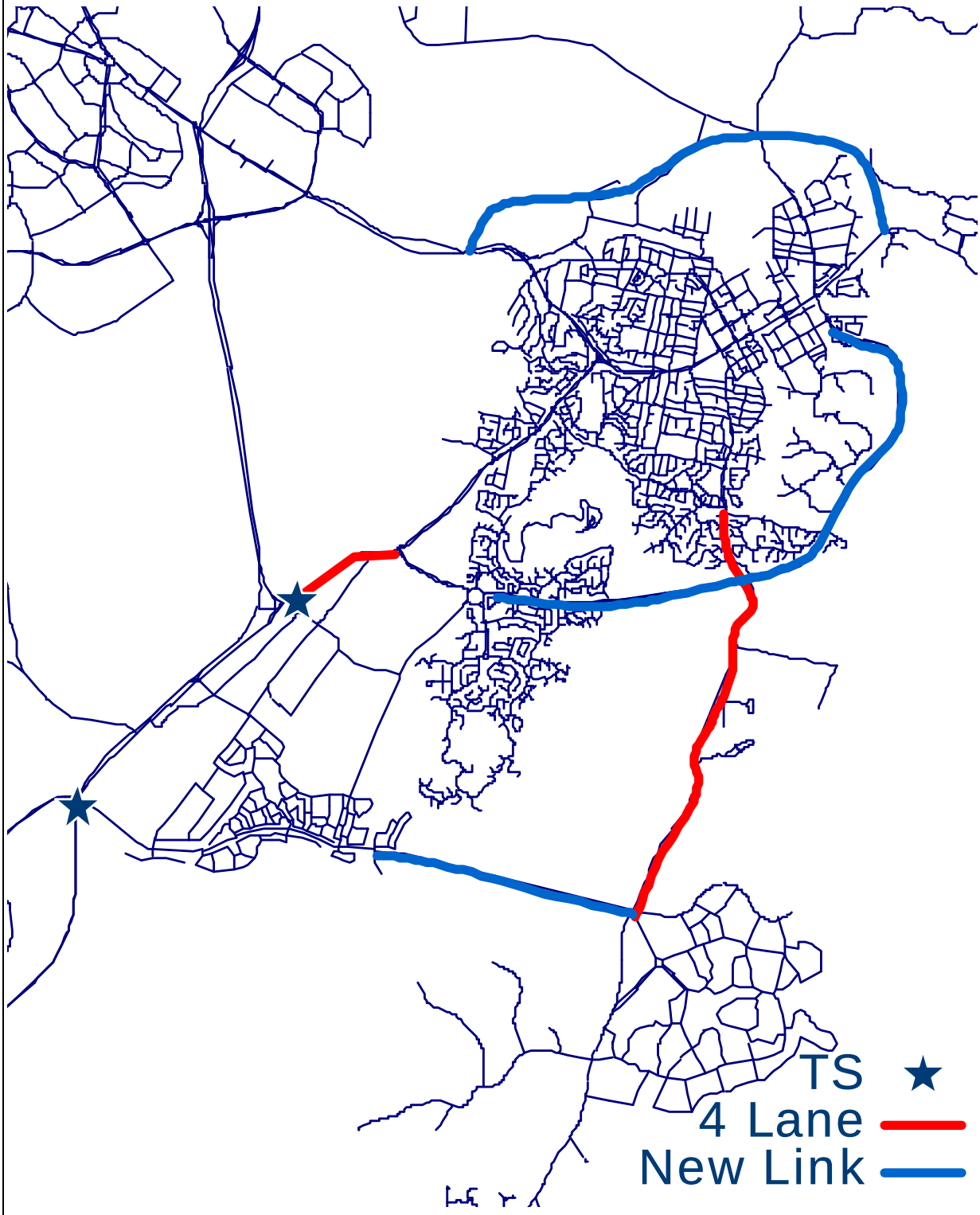
Six shortlisted options were carried forward into a more detailed analysis where intersection improvements were included with the link improvements so that an attempt was made to eliminate all link and intersection deficiencies.

The modified options analysed were as follows:

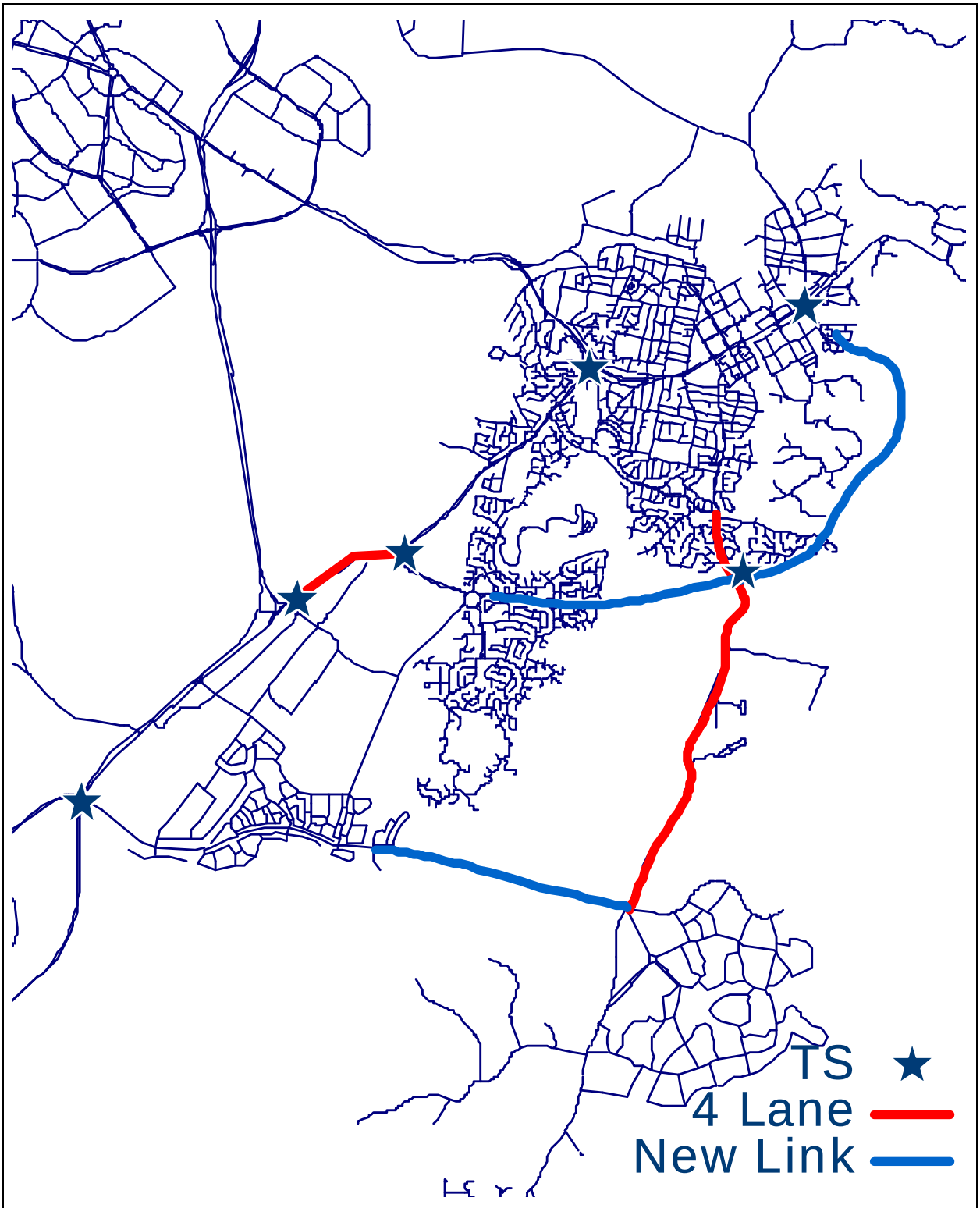
- Option 01A – Option 001 with improvements installed at Isabella / Monaro and Shepherd / Lanyon in the ACT to reduce possible capacity constraints in the area.
- Option 03A – Option 003 with improvements installed at Isabella / Monaro and Shepherd / Lanyon in the ACT to reduce possible capacity constraints in the area. Queanbeyan intersection improvements included:
    - Lanyon / Tompsitt
    - Lanyon Canberra
    - Bungendore / Atkinson
    - Old Cooma / Edwin Land Parkway Extension

- Option 05A – Option 005 with improvements installed at Isabella / Monaro and Shepherd / Lanyon in the ACT to reduce possible capacity constraints in the area. Queanbeyan intersection improvements included:
    - Lanyon / Tompsitt
    - Lanyon Canberra
    - Bungendore / Atkinson
    - Old Cooma / Edwin Land Parkway Extension
- Option CBA – Option CIC 1A with Southbar Rd four laned from Cooma St to Lanyon Rd. It also included improvements installed at Isabella / Monaro and Shepherd / Lanyon in the ACT to reduce possible capacity constraints in the area. Queanbeyan intersection improvements included:
    - Lanyon / Tompsitt
    - Lanyon Canberra
    - Bungendore / Atkinson
    - Old Cooma / Edwin Land Parkway Extension
- Option CBB – Option CIC 1B with Southbar Rd four laned from Cooma St to Lanyon Rd. It also included improvements installed at Isabella / Monaro and Shepherd / Lanyon in the ACT to reduce possible capacity constraints in the area. Queanbeyan intersection improvements included:
    - Lanyon / Tompsitt
    - Lanyon Canberra
    - Bungendore / Atkinson
    - Old Cooma / Edwin Land Parkway Extension
- Option C2A – Option CIC 2 with improvements installed at Isabella / Monaro and Shepherd / Lanyon in the ACT to reduce possible capacity constraints in the area. Queanbeyan intersection improvements included:
    - Lanyon / Tompsitt
    - Lanyon Canberra
    - Bungendore / Atkinson
    - Old Cooma / Edwin Land Parkway Extension

These initial shortlisted options are shown in **Figure 22** to **Figure 27.**

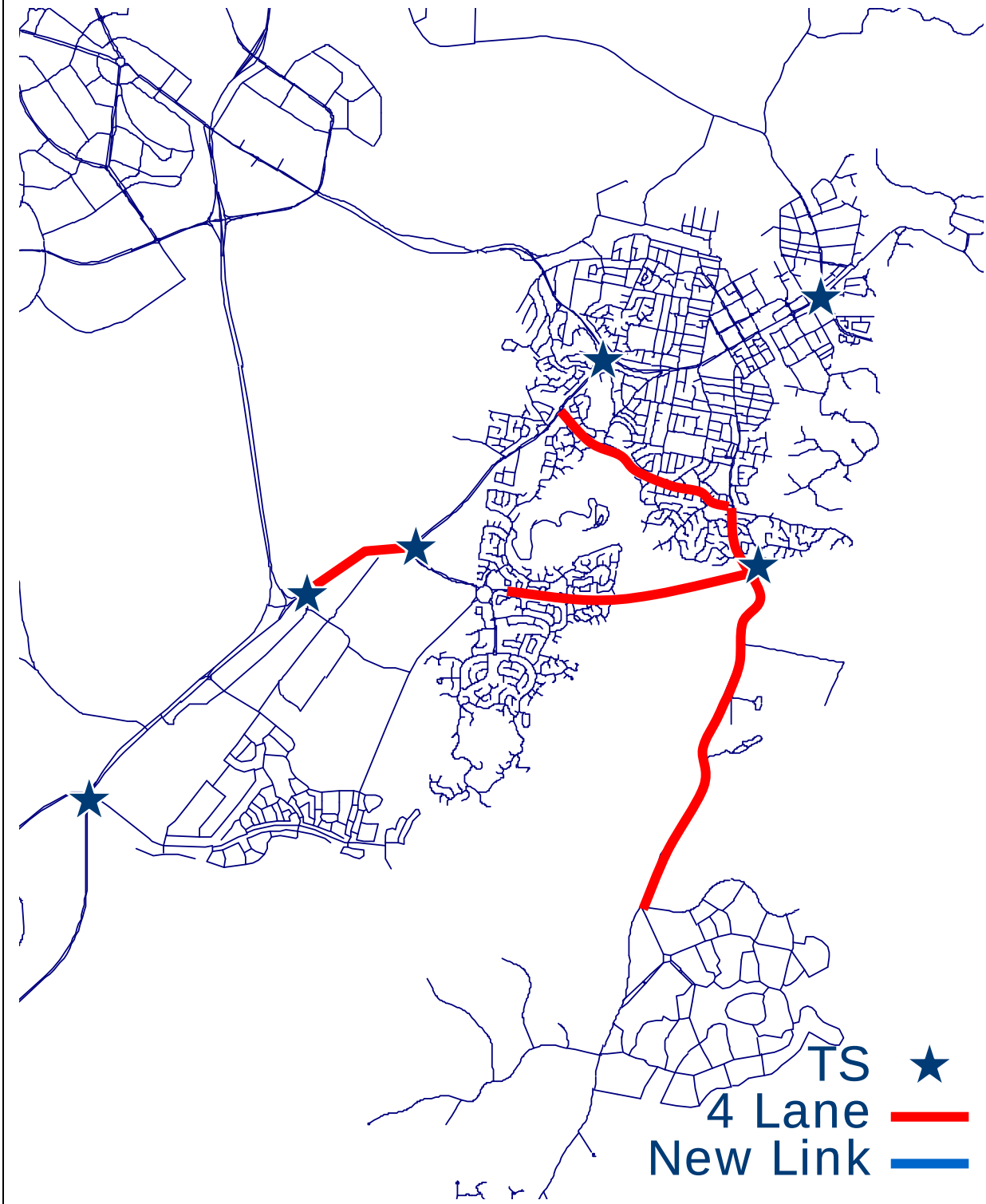


Googong and Tralee Traffic Study (2031)	**2031 Shortlisted Project Option Improvement 01A**	**Figure 22**
Gabites Porter Consultants		

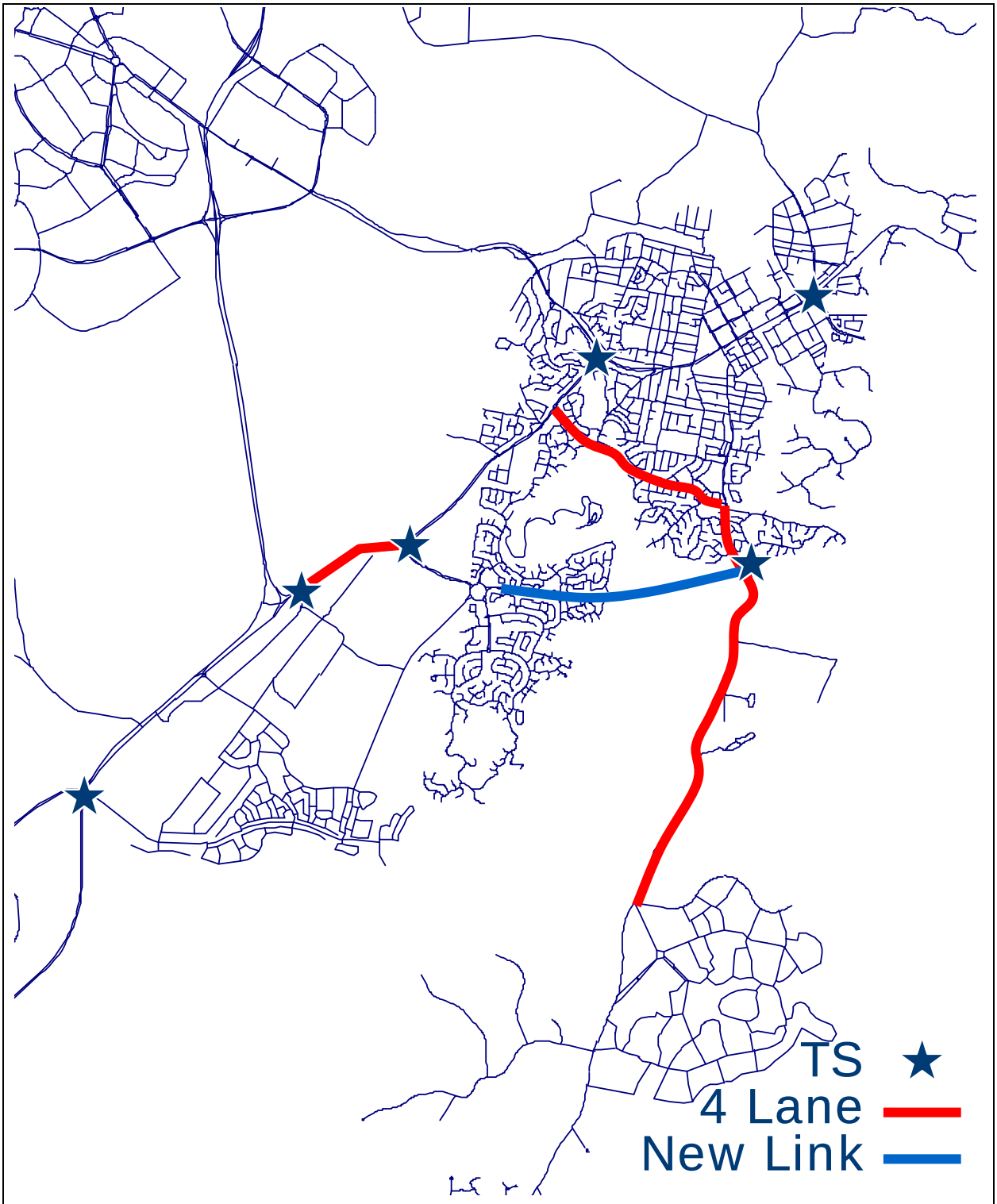


Googong and Tralee Traffic Study (2031)	**2031 Shortlisted Project Option Improvement 03A**	**Figure 23**
Gabites Porter Consultants		

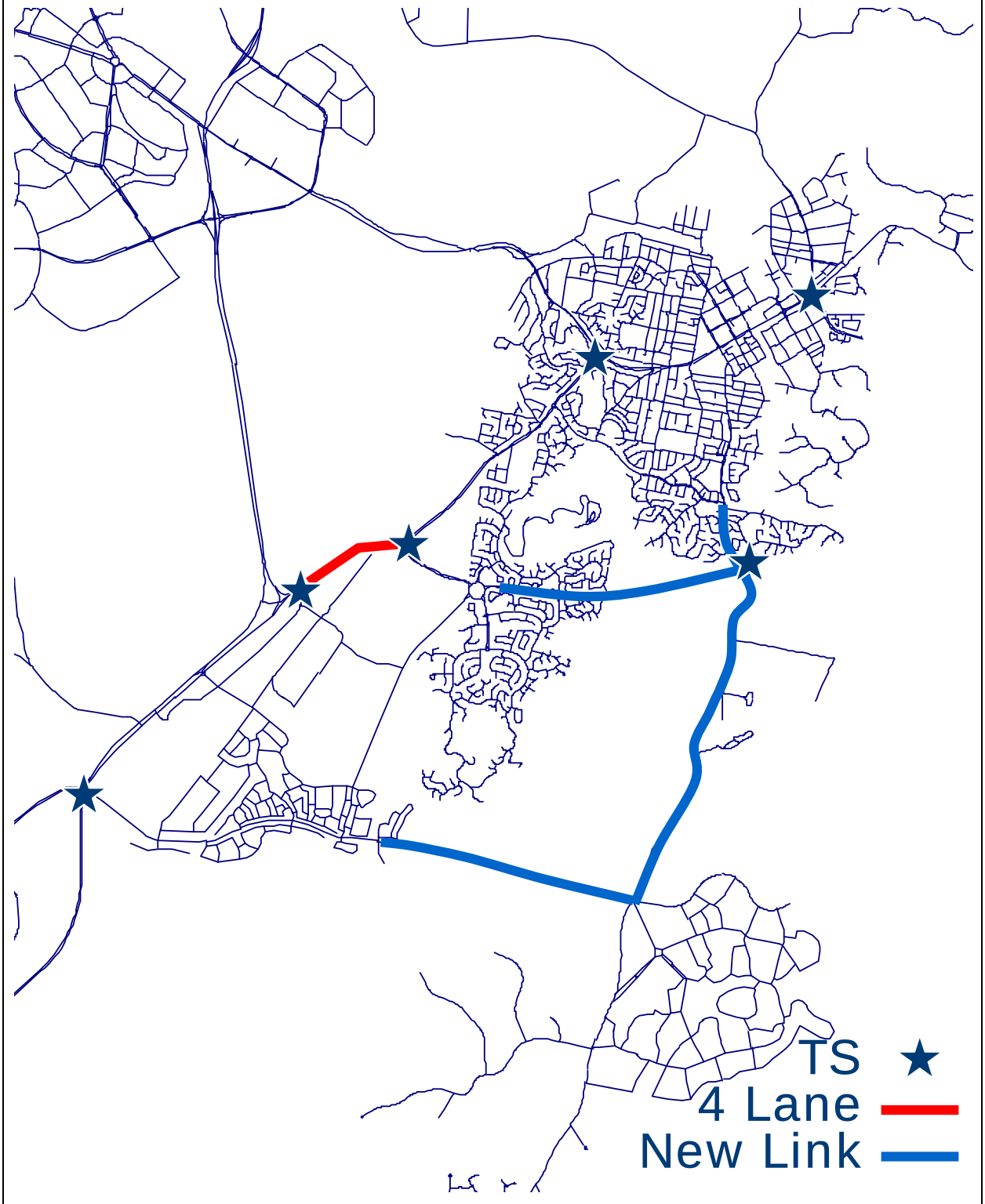
Googong and Tralee Traffic Study (2031)	**2031 Shortlisted Project Option Improvement 05A**	**Figure 24**
Gabites Porter Consultants		



Googong and Tralee Traffic Study (2031)	**2031 Shortlisted Project Option Improvement CBA**	**Figure 25**
Gabites Porter Consultants		



Googong and Tralee Traffic Study (2031)	**2031 Shortlisted Project Option Improvement CBB**	**Figure 26**
Gabites Porter Consultants		



Googong and Tralee Traffic Study (2031)	**2031 Shortlisted Project Option Improvement C2A**	**Figure 27**
Gabites Porter Consultants		

Each of these Shortlisted Project Options were analysed using the transportation model with intersection configurations altered to provide the best result for deficient intersections. This was an iterative process that involved progressively making changes to intersections until intersection operation resulted in an overall LOS of D or better.

The projected 2031 traffic volumes and level of service results are shown in **Appendix 6 – 2031 Full Development Initial Shortlisted Options AM Peak** and **Appendix 7 – 2031 Full Development Initial Shortlisted Options PM Peak**.

AT this point in the process it became evident that several of these remaining options were not suitable. Option 01A, which included the Northern Bypass, was not proceeded with as the benefit gained by diverting traffic from the CBD was not thought to be sufficient within the planning period to warrant the cost.

Option CBA was not proceeded with as the four laning of both Edwin Land Parkway extension and Southbar Rd did not improve the LOS conditions along Cooma St sufficiently to maintain an LOS D. The four laning of Edwin Land Parkway extension also appeared to make little difference to the projected flow along the link compared to designing it as a two lane road.

Option CBB was also eliminated but was adjusted to remove the four laning along Southbar Rd and progressed to the next stage of analysis.

8.5 Intermediate Shortlisted Options

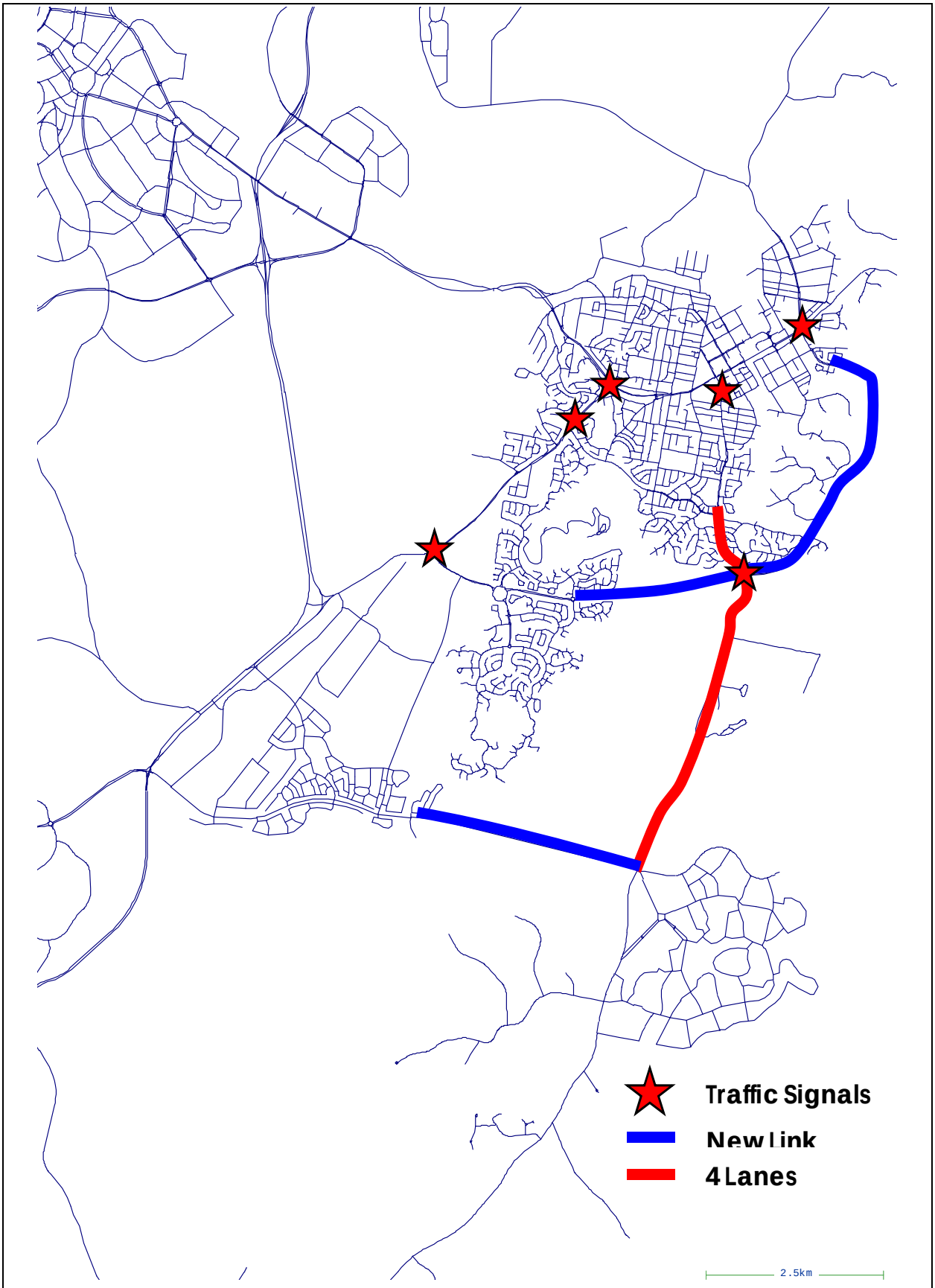
Five intermediate shortlisted options were carried forward into a more detailed analysis where intersection improvements were included with the link improvements so that every attempt was made to eliminate all link and intersection deficiencies.

The modified options analysed were as follows:

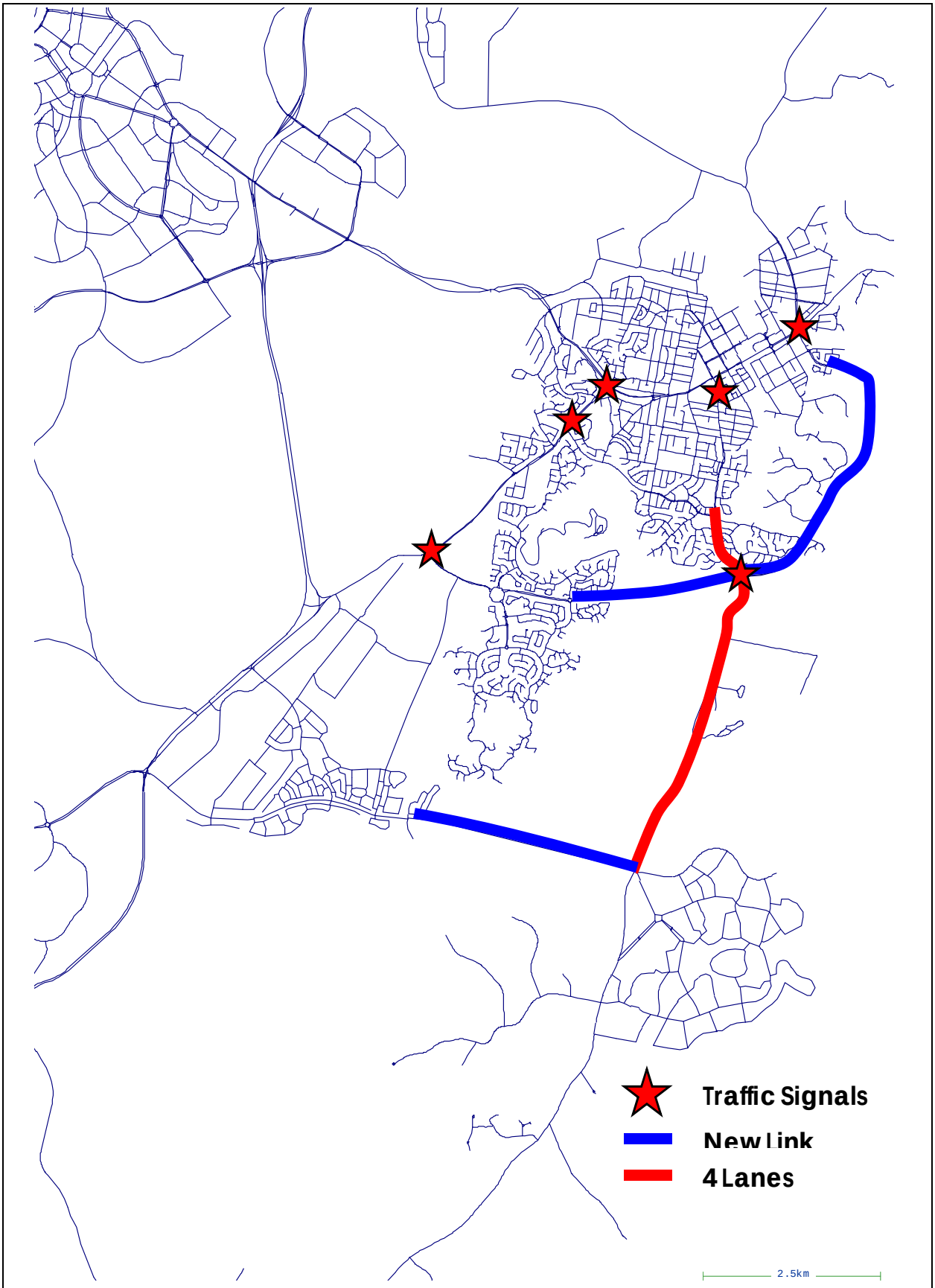
- Option 03B – Option 003/03A with east-west flyover at Old Cooma / Edwin Land Parkway, traffic signals installed at:
    - Bungendore / Yass
    - Lanyon / Tompsitt
    - Lanyon / Southbar
    - Lanyon Canberra
    - Cooma / Rutledge / Lowe
    - Old Cooma / Edwin Land Parkway Extension
- Option 03C – Option 003/03A with north-south flyover at Old Cooma / Edwin Land Parkway, traffic signals installed at:
    - Bungendore / Yass
    - Lanyon / Tompsitt
    - Lanyon / Southbar
    - Lanyon Canberra
    - Cooma / Rutledge / Lowe
    - Old Cooma / Edwin Land Parkway Extension

- Option 05B – Option 005/05B with traffic signals installed at:
    - Bungendore / Yass
    - Lanyon / Tompsitt
    - Lanyon / Southbar
    - Lanyon Canberra
    - Cooma / Rutledge / Lowe
    - Cooma / Fergus
    - Old Cooma / Edwin Land Parkway Extension
- Option CBC – Option CIC 1B / CBC with a 2 lane Edwin Land Parkway Extension, traffic signals installed at:
    - Bungendore / Yass
    - Bungendore / Atkinson
    - Lanyon / Tompsitt
    - Lanyon / Southbar
    - Lanyon Canberra
    - Cooma / Rutledge / Lowe
    - Cooma / Fergus
    - Old Cooma / Edwin Land Parkway Extension
- Option C2B – Option CIC 2 / C2A with 4 lane old Cooma Rd and 2 lane Dunns Creek, traffic signals installed at:
    - Bungendore / Yass
    - Bungendore / Atkinson
    - Lanyon / Tompsitt
    - Lanyon / Southbar
    - Lanyon Canberra
    - Cooma / Rutledge / Lowe
    - Cooma / Fergus
    - Old Cooma / Edwin Land Parkway Extension

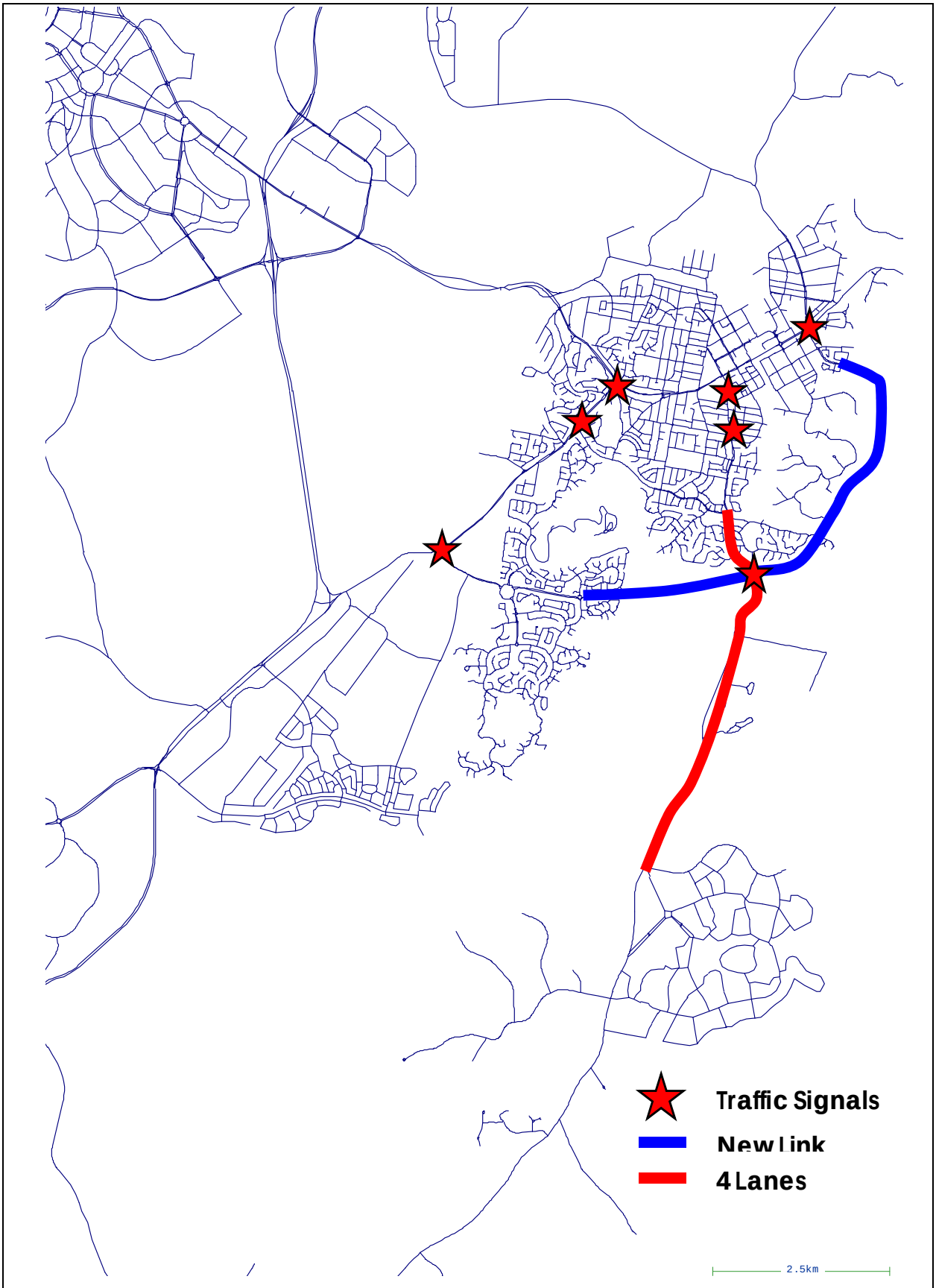
These shortlisted options are shown in **Figure 28** to **Figure 32**.



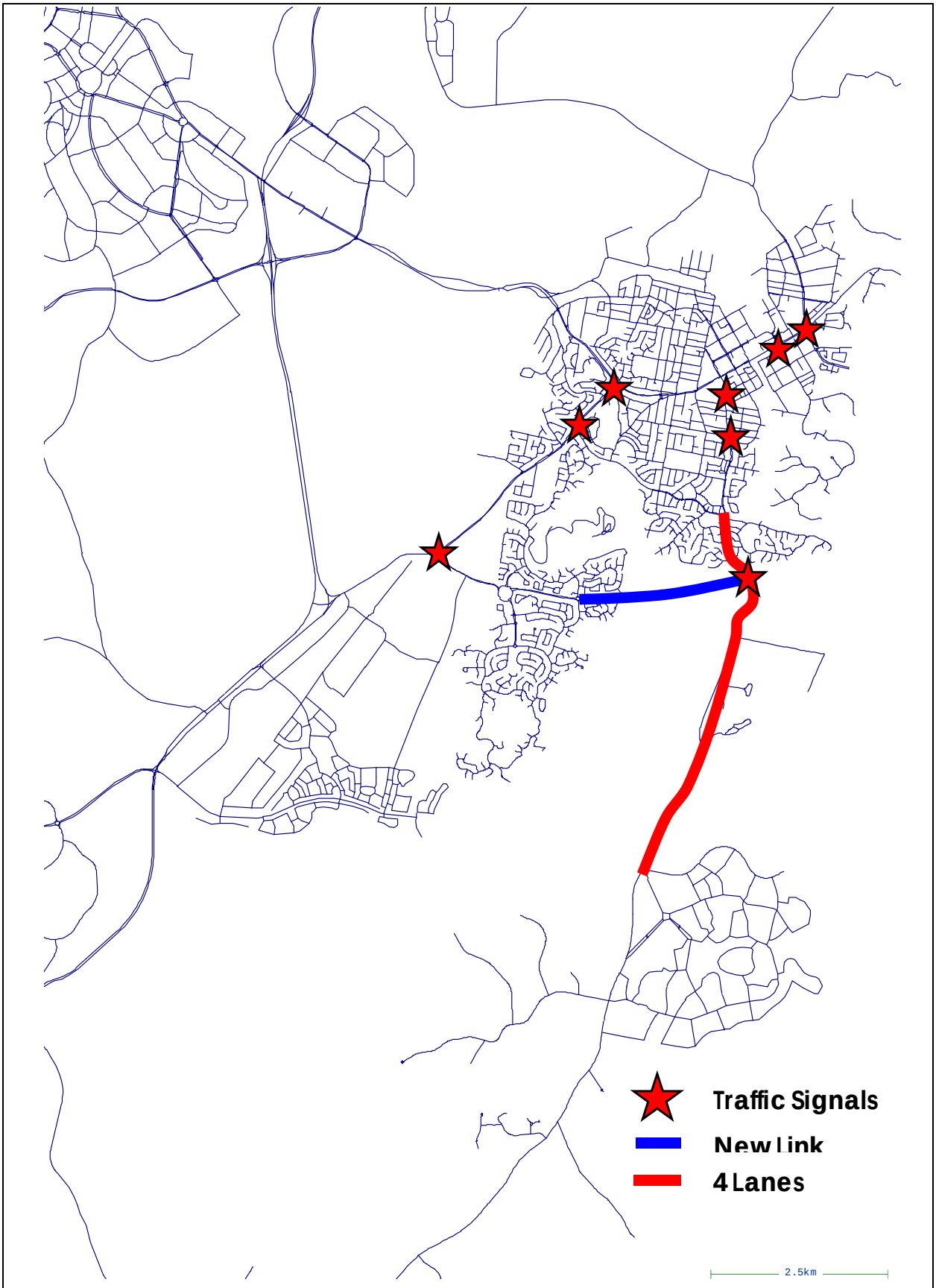
Googong and Tralee Traffic Study (2031)	**2031 Shortlisted Project Option Improvement 03B**	**Figure 28**
Gabites Porter Consultants		



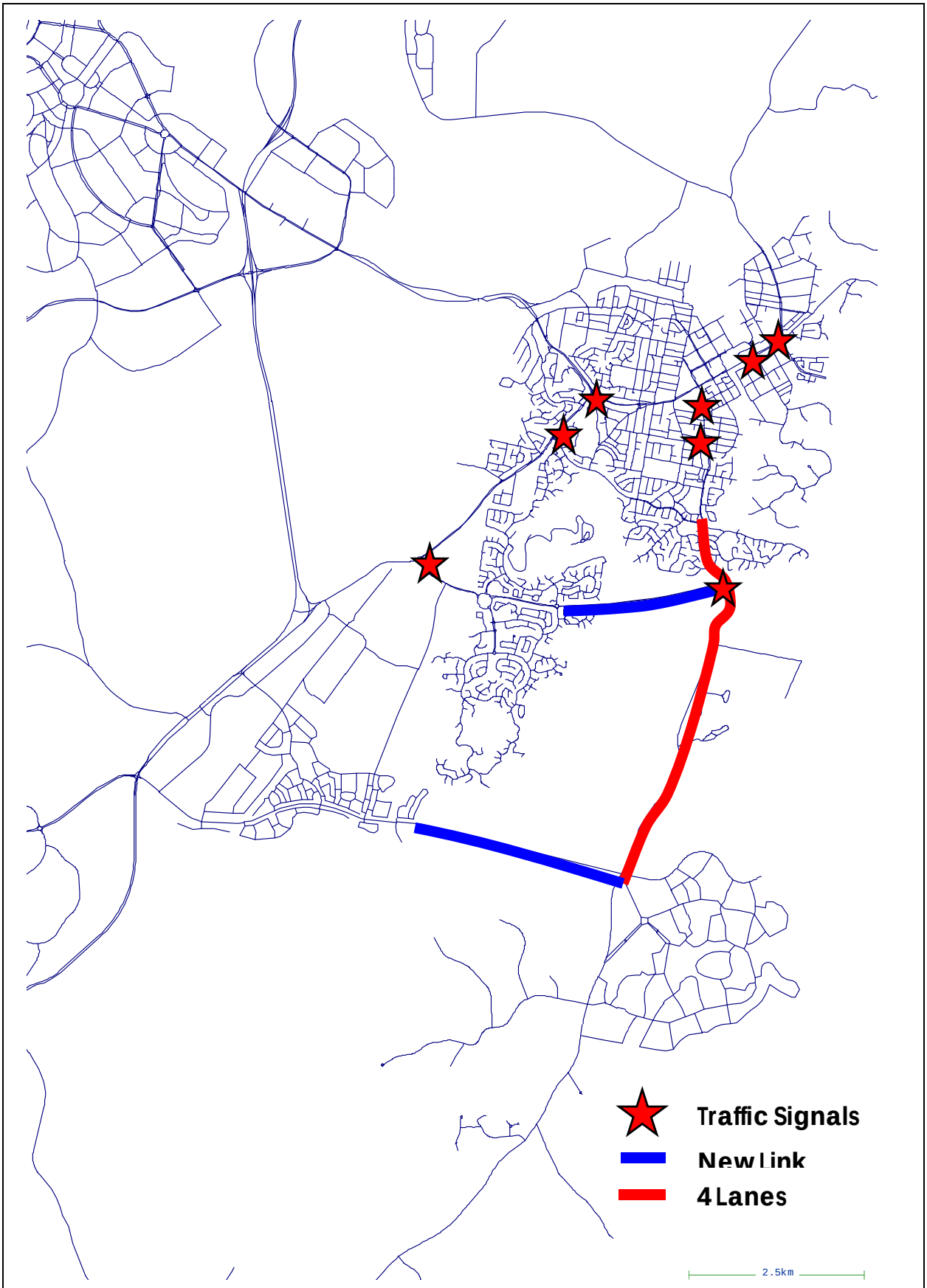
Googong and Tralee Traffic Study (2031)	**2031 Shortlisted Project Option Improvement 03C**	**Figure 29**
Gabites Porter Consultants		



Googong and Tralee Traffic Study (2031)	**2031 Shortlisted Project Option Improvement 05B**	**Figure 30**
Gabites Porter Consultants		



Googong and Tralee Traffic Study (2031)	**2031 Shortlisted Project Option Improvement CBC**	**Figure 31**
Gabites Porter Consultants		



Googong and Tralee Traffic Study (2031)	**2031 Shortlisted Project Option Improvement C2B**	**Figure 32**
Gabites Porter Consultants		

Each of these five Shortlisted Project Options were analysed using the transportation model developed for Queanbeyan. The projected 2031 traffic volumes and level of service results are shown in **Appendix 8 – 2031 Full Development Shortlisted Options AM Peak** and **Appendix 9 – 2031 Full Development Shortlisted Options PM Peak**.

Again, travel summary statistics, shown in **Table 14** were obtained for each Shortlisted Option so that a direct comparison of the overall impacts could be compared. This comparison would help in determining the relative merits of each option.

Travel Summaries of the Modelled Queanbeyan Option for 2031						Table 14
	Variable	**03B**	**O3C**	**05B**	**CBC**	**C2B**
2031 AM PEAK	Total Vehicle Kilometres (km)	146432	146493	149751	149206	145986
	Total Vehicle Minutes (mins)	197450	197070	199790	201570	199701
	Mean Network Speed (kph)	44.5	44.6	45.0	44.4	43.9
	Total vehicles Subject to Intersection Delay	255698	255831	254754	260591	259803
	Delay per Vehicle Delayed (secs)	7.9	7.7	8.1	8.2	7.9
2031 PM PEAK	Total Vehicle Kilometres (km)	156562	156642	160387	159667	155769
	Total Vehicle Minutes (mins)	220476	219984	224720	230291	225444
	Mean Network Speed (kph)	42.6	42.7	42.8	41.6	41.5
	Total vehicles Subject to Intersection Delay	293663	294526	295717	302554	301438
	Delay per Vehicle Delayed (secs)	7.3	7.2	7.9	8.5	7.9

8.6 Shortlisted Options with Monaro Highway Upgrade

The Technical Working Group felt that the significant reduction in LOS along the Monaro Highway between Isabella Drive and Lanyon Drive by 2031 may result in a reduction in the use of the Monaro-Lanyon route. This reduction could result in a change of overall travel pattern to and from the future developments and therefore "skew" the level of service results.

To test whether this potential skewing was actually taking place in the model, the five shortlisted options were all analysed again with the Monaro Highway upgraded to a 6 lane highway with significantly more capacity. The results of this analysis are shown in **Appendix 10 – 2031 Full Development Shortlisted Options AM Peak – Monaro Highway Upgrade** and **Appendix 11 – 2031 Full Development Shortlisted Options PM Peak – Monaro Highway Upgrade.**

This analysis showed that the six laning of the Monaro Highway significantly reduced the congestion along the highway and thereby improved the projected 2031 LOS substantially. The six laning did not however make any appreciable difference to the level of traffic flow along Lanyon Drive. This indicates that whilst the existing capacity of the highway is a hindrance to the smooth and rapid movement of traffic, it is not deflecting large numbers of vehicles away from the area. This could be due to the fact that this segment of highway forms part of only a few routes between areas that have quite distinct catchments. This means that speeding up that part of the route does not provide enough "time benefit" to other vehicles to attract them onto the route.

The Technical Working Group also wanted to ensure that congestion along Pialligo Ave did not make an appreciable difference to the operation of the shortlisted Options. Additional testing was undertaken with Pialligo Ave increased to four lanes. These tests showed that increasing the capacity of these roads made little difference to the flow of traffic within Queanbeyan.

8.7 Elimination of Shortlisted Options

Analysis of the shortlist Project Options showed that Options 03B, 03C and C2B, which involved the construction of Dunns Creek, were not significantly different to those without Dunns Creek and its associated cost. As indicated earlier, the Dunns Creek link between the Tralee and Googong developments was seen as being a useful inclusion in the future Queanbeyan network but would not likely be required within the current 2031 planning horizon.

The ability of the Dunns Creek link to reduce traffic flow along Old Cooma Rd and the Edwin Land Parkway Extension however the flow reduction along Old Cooma Rd was not sufficient by 2031 to preclude the need for four lanes. This route was seen by the Technical Working Group as being valuable in the future but could not be justified at this time.

Options 03B, 03C and C2B were therefore eliminated from further analysis. See **Appendix 8** and **9** for LOS results.

In addition, Options C2B and CBC resulted in a LOS E condition applying along Cooma St from Southbar Rd to Rutledge St. The lack of the Ellerton Rd Extension caused additional traffic to travel along Cooma St to access north and east Queanbeyan.

This process eliminated all but Option 05B. Discussion within the Technical Working Group concluded that a further variation of Option CBC should also be included in further analysis. Option CBC was to include the four laning of Old Cooma Rd and the two lane extension of the Edwin Land Parkway along with a number of intersection improvements along Cooma St so as to minimize as many of the intersection issues as possible along the route.

8.8 Selection of 2031 Network

The two remaining Options 05B and CBC were again analysed in depth using the Queanbeyan model. In both options all remaining intersections that were found to be operating at LOS E or F were modified until they maintained an LOS D level. This involved all of the intersections shown in **Table 10**.

The inclusion of the Option CBC variation in the final analysis was to determine if it was possible to produce a future network option that did not require the Ellerton Rd Extension yet maintain a suitable LOS along Cooma St. One of the main reasons for the Ellerton Extension was to reduce the traffic flow along both Cooma St corridor and improve its projected level of service back to LOS D.

A number of additional improvements were proposed for Cooma St so that the Ellerton Rd Extension was not needed. These improvements involved modified intersection lay-outs for intersection along Cooma St and the installation of clearways during peak periods. Clearways would enable the introduction of four lanes of traffic along Cooma St between Rutledge St and Southbar Rd.

A series of additional analyses were undertaken for Option CBC which involved the following variations:

- Intersection modifications without clearways
- Intersection modifications with clearways
- Intersection modifications with clearways and Ellerton Dr extension
- Intersection modifications and Dunns Creek Link

The detailed local projected traffic volumes and LOS results for these analyses are included in **Appendix 12 – 05B/CBC Final Analysis – AM Peak** and **Appendix 13 – 05B/CBC Final Analysis – PM Peak** .

The level of service plots clearly show the following:

1. Implementing Cooma St intersection improvements without both clearways and the Ellerton Extension results in LOS E conditions along Cooma St and on Queens Bridge during the peak periods.

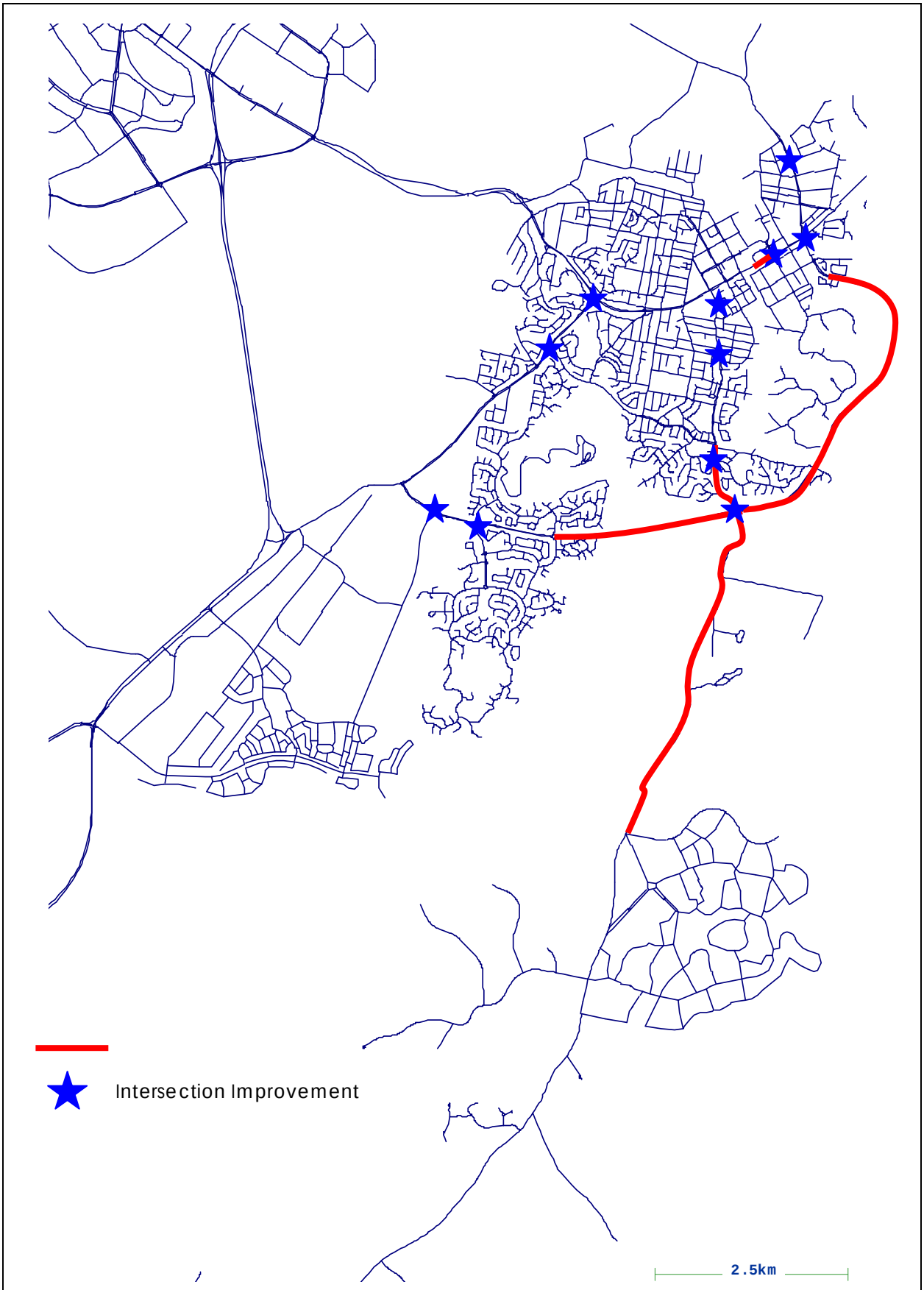
2. Implementing Cooma St intersection improvements with clearways but no Ellerton Extension results in better than LOS D conditions along Cooma St but Queens Bridge would remain LOS E during the peak periods. A number of additional side street approaches along Cooma St will be subjected to LOS E or F conditions during the PM Peak.

3. Implementing Cooma St intersection improvements with both clearways and the Ellerton Extension results in LOS D or better conditions along Cooma St and on Queens Bridge during the peak periods. No additional side street approaches along Cooma St will be subjected to worse than LOS D conditions during the PM Peak. A further improvement to the proposed intersection design for the Old Cooma / Ellerton Extension / Edwin Land Parkway intersection would be required.

4. Implementing Cooma St intersection improvements with the Dunns Creek Link results in LOS E conditions along Cooma St and Queens Bridge during the peak periods. A number of additional side street approaches along Cooma St will be subjected to LOS D or E conditions during the PM Peak. In addition, parts of Lowe St between Rutledge and Monaro would also drop to LOS E during the PM Peak.

Whilst the Option CBC variations with clearways produced the desired result of LOS D or better along Cooma St, the Technical Working Group believed it was expected to come at a cost to local residential amenity. The increased flow associated with the four lane clearways would result in greater noise and a decreased ability to access properties. Right turning from driveways into clearway conditions would be difficult at best and banned in some instances.

Option 05B was eventually preferred by the Technical Working Group as being the final 2031 improvement works project. Option 05B with its associated works is shown in **Figure 33**.



Googong and Tralee Traffic Study (2031)	**2031 Proposed Improvement Project**	**Figure 33**
Gabites Porter Consultants		

The result of the introduction of the Option 05B improvements on the 2031 AM Peak and PM Peak networks are shown in **Appendix 12 – 05B/CBC Final Analysis – AM Peak** and **Appendix 13 – 05B/CBC Final Analysis – PM Peak**. These figures show the Levels of Service for the Queanbeyan network after the proposed intersection and link improvements have been included.

Clearly, implementing Option 05B with its associated link and intersection improvements results in LOS D or better conditions along Cooma St and on Queens Bridge during the peak periods.

9. DEVELOPER CONTRIBUTIONS

As detailed in the previous sections of this report, the increases in traffic volumes and delays, over and above those caused by natural growth, are due to the additional 2031 developments detailed in **Table 5**. The works included in the preferred Proposed Improvement Project are as a direct result of those increases. Without those developments the existing network is expected to continue to operate well in 2031, as shown in **Appendix 2**.

Therefore the costs associated with these improvement works are attributable to the developments that take place up to 2031. This study investigated also how to apportion the project costs to each development so that developer contributions could be levied by the QCC. Discussion took place within the Technical Working Group as what method should be used to calculate the apportionment. It was concluded that the flow to and from each development would be tracked in the model. This tracking allowed the Technical Working Group to see how much traffic from each development went along or through each improvement in the preferred Project Option.

The relativity of each development's flow through an improvement creates the relative contribution that each development should make to the cost of the improvement.

It was also felt that as the existing community will use these new facilities they should also contribute to some degree to the cost of each improvement.

To simplify this process and help identify contributions, the developments were grouped as follows:

- Googong Development (GOG)
- South Jerrabomberra - Tralee, SE Jerrabomberra and Tralee Station Developments (SJ)
- HQJOC (HQJ)
- All other development (DEV)
- Other Queanbeyan Users (QUE)

Flows from each of the five groups (DEV, GOG, TRA, HQJ, QUE) were modelled separately for both the 2031 AM and PM Peaks. The period volumes were combined so that the total peak period volume was used in the apportionment calculations. The percentage relativity of each group's flows was used in apportioning the cost of each improvement work. It should be noted that the following volumes do not include ACT traffic using the links and intersections.

Only the Edwin Land Parkway Extension and the Ellerton Extension projects had costs apportioned to existing Queanbeyan residents as these two projects offered additional benefits to residents. All other link and intersection works were apportioned to GOG, SJ, HQJ and DEV only, as they were being constructed to repair disbenefits to existing Queanbeyan users produced by these developments.

Table 15 details the volumes and relative proportion of the combined flows from each development along each of the improvement links detailed in Table 2.

2031 Improvement Link Flows (AMP+PMP)						Table 15
Location	**GOG**	**SJ**	**HQJ**	**DEV**	**QUE**	**Total**
4L Old Cooma (Googong to ELP)	4404	297	51	365		5117
4L Old Cooma (ELP to Southbar)	2514	169	16	260		2959
4L Monaro (Alkinson to Bridge)	144	258	303	296		1001
2L ELP Ext (Jerrabomberra – Old Cooma)	1004	513	53	127	701	2398
2L Ellerton Extension	868	41	97	91	249	1346
	GOG	**SJ**	**HQJ**	**DEV**	**QUE**	**Total**
4L Old Cooma (Googong to ELP)	86%	6%	1%	7%		100%
4L Old Cooma (ELP to Southbar)	85%	6%	1%	9%		100%
4L Monaro (Alkinson to Bridge)	14%	26%	30%	30%		100%
2L ELP Ext (Jerrabomberra – Old Cooma)	42%	21%	2%	5%	29%	100%
2L Ellerton Extension	64%	3%	7%	7%	18%	100%

As indicated earlier, both the 2L Ellerton Extension and the Edwin Land Parkway Extension improvements have been apportioned to include a contribution from existing Queanbeyan residents. These new improvements are being implemented as a result of congestion and Level of Service issues elsewhere in the network. As these proposed roads have also been included in Council planning maps for many years, the apportionment of costs is therefore being calculated differently.

These links will provide a potential benefit to the existing Queanbeyan residents and QCC considers it reasonable to include the flow from existing residents in calculating the apportionment of cost.

Table 16 details the volumes and relative proportion of the combined flows from each development through each of the improvement intersections.

2031 Improvement Intersection Flows (AMP+PMP)						Table 16
Location	**GOG**	**SJ**	**HQJ**	**DEV**	**QUE**	**Total**
Cooma/ELP	4386	513	111	423		5433
Tompsitt/ELP/Jerrabomberra	823	1879	13	103		2818
Tompsitt/New Link	738	2564	40	91		3433
Cooma/Rutledge/Lowe	798	32	42	186		1058
Cooma/Fergus	1243	24	37	236		1540
Cooma/Thornton/Barracks Flat	2484	128	21	391		3024
Lanyon/Southbar	624	1095	160	249		2128
Lanyon/Canberra	861	847	200	429		2337
Monaro/Atkinson	157	259	407	715		1538
Monaro/Yass/Bungendore	880	228	911	839		2858
Yass/Aurora	594	39	390	575		1598
Farrer / Cameron					2611	2611
Lanyon / Tompsitt					3834	3834

						Table 16 Continued
Location	**GOG**	**SJ**	**HQJ**	**DEV**	**QUE**	**Total**
Cooma/ELP	81%	9%	2%	8%		100%
Tompsitt/ELP/Jerrabomberra	29%	67%	0%	4%		100%
Tompsitt/New Link	21%	75%	1%	3%		100%
Cooma/Rutledge/Lowe	75%	3%	4%	18%		100%
Cooma/Fergus	81%	2%	2%	15%		100%
Cooma/Thornton/Barracks Flat	82%	4%	1%	13%		100%
Lanyon/Southbar	29%	51%	8%	12%		100%
Lanyon/Canberra	37%	36%	9%	18%		100%
Monaro/Atkinson	10%	17%	26%	46%		100%
Monaro/Yass/Bungendore	31%	8%	32%	29%		100%
Yass/Aurora	37%	2%	24%	36%		100%
Farrer / Cameron					100%	100%
Lanyon / Tompsitt					100%	100%

10. INITIAL IMPROVEMENT TIMING

An initial analysis was undertaken to determine a simple timing of the improvements detailed in Section 9. This analysis involved creating the expected 2021 land use for Queanbeyan and ACT based on available details of development construction rates. The 2006-2021 increase in households, jobs, cars and population was estimated from data provided by QCC and ACT and used to create AM and PM Peak models of traffic in Queanbeyan in 2021.

These models show the deficiencies in the existing network that would result if the expected 2021 development was put in place without any improvements. **Appendix 14 – 2021 Base network** shows the level of service expected in Queanbeyan as a result of the 2021 developments.

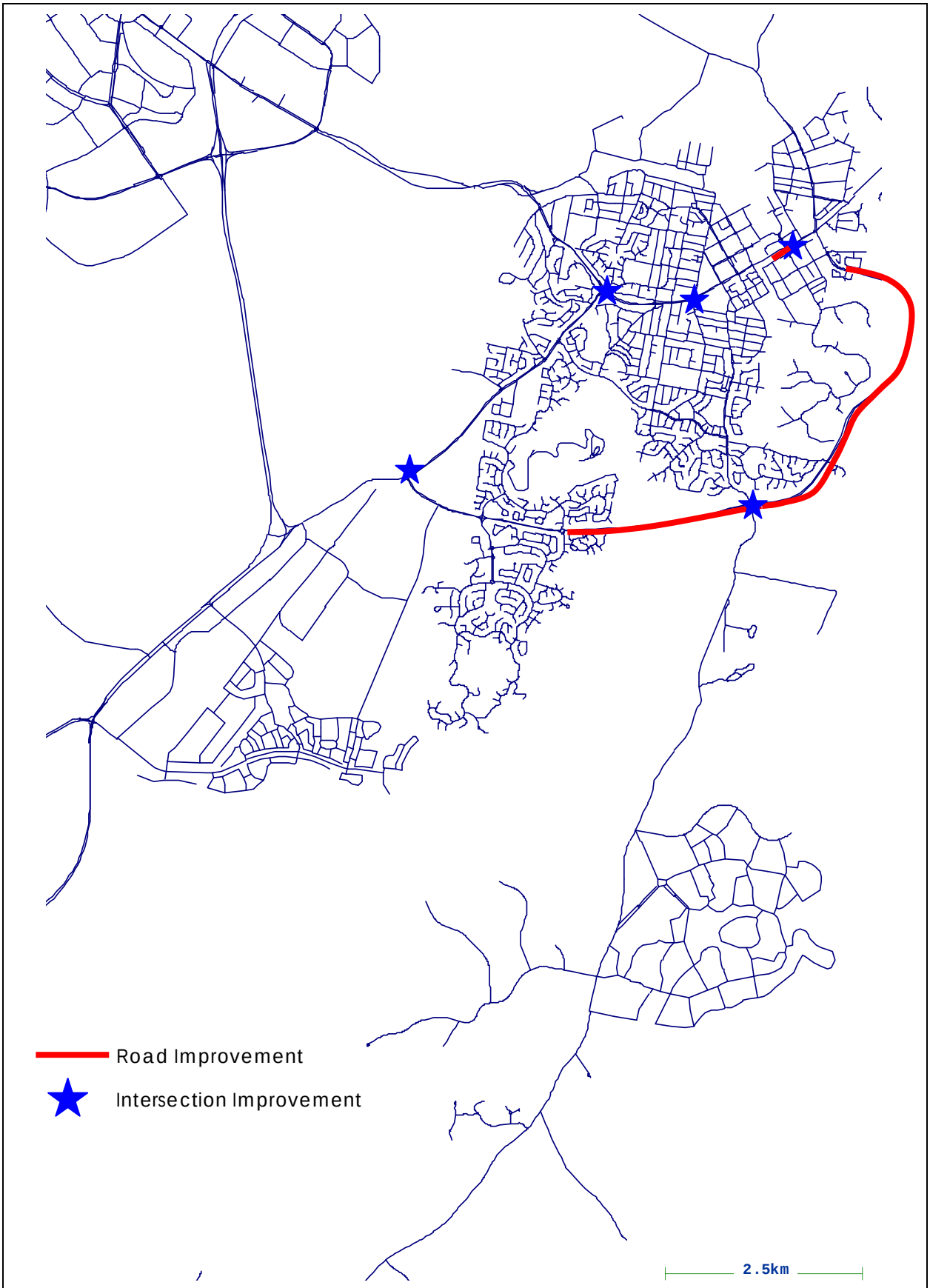
The poor levels of service shown in Appendix 14 show where improvements need to be implemented by 2021 and therefore cannot wait until 2031. **Table 17** and **Table 18** indicate the likely construction timing of each of the proposed improvement works. **Figure 34** shows the locations of the improvement works needed by 2021.

Link Improvement Timing — **Table 17**

Location	By 2021	By 2031
4L Old Cooma (Googong to ELP)		✓
4L Old Cooma (ELP to Southbar)		✓
4L Monaro (Alkinson to Bridge)	✓	
2L ELP Extension (Jerra – Old Cooma)	✓	
2L Ellerton Extension	✓	

Intersection Improvement Timing — **Table 18**

Location	By 2021	By 2031
Cooma/ELP	✓	
Tompsitt/ELP/Jerrabomberra		✓
Tompsitt/New Link		✓
Cooma/Rutledge/Lowe		✓
Cooma/Fergus		✓
Cooma/Thornton/Barracks Flat		✓
Lanyon/Southbar		✓
Lanyon/Canberra	✓	
Monaro/Atkinson	✓	
Monaro/Yass/Bungendore		✓
Yass/Aurora		✓
Farrer / Cameron	✓	
Lanyon / Tompsitt	✓	



Googong and Tralee Traffic Study (2031)	**2021 Proposed Improvement Project**	**Figure 34**
Gabites Porter Consultants		

This 2021 analysis is only a preliminary indication of timing. A more detailed analysis including confirmed development rates from all of the major developments needs to be obtained and included in the analysis. In addition, an iterative process needs to be undertaken where the proposed 2021 works are implemented and additional improvements included should problems elsewhere in the network arise.

To obtain a more detailed timeline of improvement installation, additional future years need to be analysed so that implementation can be highlighted in 5 year intervals.

Submission Number	Respondent	Summary description of Issues	Proposed Response	Outcome
1	Dorothy Lawson	The impact of additional traffic from Edwin Land Parkway on Lanyon Drive.	The Roads and Traffic Authority are due to commence upgrade works on Lanyon Drive from Tompsitt Drive to the Monaro Highway that will widen Lanyon Drive to 4 lanes and improve the intersection of Tompsitt Drive and Lanyon Drive. This work will improve the capacity of the intersection and road link to the Monaro Highway thus reducing the congestion that is currently experienced at that location.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
1.1		Pedestrian access across Edwin Land Parkway	The upgrading of Edwin Land Parkway will include the provision of traffic signals at Jerrabomberra Parkway/Edwin Land Parkway/Tompsitt Drive intersection. Traffic signals will provide controlled pedestrian crossing points for pedestrians wishing to cross Edwin Land Parkway.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
1.2		Construct Dunns Creek Road instead of Edwin Land Parkway	Edwin Land Parkway has been identified as part of a Queanbeyan ring road for many years. The planning process for the construction of Edwin Land Parkway is well advanced with construction due to commence towards the end of 2009. Delaying this project may jeopardise funding that has been provided by the Federal Government and will create traffic issues for Cooma Street if it is not completed before the release of land at Googong.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
1.3		Lack of public consultation	The Plan has been on public exhibition for 9 weeks. Information sessions were held in Jerrabomberra and Queanbeyan on 14 and 15 July respectively. Additional briefing sessions were given to the Queanbeyan Development Board, Steve Whan and John Stanhope.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
2	Verona Armstrong	Why were Gabites Porter engaged?	Gabites Porter were engaged as they are an expert traffic engineering firm. The Roads and Traffic Authority approve of the Tracks model that is used by Gabites Porter.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
2.1		Challenges the notion that Ellerton Drive had been on Councils agenda for more than 10 years	Ellerton Drive has been on the local environmental plan map since 1991. Consequently, Council has progressively acquired land for this purpose over a significant number of years.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
2.2		Concerned with diverting heavy vehicles through Jerrabomberra	The Traffic proposal will not increase the number of heavy vehicles presently experienced on the road network. The construction of Ellerton Drive and Edwin Land Parkway will provide alternative routes for heavy vehicles however the percentage of heavy vehicles expected on these roads is still considered to be low.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
3	Steven Petkovski	Suggests that the construction of Edwin Land Parkway be delayed until Dunns Creek Road has been constructed.	The planning process for the construction of Edwin Land Parkway is well advanced with construction due to commence towards the end of 2009. Delaying this project may jeopardise funding that has been provided by the Federal Government and will create traffic issues for Cooma Street if it is not completed before the release of land at Googong.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
3.1		Edwin Land Parkway should carry a 60kph speed limit and remain at two lanes only.	The modelling indicates that the 2031 traffic volumes expected on Edwin Land Parkway can be adequately accommodated with two lanes only. Consultation with the Roads and Traffic Authority will determine the appropriate speed limit for the road.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
3.2		Council to consider sharing the cost of construction Dunns Creek Road with developers.	The modelling indicates that Dunns Creek Road is not required to manage the traffic issues that are expected in 2031. Accordingly, Council cannot legally require developers to fund the construction of the road. Developers may contribute to the construction of Dunns Creek Road however this would be as a result of an agreement outside the scope of this Traffic Plan.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
4	Rod Sandison	Concerned with pedestrian issues related to the construction of Edwin Land Parkway.	The upgrading of Edwin Land Parkway will include the provision of traffic signals at Jerrabomberra Parkway/Edwin Land Parkway/Tompsitt Drive intersection. Traffic signals will provide controlled pedestrian crossing points.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
5	Dr Mark Doverty	Concerned with traffic being diverted into Jerrabomberra	The intention of the Traffic Plan is to address the traffic impacts that were anticipated from future developments such as Googong and Tralee on the entire Queanbeyan road network. Rather than merely shifting congestion issues from one location to another, the Traffic Plan provides a road network solution that will adequately accomodate expected traffic volumes. It is evident from the documentation that existed at the inception of the Jerrabomberra development that the Edwin Land Parkway was seen as a major traffic link that would carry high volumes of both local and out of area traffic. The road corridor has been designed from the begining of the Jerrabomberra development as shown on early documents and Master Plan, as an arterial road with no direct driveway access or property frontage.Consequently, it is difficult to accept that this was done without the understanding that the Jerrabomberra residential area was to exist. Due to the above planning, the completion of the Edwin Land Parkway is consistent with the aims that the road corrider was originally reserved for and will form part of the complete road network once other improvements are completed.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
5.1		Is opposed to the Edwin Land Parkway proposal	Noted	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
5.2		Concerned over the lack of community engagement with the construction of Edwin Land Parkway.	Community consultation on the construction of Edwin Land Parkway has not yet commenced. This will commence once the necessary approvals have been obtained.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
5.3		The traffic strategy has progressed with enormous haste and little engagement or consideration of human issues.	The Traffic Plan considers the wider community benefit by providing an adequate road network that will cope with the projected traffic volumes. There are significant community benefits associated with the provision of an adequate road network that will improve the amenity and safety of residents and road users. The Traffic Plan has been on public exhibition for 9 weeks. Information sessions were held in Jerrabomberra and Queanbeyan on 14 and 15 July respectively. Additional briefing sessions were given to the Queanbeyan Development Board, Steve Whan and John Stanhope	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
6	Chris Pearson	Requested additional information	Additional information has been provided.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
7	Tony Carey	Supports the recommendations made in the study.	Noted.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
7.1		Supports the identification of a suitable route for Dunns Creek Road.	Noted.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.

8	G A McCubbin	Additional route proposals should have been considered beyond Dunns Creek Road, Ellerton Drive and the Northern Ring Road.	The proposals included in the modelling had been considered by Queanbeyan Council at various times and in various capacities in the past. These options were considered to be the most appropriate options to be further developed as they were well supported with background information. Further options may be added but would require significantly more background work to be undertaken to determine their achievability.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
8.1		Supports the construction of Dunns Creek Road.	Noted.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
8.2		Concerns that other roads in Queanbeyan are not capable of supporting traffic volumes	The model indicates that the broader road network, following the completion of the identified improvements, will adequately accommodate the expected traffic volumes. There may be specific roads or intersections that may require particular treatments to manage traffic, but on the whole, the road network should function appropriately	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
8.2		Concerns with the 4 laning of Cooma Street	The proposed option does not include widening Cooma Street to 4 lanes. Cooma Street (north of Southbar Road) will remain 2 lanes wide.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
8.4		Concerns with pedestrians around Cooma Street, Rutledge Street, Lowe Street.	The Traffic Plan does not deal with pedestrian issues. Pedestrian issues will be managed through the CBD master plan and specific intersection upgrades.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
8.5		Suggested that Council should consider other connections from Googong to the ACT through areas such as Fernleigh Park	The proposals included in the modelling had been considered by Queanbeyan Council at various times and in various capacities in the past. These options were considered to be the most appropriate options to be further developed as they were well supported with background information. Further options may be explored in the future as part of the development of lands beyond the 25 years considered by the Traffic Plan and identified as investigation areas on the Queanbeyan Residential and Economic Strategy 2031.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
8.6		Concerned that widening Cooma Street to 4 lanes will make it difficult to turn right from Dane Street into Cooma Road	The proposed option does not include widening Cooma Street to 4 lanes. Cooma Street (north of Southbar Road) will remain 2 lanes wide.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
9	Marian Furner	Objects to the Edwin Land Parkway bypass going through Jerrabomberra	Noted.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
10	Paul Stace	Concerned that actual traffic flows in the future may be different to the predicted traffic flows used by the model.	Proposed Regular reviews of the Traffic Plan will identify deviations from predicted traffic volumes. Work may then be either accelerated or delayed to address unexpected traffic increases or decreases.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
10.1		Encouraging Council to consider factors beyond Engineering factors such as resident amenity, safety and building liveability.	The Traffic Plan provides a road network that will function to an appropriate level of service that will benefit road users by reducing traffic congestion and delays to travel times. This will improve resident amenity and safety for the entire Queanbeyan community. The specific amenity, safety and liveability issues that may be present when particular elements of the Traffic Plan are constructed will be addressed during the approvals process of that specific construction project.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
10,2		Concerned over the impact of the proposal on Jerrabomberra residents.	The Traffic Plan provides a road network that will function to an appropriate level of service that will benefit road users by reducing traffic congestion and delays to travel times. This will improve resident amenity and safety for the entire Queanbeyan community. The specific amenity, safety and liveability issues that may be present when particular elements of the Traffic Plan are constructed will be addressed during the approvals process of that specific construction project.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
10.3		Suggesting that the emergence of the Jerrabomberra residential area should remove the previously planned bypass route.	It is evident from the documentation that existed at the inception of the Jerrabomberra development that the Edwin Land Parkway was seen as a major traffic link that would carry high volumes of both local and out of area traffic. The road corridor has been designed from the beginning of the Jerrabomberra development as an arterial road with no direct driveway access or property frontage. It is difficult to accept that this was done without the understanding that the Jerrabomberra residential area was to exist. Due to the above planning, the completion of the Edwin Land Parkway is consistent with the aims that the road corridor was originally reserved for.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
10.4		Requesting that heavy vehicles be prohibited from the Edwin Land Parkway and Ellerton Drive.	The Traffic Plan will not increase the number of heavy vehicles presently experienced on the road network. The construction of Ellerton Drive and Edwin Land Parkway will provide alternative routes for heavy vehicles however the percentage of heavy vehicles expected on these roads is still considered to be low.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
10.5		Concerned over the impact on Edwin Land Parkway on Lanyon Drive.	The Roads and Traffic Authority are due to commence upgrade works on Lanyon Drive from Tompsitt Drive to the Monaro Highway that will widen Lanyon Drive to 4 lanes and improve the intersection of Tompsitt Drive and Lanyon Drive. This work will improve the capacity of the intersection and road link to the Monaro Highway thus reducing congestion at that location.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
10.6		Supports the construction of Dunns Creek Road.	Noted.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
10.7		Council to improve the provision of public transport.	Council recognises the need to address public transport issues in Queanbeyan and has included this issue in the 10 year community strategic plan recently adopted by Council.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
11	Verona Armstrong	TSR impact on the proposed Dunns Creek Road	The ongoing management of travelling stock reserves is the responsibility of the Rural Lands Protection Board. Any environmental issues concerning Dunns Creek Road will be addressed during the approvals process and will involve the relevant authorities.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
12	Teresa Kruse	Disappointed that the Northern Bypass has been discounted.	The modelling demonstrated that the Northern Ring Road did not significantly contribute to alleviating the traffic issues expected in 2031. However addition road links may be considered in the future if parts of the ACT north of Queanbeyan in Kowen are developed.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
12.1		Concerned over the impact of Edwin Land Parkway on Jerrabomberra residents.	The Traffic Plan provides a road network that will function to an appropriate level of service that will benefit road users by reducing traffic congestion and delays to travel times. This will improve resident amenity and safety for the entire Queanbeyan community. The specific amenity, safety and liveability issues that may be present when particular elements of the Traffic Plan are constructed will be addressed during the approvals process of that specific construction project.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
12.2		Can't understand why the Edwin Land Parkway was not taken off the map once Jerrabomberra was constructed.	It is evident from the documentation that existed at the inception of the Jerrabomberra development that the Edwin Land Parkway was seen as a major traffic link that would carry high volumes of both local and out of area traffic. The road corridor has been designed from the beginning of the Jerrabomberra development as shown on early documents and Master Plan, as an arterial road with no direct driveway access or property frontage. Consequently it is difficult to accept that this was done without the understanding that the Jerrabomberra residential area was to exist. Due to the above planning, the completion of the Edwin Land Parkway as it was clearly intended will create little change from the present except for the upgrading of the two intersection locations.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.

12.3		Supports the construction of Dunns Creek Road	Noted.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
12.4		Concerned over the ability of Lanyon Drive to cater for the increase in traffic if Edwin Land Parkway is constructed.	The Roads and Traffic Authority are due to commence upgrade works on Lanyon Drive from Tompsitt Drive to the Monaro Highway that will widen Lanyon Drive to 4 lanes and improve the intersection of Tompsitt Drive and Lanyon Drive. This work will improve the capacity of the intersection and road link to the Monaro Highway thus reducing congestion at that location.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
13	Dr Andrew Allibone and Rachel Allibone	Support the Traffic Plan and the construction of Edwin Land Parkway	Noted.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
13.1		Does not support the JRA view of opposing the construction of Edwin Land Parkway.	Noted.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
14	Brian Brown	Suggests that Dunns Creek Road is incorporated into the Traffic Plan.	The Traffic Plan provides, among other things, the nexus between road network improvements and the developments that will cause the need for those improvements. This has been done in a logical and legally defendable fashion to support Councils claim against developers to fund these works. The modelling does not support the inclusion of Dunns Creek Road in the Traffic Plan. Arbitrarily including Dunns Creek Road in the Traffic Plan may place any future Voluntary Planning Agreement or S94 Plan at risk of being challenged in the courts.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
14.1		Concerned that Ellerton Drive will not be constructed for 12 years.	The modelling indicates that Ellerton Drive will be required before 2021. Further work is required to identify exactly when Ellerton Drive will be required, which may identify the need for the road well before 2021.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
14.2		Concerned that present environmental issues will make it difficult for Council to construct Ellerton Drive.	Environmental issues will be addressed during the approvals process for the construction of Ellerton Drive.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
14.3		Requests that Dunns Creek Road be included in the Community Strategic Plan.	This matter will be referred to the next review of the Community Strategic Plan.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
14.4		Requesting Council to resolve as follows: That all public submissions be fully reviewed, critiqued and incorporated, if warranted, into the Queanbeyan Strategic Traffic Plan. That Council urgently rescind or supersede their motion supporting in principle the Draft Queanbeyan Transport Study. That Council endorse a Queanbeyan Strategic Traffic Plan that includes Dunns Creek Road. That council move to acquire the land for the Dunns Creek Road alignment as soon as possible. Also, that the Council include Dunns Creek Road in the Queanbeyan Community Strategic Plan 2009 – 2019.	Noted.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
15	Leon Arundell	Requesting information on how walking and cycling will be addressed in the traffic plan.	The Traffic Plan does not deal with pedestrian issues. Pedestrian issues will be managed through the CBD master plan and specific intersection upgrades. Council has been progressively implementing a cycling action plan for a number of years.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
16	Jerrabomberra Residents Association	Fails to understand how the final option was arrived at.	The final option was arrived at after a detailed examination of a considerable range of options. The final option provides a road network that will accommodate the traffic volumes expected by 2031 as a result of development in Queanbeyan.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
16.1		That both Ellerton Drive and Dunns Creek Road are required.	The traffic modelling indicates that Dunns Creek Road is not required before 2031 to accommodate the expected traffic.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
16.2		Request that Council reconsider the Plan to include Dunns Creek Road.	The Traffic Plan provides, among other things, the nexus between road network improvements and the developments that will cause the need for those improvements. This has been done in a logical and legally defendable fashion to support Councils claim against developers to fund these works. The modelling does not support the inclusion of Dunns Creek Road in the Traffic Plan. Arbitrarily including Dunns Creek Road in the Traffic Plan may place any future Voluntary Planning Agreement or S94 Plan at risk of being challenged in the courts.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
16.3		Concerned that Ellerton Drive will not be constructed for 12 years	The modelling indicates that Ellerton Drive will be required before 2021. Further work is required to identify exactly when Ellerton Drive will be required, which may identify the need for the road well before 2021.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
16.4		Oppose the duplication of Edwin Land Parkway	The modelling indicates that the 2031 traffic volumes expected on Edwin Land Parkway can be adequately accommodated with two lanes only.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
17	Sally Hudson	Concerned that the study focused on the main street of Queanbeyan only.	The modelling considered the entire Queanbeyan road network. The resulting Traffic Plan is designed to deliver a road network that will function in an adequate fashion till at least 2031. This outcome will benefit all road users as well as the wider Queanbeyan community.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
17.1		Raised the risks to pedestrian crossing the Edwin Land Parkway	The upgrading of Edwin Land Parkway will include the provision of traffic signals at Jerrabomberra Parkway/Edwin Land Parkway/Tompsitt Drive intersection. Traffic signals will provide controlled pedestrian crossing points.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
17.2		Questioned why the plan did not consider social, community or environmental impacts.	The Traffic Plan considers the wider community benefit by providing an adequate road network that will cope with the projected traffic volumes. There are significant community benefits associated with the provision of an adequate road network that will improve the amenity and safety of residents and road users.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
17.3		Suggest that any by-pass should located well away from residential areas	The intention of the Traffic Plan was to address the traffic impacts that were anticipated from future developments such as Googong and Tralee. The location of any future by-pass would require additional work to determine if it could be located away from existing or future residential areas. Biodiversity and other environmental factors limit such options.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
18	Mark Grayson - CBRE - on behalf of Abercraft P/L - Owners of the Karabar Shopping Centre	Concerned that the upgrade work proposed for the intersection of Old Cooma Road and Southbar Road will impact on their proposal to expand the shopping centre.	Investigations into the proposed expansion of the Karabar Shopping Centre are preliminary and have not determined the full extent of any impact that may be caused to the intersection of Southbar Road and Cooma Street. Detailed design of this intersection is yet to be completed but will consider any proposal that includes the Karabar Shopping Centre.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
18.1		Concerned over the impact of any widening of Cooma St along the frontage of their property.	The impact of any widening proposed for Cooma Street on the Karabar Shopping Centre will be addressed as part of the detailed design of this work.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
19	Canberra Airport	Supports the road improvement projects identified in the Traffic Plan	Noted.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.

19.1		Questions the growth figures used in the report.	Noted. These were checked and confirmed as part of background investigations and are consistent with the Department of Planning's estimates. These figures will be reviewed during the life of the Traffic Plan and adjustments made accordingly.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
19.2		Reaffirms it's objection to proposed development within the high noise corridor	Noted.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
19.3		Disappointed that the Traffic Plan does not address road upgrade requirements in the ACT.	The Traffic Plan addresses traffic issues in the Queanbeyan Council area only. Further work is required to include the road requirements of the ACT.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
20	Queanbeyan-Monaro Greens	Disappointed with the narrow focus of the Traffic Plan and the selective composition of the Traffic Working Group	The Traffic Plan addresses the traffic issues expected by developments such as Googong and Tralee to provide a road network within Queanbeyan that would manage predicted traffic volumes till 2031. Road and traffic issues beyond the Queanbeyan area will be addressed in future studies. The participants in the Traffic Working Group were considered appropriate to best inform the intended purpose of the Traffic Plan.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
20.1		The Traffic Plan fails to address climate change and continues to rely heavily on private vehicles.	Council recognises the need to address public transport issues in Queanbeyan and has included this issue in the 10 year community strategic plan recently adopted by Council.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
20.2		Fails to address alternative transport such as rail.	Council recognises the need to address public transport issues in Queanbeyan and has included this issue in the 10 year community strategic plan recently adopted by Council.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
20.3		Fails to address roads that connect to the ACT such as Pialligo Rd, Fariburn Rd and Canberra Ave.	The Traffic Plan addresses the traffic issues expected by developments such as Googong and Tralee to provide a road network within Queanbeyan that would manage predicted traffic volumes till 2031. Road and traffic issues beyond the Queanbeyan area will be addressed in future studies.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
20.4		Improving public transport services should be include in the Traffic Plan	Council recognises the need to address public transport issues in Queanbeyan and has included this issue in the 10 year community strategic plan recently adopted by Council.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
20.5		Concerned that the environmental impact of Ellerton Drive has not been assessed in the Traffic Plan	Environmental issues will be addressed during the approvals process for the construction of Ellerton Drive.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
20.6		The introduction of a peak bus service between Googong and Queanbeyan would remove the need to widen Old Cooma Road. This should be included in the Traffic Plan.	Council recognises the need to address public transport issues in Queanbeyan and has included this issue in the 10 year community strategic plan recently adopted by Council.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
20.7		Concerned that Council has entered into an agreement with Village Building Company to build Dunns Creek Road given the identification of serious environmental issues on the proposed route.	Environmental issues will be addressed during the approvals process for the construction of Dunns Creek Road.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
20.8		Where has Council identified offset land for the Dunns Creek Road and Ellerton Drive projects?	Environmental issues will be addressed during the approvals process for the construction of Dunns Creek Road and Ellerton Drive. The identification of suitable offset lands will be addressed as part of that process.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
20.9		Will Council make public the environmental and archaeological reports for Dunns Creek Rd?	These reports are available on request	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
20.10		Opposed to the destruction of woodlands and grasslands associated with the construction of the roads recommended in the Traffic Plan as well as Dunns Creek Road and ask that Council preserve these areas for future generations.	Noted	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
20.11		That Council commits to revegetation above simply providing biodiversity offsets.	Environmental issues will be addressed during the approvals process for the construction of Dunns Creek Road and Ellerton Drive.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
20.12		Provide for transit lanes and bicycle lanes on all new and widened roads.	Either on or off road cycle lanes are include in the design of all new or upgraded roads.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
20.13		Traffic planning to include the provision of light rail along all major transport corridors.	Examination of the provision of light rail is outside the scope of the Traffic Plan.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
21	Max Rogers	Concerned over the impact that the Traffic Plan will have on Jerrabomberra	The Traffic Plan provides a road network that will function to an appropriate level of service that will benefit road users by reducing traffic congestion and delays to travel times. This will improve resident amenity and safety for the entire Queanbeyan community. The specific amenity, safety and liveability issues that may be present when particular elements of the Traffic Plan are constructed will be addressed during the approvals process of that specific construction project.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
22	Sue Jarvis	Supports the construction of Edwin Land Parkway advising the road will improve emergency services to Jerrabomberra, reduce traffic on Halloran Drive and Carolyne Jackson Drive.	Noted	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
22.1		Council to ensure that adequate sound barriers, access to shopping centres and pedestrian facilities are installed when Edwin Land Parkway is constructed.	These issues will be addressed during the approvals process of Edwin Land Parkway.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
23	Queanbeyan Landcare Inc	Requesting a comprehensive analysis of cost, public transport, energy use, noise and air pollution, congestion, hazard levels, significant biodiversity impacts and quality of life be undertaken.	The Traffic Plan provides a road network that will function to an appropriate level of service that will benefit road users by reducing traffic congestion and delays to travel times. This will improve resident amenity and safety for the entire Queanbeyan community. The specific amenity, safety and liveability issues that may be present when particular elements of the Traffic Plan are constructed will be addressed during the approvals process of that specific construction project.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
23.1		Council prepare a Queanbeyan Transport blueprint for the long term.	Noted	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
23.2		Council urgently provide data on the density, hazard and pollution impacts from new traffic flows on Cooma Street.	This matter may be further discussed between staff and the respondent.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
23.3		Council publicly explain the apparent conflict between Dunns Creek Road not being in the Traffic Plan and Councils intention to negotiate an agreement to Construct the road.		This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
23.4		Consider modifying the CBD Master plan to retain Monaro St as the East/West bypass of Queanbeyan	The Traffic Plan provides a number of options that may address any future need to provide an east/west by-pass around Queanbeyan.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
23.5		Council engage the community in a direct manner in the further development of the Traffic Plan, Local Environmental Plan and Biodiversity Plan.	Council will continue to engage the community.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
24	Queanbeyan Development Board	Supports the recommendation of the Traffic Plan	Noted	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
25	Connee Colleen	The Traffic Plan fails to give relief to Monaro Street and the CBD.	The Traffic Plan provides a road network that will function to an appropriate level of service that will benefit road users by reducing traffic congestion and delays to travel times. These benefits will apply to all roads within Queanbeyan, including Monaro Street.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.

25.1		Suggested improvements will not be implemented before the CBD becomes congested	The modelling indicates that Ellerton Drive will be required before 2021. Further work is required to identify exactly when Ellerton Drive will be required, which may identify the need for the road well before 2021.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
25.2		The northern ring road is required to provide a by-pass around Queanbeyan	The modelling demonstrated that the Northern Ring Road did not significantly contribute to alleviating the traffic issues expected in 2031. However addition road links may be considered in the future if parts of the ACT north of Queanbeyan in Kowen are developed.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
25.3		The Traffic Plan does not recognise Queanbeyan's heritage. Northern ring road is required immediately.	The modelling demonstrated that the Northern Ring Road did not significantly contribute to alleviating the traffic issues expected in 2031. However addition road links may be considered in the future if parts of the ACT north of Queanbeyan in Kowen are developed.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
25.4		The widening of Bungendore Road between Atkinson St and Queens bridge will not improve traffic congestion.	Noted	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
25.5		Suspects that the Traffic Plan includes a new 4 lane Queens bridge.	The Traffic Plan does not propose to widen the Queens Bridge.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
25.6		Suspects that Council has an agenda to construct another route along Campbell St.	The Traffic Plan does not propose to alter Campbell Street	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
25.7		Would like the details of investigations into the CBD tunnel proposal made public.	Documentation that Council may have on a CBD Tunnel proposal is available upon request.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
25.8		Ellerton Drive should be 4 lanes wide.	The modelling indicates that Ellerton Drive is required to be two lanes only until 2031.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
26	Urbis - on behalf of Sandra Walsh as reviewed by GHD	Requesting further clarification of the road links from the proposed South Jerrabomberra development into the ACT.	This matter may be further discussed between staff and the respondent.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
26.1		Clarification of the inclusion of the Tralee Street link to the Dunns Creek Road through Hume in the ACT in the base 2031 network	This matter may be further discussed between staff and the respondent.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
26.2		Clarification of trip rates used for various greenfield areas	This matter may be further discussed between staff and the respondent.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
26.3		Incorporate the impact of topography on Level of Service	This matter may be further discussed between staff and the respondent.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
26.4		More detailed explanation on the elimination of Option 2 and Option CIC2.	This matter may be further discussed between staff and the respondent.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
26.5		Review the model with Edwin Land Parkway included in the base case.	Edwin Land Parkway was included in the base case in the modelling.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
26.6		Further explanation on future public transport networks and their ability to reduce vehicle kilometres travelled	Council recognises the need to address public transport issues in Queanbeyan and has included this issue in the 10 year community strategic plan recently adopted by Council.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
26.7		Clarification of local or regional contribution from land development for employment or education uses will be required.	Noted	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
26.8		Stresses the importance of the early provision of the Dunns Creek Road link between Monaro Highway and South Jerrabomberra to address matters such as amenity, local character, relationship to the ACT and other "gateway" issues.	Noted	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
27	Carol Fullalove	Suggest that the Traffic Plan should address broader issues such as reducing traffic flows by encouraging other forms of transport such as cycling and walking.	Council recognises the need to address public transport issues in Queanbeyan and has included this issue in the 10 year community strategic plan recently adopted by Council.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
28	Canberra Investment Corporation Limited	Commends Council on the professional manner in which the Traffic Plan was prepared and strongly supports the modelling process undertaken	Noted	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
28.1		Strongly supports the option recommended in the Traffic Plan.	Noted	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
28.2		Advises that it is their view that the Googong Development does not trigger the need for Ellerton Drive and any contribution required from Googong for Ellerton Drive reflect this position.	The modelling indicates that the impact of development in Queanbeyan, including the Googong development, creates the need to provide Ellerton Drive. This has been reflected in the proposed developer contributions shown in the Traffic Plan. The benefit that Queanbeyan gains from Ellerton Drive has also been appropriately reflected in the proposed developer contributions shown in the Traffic Plan.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
28.3		As the planning for Ellerton Drive predates the Googong development, the benefit of providing Ellerton Drive to existing residents should be recognised through local, state and federal funding.	The Traffic Plan may be used by Council to seek funding from the State and Federal Government for Ellerton Drive.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
29	Village Building Company	A full assessment of the cost and environmental assessment of the preferred option has not been undertaken.	Environmental issues will be addressed during the approvals process for the construction of Ellerton Drive.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
29.1		That Council adopt the cost apportionment methodology proposed in the ARUP report.	The apportionment methodology proposed by ARUP is not considered appropriate in this instance. The methodology detailed in the Traffic Plan provides a solid basis of determining appropriate developer contributions.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
29.2		That Council determine an implementation plan for the Traffic Plan		This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
29.3		Council consider including the outcomes from the Traffic Plan in a Voluntary Planning Agreement for South Jerrabomberra.	A Voluntary Planning Agreement would be based on the finding and recommendations of the Traffic Plan.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
29.4		That the Traffic Plan be amended to reflect the proposal made by the Village Building Company to contribute funding towards the provision of Dunns Creek Road	The Traffic Plan provides, among other things, the nexus between road network improvements and the developments that will cause the need for those improvements. This has been done in a logical and legally defendable fashion to support Councils claim against developers to fund these works. The modelling does not support the inclusion of Dunns Creek Road in the Traffic Plan. Arbitrarily including Dunns Creek Road in the Traffic Plan may place any future Voluntary Planning Agreement or S94 Plan at risk of being challenged in the courts.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
29.5		Amend the Traffic Plan to include a new section on Cross Boarder Traffic	The Traffic Plan addresses the traffic issues expected by developments such as Googong and Tralee to provide a road network within Queanbeyan that would manage predicted traffic volumes till 2031. Road and traffic issues beyond the Queanbeyan area will be addressed in future studies.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.
29.6		That Council and the RTA lead negotiations with the ACT Government to determine necessary ACT road improvements as a result of development within the Queanbeyan Council area.	Council does have a role in these negotiations however the developers of the South Jerrabomberra area need to be working closely with the ACT Government to ensure that the ACT traffic issues are addressed.	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.

30	Queanbeyan Business Council	Supports the findings and recommendations of the Traffic Plan	Noted	This issue has been addressed in the response provided and it is proposed not to alter the Traffic Plan in this regard.

12. Appendix E

E.1 *Ellerton Drive Extension, Noise Impact Assessment - Operation and Construction* (12 February 2015)

E.2 *Ellerton Drive Extension Project Property Inspections* Report Number 670.10568-R3 27 March 2015

E.2 SLR report *Memorandum 670.10568 M2 20150330.docx* 30 March 2015

global environmental solutions

Ellerton Drive Extension

Noise Impact Assessment

Operation and Construction

Report Number 670.10568-R1

12 February 2015

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Version: Revision 3

Ellerton Drive Extension

Noise Impact Assessment

Operation and Construction

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DOCUMENT CONTROL

Reference	Status	Date	Prepared	Checked	Authorised
670.10568-R1	Revision 3	12 February 2015	Zhang Lai	David Lindsey	Jamie Hladky
670.10568-R1	Revision 2	18 December 2014	Zhang Lai	David Lindsey	Jamie Hladky
670.10568-R1	Revision 1	9 December 2014	Zhang Lai	David Lindsey	Jamie Hladky
670.10568-R1	Revision 0	15 October 2014	Zhang Lai	David Lindsey	Jamie Hladky

The Queanbeyan City Council (QCC) proposes to construct a 4.6 km long extension to the Ellerton Drive. The existing Ellerton Drive connects to Yass Road and Bungendore Street at a roundabout and terminates approximately 850 m southeast of this roundabout. The proposal is to extent Ellerton Drive from its current terminus to the existing Old Cooma Road and Edwin Land Parkway intersection, forming the fourth leg of this intersection. This will be a two lane single carriageway roadway and was identified to be required by 2017.

SLR Consulting (Australia) Pty Ltd (SLR) has been engaged by Opus International Consultants (Opus) to conduct a noise impact assessment for the proposed extension. This is required as part of the design and documentation processes undertaken by Opus. The objective of SLR's engagement was to assess the potential noise impacts of the operation of the proposed extension.

All of the identified potentially impacted sensitive receivers were grouped into 8 Noise Catchment Areas. In March – April 2014, SLR conducted ambient noise monitoring at 11 locations to determine the existing ambient noise environment. In addition, concurrent traffic count was also conducted at the existing Edwin Land Parkway and Old Cooma Road intersection to allow validation of the noise model.

OPERATIONAL NOISE CRITERIA

Upon completion of the proposed Ellerton Drive extension, the entire Ellerton Drive is considered to be a sub-arterial road. The RNP assessment criteria applicable for this project were determined to be:

Road Category	**Type of Project/Land Use**	**Assessment Criteria (dBA)**	
		Daytime (7 am – 10 pm)	**Night-time (10 pm – 7 am)**
Freeway/ arterial/ sub-arterial roads	1. existing residences affected by noise from new freeway/arterial/sub-arterial road corridors	$L_{Aeq(15hour)}$ 55 (external)	$L_{Aeq(9hour)}$ 50 (external)

In addition to the noise criteria above, the RNP describes a "Relative Increase Criteria" of 12 dB above existing traffic noise. This criterion is primarily intended to protect existing quiet areas from excessive changes in amenity. Most of the existing residences along the proposed extension are currently not affected by significant traffic noise. Therefore, the "Relative Increase Criteria" are also considered in this assessment.

VALIDATION OF NOISE MODEL

Validation of the noise model was performed based on noise monitoring conducted at the Edwin Land Parkway road reserve and 12 Alfred Place, Karabar. The variations between the model-predicted noise levels and the measured noise levels were within ±2 dB. In accordance to guidelines provided by NSW Environmental Noise Management Manual, these variances are considered to be acceptable. Therefore, it was determined that the noise model provides results which enable a reliable assessment of the project.

OPERATIONAL NOISE ASSESSMENT FINDINGS

The modelled traffic speed was 60 km/hr from the existing section of Ellerton Drive to about Ch1200 and 80 km/hr from Ch1200 onwards to the Old Cooma Road intersection. The road pavement adopted in the noise model was dense graded asphalt (DGA)

Executive Summary

The following summarises the findings of the noise prediction and assessment conducted for the design year (2027, 10 years after project opening):

- NCA1
    - 26 out of 26 receivers exceed the relevant RNP criteria
    - Level of exceedance of the $L_{Aeq(15hour)}$ and $L_{Aeq(9hour)}$ was up to 9 dB
    - Level of exceedance of the Relative Increase Criteria was up to 8 dB
    - Possible feasible and reasonable mitigation:
        - Upgraded property boundary fence to a height of 3 to 3.6 m
        - Building treatment for 2nd storey receivers (approximately 7 properties)
- NCA2
    - 15 out of 20 receivers exceed the relevantRNP criteria
    - Level of exceedance of the $L_{Aeq(15hour)}$ and $L_{Aeq(9hour)}$ was up to 8 dB
    - Level of exceedance of the Relative Increase Criteria was up to 6 dB
    - Possible feasible and reasonable mitigation:
        - Upgraded property boundary fence to a height of 2.4 m
- NCA3
    - 10 out of 13 receivers exceed the relevant RNP criteria
    - Level of exceedance of the $L_{Aeq(15hour)}$ and $L_{Aeq(9hour)}$ was up to 6 dB
    - Level of exceedance of the Relative Increase Criteria was up to 11 dB
    - Possible feasible and reasonable mitigation:
        - 650 m long of road side noise barrier at 3.6 m to 4.8 m high.
        - Alternatively, if road barrier is not considered feasible and reasonable, building treatment for receivers exceeding relevant criteria (approximately 10 properties)
- NCA4
    - 4 out of 11 receivers exceed the relevant RNP criteria
    - No exceedance of the $L_{Aeq(15hour)}$ and $L_{Aeq(9hour)}$
    - Level of exceedance of the Relative Increase Criteria was up to 5 dB
    - Possible feasible and reasonable mitigation:
        - Quieter road surface (e.g. open graded or stone mastic asphalt).
        - Alternatively, if road barrier is not considered feasible and reasonable, building treatment for receivers exceeding relevant criteria (approximately 4 properties)
- NCA5
    - 4 out of 10 receivers exceed the relevant RNP criteria
    - No exceedance of the $L_{Aeq(15hour)}$ and $L_{Aeq(9hour)}$
    - Level of exceedance of the Relative Increase Criteria was up to 7 dB

Executive Summary

  - Possible feasible and reasonable mitigation:
    - 500 m long of road side noise barrier at 2.4 m to 3.6 m high
    - Alternatively, if road barrier is not considered feasible and reasonable, building treatment for receivers exceeding relevant criteria (approximately 2 properties)

- NCA6
  - 1 out of 1 receiver exceeds that relevant RNP criteria
  - Level of exceedance of the $L_{Aeq(15hour)}$ and $L_{Aeq(9hour)}$ was up to 7 dB
  - Level of exceedance of the Relative Increase Criteria was up to 12 dB
  - Possible feasible and reasonable mitigation:
    - Building treatment for receivers exceeding relevant criteria (1 property)
- NCA7
  - 26 out of 26 receivers exceed the relevant RNP criteria
  - Level of exceedance of the $L_{Aeq(15hour)}$ and $L_{Aeq(9hour)}$ was up to 10 dB
  - Level of exceedance of the Relative Increase Criteria was up to 13 dB
  - Possible feasible and reasonable mitigation:
    - Upgraded property boundary fence to a height of 3.6 to 4.2 m
    - 2.4 m high wall outside the southbound traffic lane on the bridge
    - Building treatment for 2nd storey receivers, isolated receivers and receivers where fence is not feasible due to driveway access requirements (approximately 9 properties)
- NCA8
  - 39 out of 42 receivers exceed the relevant RNP criteria
  - Level of exceedance of the $L_{Aeq(15hour)}$ and $L_{Aeq(9hour)}$ was up to 10 dB
  - Level of exceedance of the Relative Increase Criteria was up to 14 dB
  - Possible feasible and reasonable mitigation:
    - Road side noise barrier of 3.6 m high for receivers at Webber Place, Fitzgibbon Place, Caroline Place, Alfred Place.
    - Road side noise barrier of 2.4 to 3 m for receivers at Barracks Flat Drive
    - 2.4 m high wall outside the northbound traffic lane on the bridge
    - Building treatment for 2nd storey receivers, isolated receivers and receivers where fence is not feasible due to driveway access requirements (approximately 6 properties)

Further information in relation to the recommended noise barrier is presented in **Appendix P**.

Based on the results presented in **Appendix O**, properties that may require further consideration of property treatment are highlighted Green.

Executive Summary

CONSTRUCTION NOISE

Based on the typical construction stages assumed in the assessment, it was found that the predicted noise levels exceed the noise affected noise management levels determined based on the measured Rating Background Level within the project area. The worst level of exceedance was predicted to be 32 dB. It was recommended that a standard suite of mitigation measures be implemented in order to mitigate and reduce the potential noise impact associated with the construction of the project.

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1 INTRODUCTION

1.1 Project Background

The Queanbeyan City Council (QCC) proposes to construct a 4.6 km long extension to the Ellerton Drive. The existing Ellerton Drive connects to Yass Road and Bungendore Street at a roundabout and terminates approximately 850 m southeast of this roundabout. The proposal is to extent Ellerton Drive from its current terminus to the existing Old Cooma Road and Edwin Land Parkway intersection, forming the fourth leg of this intersection. This will be a two lane single carriageway roadway and was identified to be required by 2017.

A previous traffic study commissioned by the QCC determined that the Queanbeyan road network requires to be upgraded to accommodate the rising population. The extension of Ellerton Drive was identified to be one major piece of work as part of the entire potential improvements that are required. The proposed project is shown in **Figure 1**.

1.2 Report Objectives

SLR Consulting Australia Pty Ltd (SLR) has been engaged by Opus International Consultants (Opus) to assess the operational and construction noise impacts of the proposed extension. This is required as part of the design and documentation processes undertaken by Opus. .

1.3 Relevant Guidelines

The noise and vibration guidelines for construction and operations are based on the publications managed by the Environment Protection Authority [1] (EPA). The guidelines applicable to this assessment include:

- Operational Noise – *Road Noise Policy* (RNP), DECCW 2011
- Construction Noise – *Interim Construction Noise Guideline* (ICNG), DECC 2009
- Construction Vibration (Human Comfort) – *Assessing Vibration - a technical guideline,* DEC 2006
- British Standard BS 7385 Part 2-1993 *Evaluation and measurement for vibration in buildings Part 2*.

The following additional guidelines and standards are also referenced in this study:

- Noise measurement procedure (operational) – *AS* 2702:1984 *Acoustic Methods of Measurement of Road Traffic Noise*
- Noise measurement procedure (construction) – AS 1055:1997 *Acoustics – Description and Measurement of Environmental Noise*
- Acoustic instrumentation – AS IEC 61672.1-2004 *Electroacoustics - Sound Level Meters*
- RMS assessment requirements – *Preparing an Operational Noise and Vibration Assessment*, RMS July 2011
- RMS noise management response – *Environmental Noise Management Manual (ENMM),* RTA 2001

1.4 Terminology

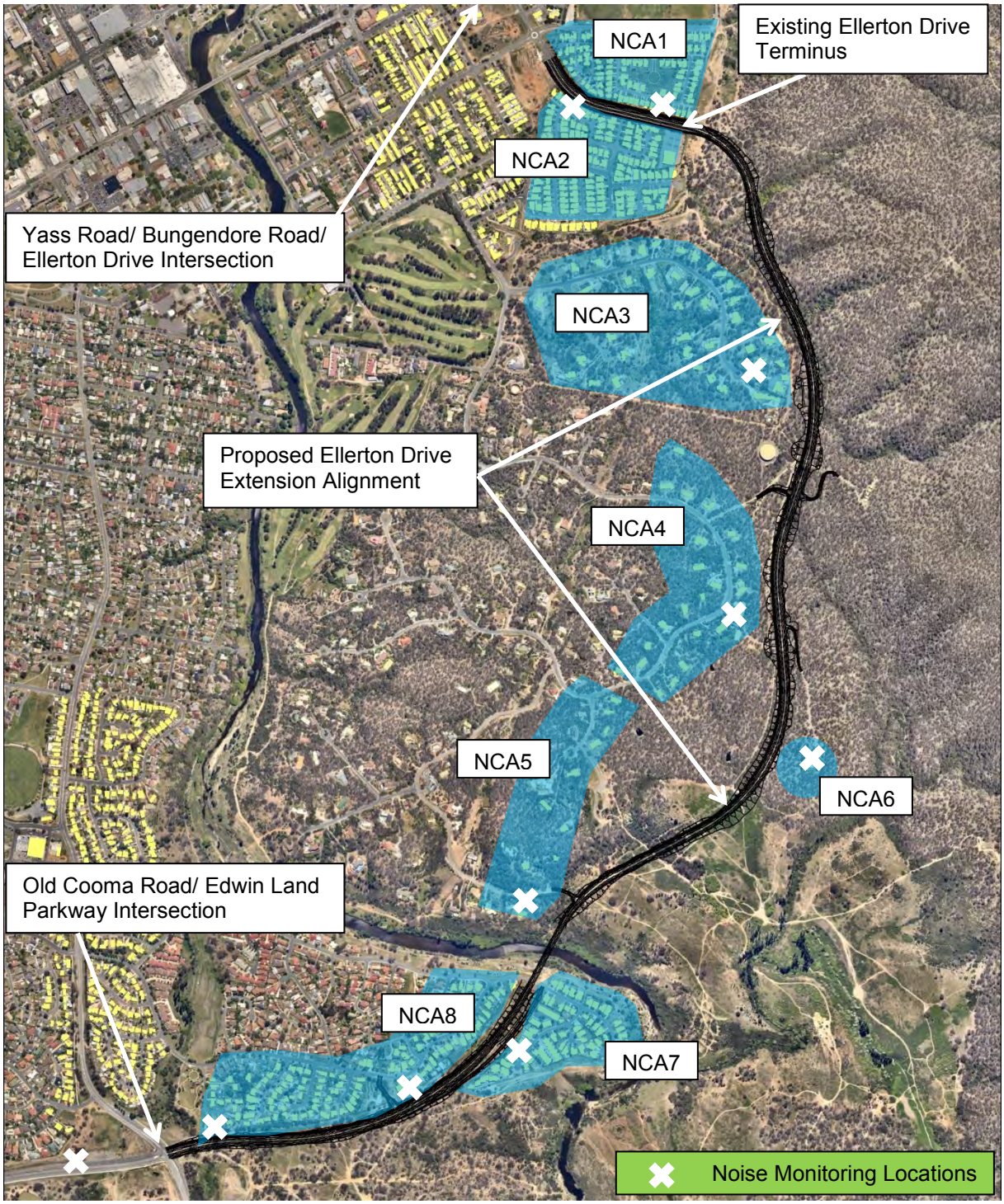
Specific acoustic terminology is used within this assessment. An explanation of common acoustic terms is included as **Appendix A**.

[1] Noise and Vibration guidelines are available at the following web address: http://www.environment.nsw.gov.au/noise

2 PROJECT AREA

Figure 1 indicates the locations of the proposed extension and potentially affected sensitive receivers along the route of the proposed alignment, grouped in separate Noise Catchment Areas (NCA).

Figure 1 Proposed Extension Alignment and Potentially Affected Sensitive Receivers



3 EXISTING AMBIENT NOISE ENVIRONMENT

In order to characterise the noise environment across the project area (in relation to both construction and operation) and to establish existing ambient noise levels upon which to base the noise emission targets, environmental noise monitoring was performed at selected representative locations within the project area. As indicated in **Figure 1**, a total of 8 NCA's have been determined to assist with the noise assessment. At least one noise monitoring location was established within each NCA to assist with understanding the existing ambient environment.

3.1 Monitoring Methodology

3.1.1 Unattended Noise Monitoring

Unattended noise monitoring was conducted using ARL type 316 noise monitors. The instrument signal calibration was conducted before and after each measurement survey, with the variation in calibrated levels not exceeding ±0.5 dBA.

All unattended monitoring equipment was programmed to record continuously statistical noise level indices in 15 minute intervals including the L_{Amax}, L_{A1}, L_{A10}, L_{A50}, L_{A90}, L_{A99}, L_{Amin} and L_{Aeq}.

In addition, operator attended monitoring was also conducted at each selected locations. This will assist in understanding of the source and spectral information.

3.1.2 Attended Noise Monitoring

Operator-attended ambient noise survey was conducted at all noise monitoring locations in order to support the identification and occurrence of ambient noise sources.

Attended ambient noise measurements were performed using a calibrated Rion NA-28 Sound Level Meter (S/N: 01060054). The instrument calibration was checked before and after the measurements, with the variation in calibrated levels not exceeding the acceptable variation of ±0.5 dBA (AS 1055).

The acoustic instrumentation (SLM and calibrator) employed throughout the monitoring programme was designed to comply with the requirements of AS IEC 61672.1-2004 "*Electroacoustics - Sound Level Meters"* and carry current NATA or manufacturer calibration certificates.

3.1.3 Traffic Counting

In accordance with RMS document *Preparing an Operational Traffic and Construction Noise and Vibration Assessment Report*, traffic counting was undertaken concurrently with the noise monitoring near the Old Cooma Road and Edwin Land Parkway intersection. Traffic counting was conducted on all three existing approaches of this intersection.

In addition to these concurrent traffic counting data, past traffic data at the Bungendore Road, Yass Road and existing Ellerton Drive intersection was also provided by the Council to assist with the noise study.

3.2 Monitoring Results

3.2.1 Unattended Noise Monitoring

A summary of the ambient noise logging results during ICNG and RNP defined time periods (where applicable) is contained in **Table 1**. A full graphical representation of the noise level recorded is provided in **Appendix B** to **Appendix L**.

Periods affected by adverse weather have been excluded from the results according to the procedure outlined in the *NSW Industrial Noise Policy* (INP).

Table 1 Ambient Noise Logging Results

Noise Monitoring Location	Ambient Noise Logging Results				
NCA1	**– ICNG Defined Time Periods**				
55 Thomas Royal Garden	**Monitoring Period**	**Noise Level (dBA re 20 μPa)**			
		RBL	**LAeq**	**L10**	**L1**
7 – 17 March 2014	**Daytime**	31	46	41	51
	Evening	28	46	40	48
S/N: 16-207-049	**Night-time**	23	40	30	38
NCA2.1	**– ICNG Defined Time Periods**				
50 Stone Haven Circuit	**Monitoring Period**	**Noise Level (dBA re 20 μPa)**			
		RBL	**LAeq**	**L10**	**L1**
7 – 17 March 2014	**Daytime**	36	50	49	59
	Evening	33	58	47	58
S/N: 16-207-043	**Night-time**	24	42	34	45
NCA2.2	**– ICNG Defined Time Periods**				
16 Geebung Place	**Monitoring Period**	**Noise Level (dBA re 20 μPa)**			
		RBL	**LAeq**	**L10**	**L1**
7 – 17 March 2014	**Daytime**	29	48	42	52
	Evening	32	44	40	46
S/N: 16-203-528	**Night-time**	26	38	67	43
NCA3	**– ICNG Defined Time Periods**				
40 Taylor Place	**Monitoring Period**	**Noise Level (dBA re 20 μPa)**			
		RBL	**LAeq**	**L10**	**L1**
7 – 17 March 2014	**Daytime**	30	57	39	49
	Evening	28	52	40	48
S/N: 16-203-530	**Night-time**	23	38	31	37
NCA4	**– ICNG Defined Time Periods**				
46 Severne Street	**Monitoring Period**	**Noise Level (dBA re 20 μPa)**			
		RBL	**LAeq**	**L10**	**L1**
7 – 17 March 2014	**Daytime**	27	46	39	49
	Evening	28	53	42	50
S/N: 16-306-044	**Night-time**	25	41	39	46
NCA5	**– ICNG Defined Time Periods**				
35 Lonergan Drive	**Monitoring Period**	**Noise Level (dBA re 20 μPa)**			
		RBL	**LAeq**	**L10**	**L1**
6 – 17 March 2014	**Daytime**	30	51	44	51
	Evening	32	57	43	48
S/N: 16-306-041	**Night-time**	29	46	39	45
NCA6	**– ICNG Defined Time Periods**				
40a Serverne Street	**Monitoring Period**	**Noise Level (dBA re 20 μPa)**			
		RBL	**LAeq**	**L10**	**L1**
	Daytime	30	45	40	47

Noise Monitoring Location	Ambient Noise Logging Results				
7 – 17 March 2014	**Evening**	29	47	49	53
S/N: 16-203-526	**Night-time**	26	44	45	52
NCA7 26 Doeberl Place	**– ICNG Defined Time Periods**				
	Monitoring Period	**Noise Level (dBA re 20 μPa)**			
		RBL	**LAeq**	**L10**	**L1**
7 – 17 March 2014	**Daytime**	30	51	41	48
S/N: 16-004-033	**Evening**	29	45	40	47
	Night-time	25	44	30	37
NCA8.1 78 Barracks Flat Drive	**– ICNG Defined Time Periods**				
	Monitoring Period	**Noise Level (dBA re 20 μPa)**			
		RBL	**LAeq**	**L10**	**L1**
7 – 17 April 2014	**Daytime**	30	47	43	53
	Evening	29	52	41	49
S/N: 16-306-044	**Night-time**	24	49	33	39
	– ICNG Defined Time Periods				
	Monitoring Period	**Noise Level (dBA re 20 μPa)**			
		RBL	**LAeq**	**L10**	**L1**
NCA8.2 12 Alfred Place	**Daytime**	40	57	53	61
	Evening	34	54	49	55
7 – 17 April 2014	**Night-time**	26	53	42	50
	– RNP Defined Time Periods				
S/N: 16-203-526	**Monitoring Period**	**Noise Level $L_{Aeq(Period)}$ (dBA)**			
	Daytime (7am-10pm)	56			
	Night-time (10pm-7am)	53			
Edwin Land Parkway Road Reserve near 19 Nimbus Place	**– RNP Defined Time Periods**				
	Monitoring Period	**Noise Level $L_{Aeq(Period)}$ (dBA)**			
	Daytime (7am-10pm)	59			
7 – 17 April 2014	**Night-time (10pm-7am)**	51			
S/N: 16-207-049					

Note 1: ICNG Governing Periods – Day: 7.00 am to 6.00 pm Monday to Saturday, 8.00 am to 6.00 pm Sunday; Evening: 6.00 pm to 10.00 pm; Night: 10.00 pm to 7.00 am Monday to Saturday, 10.00 pm to 8.00 am Sunday.

Note 2: RNP Governing Periods – Day: 7.00 am to 10.00 pm; Night: 10.00 pm to 7.00 am.

3.2.2 Attended Noise Monitoring

A summary of the 15 minute operator-attended ambient noise survey undertaken at the noise logging site, is shown in **Table 2**.

Table 2 Operator-Attended Ambient Noise Survey at Noise Logging Location

Noise Survey Location	Measurement Details	Measured Noise Level (dBA)			Description of Ambient Noise Sources – Typical Maximum Noise Levels LAmax
		LA90	LAeq	LAmax	
NCA1 55 Thomas Royal Garden	17/03/14 04:09 pm Light winds 1-2 m/s Cloud cover 2/8	41	44	60	Distant traffic noise: 41-42 Distant truck: up to 45 Wind in trees: 41-45 Dog bark: up to 51 Noisy exhaust from bike: up to 60 Existing background noise level dominated by distant traffic (likely to be from Bungendore Street / Kings Highway)
NCA2.1 50 Stone Haven Circuit	17/03/14 03:37 pm Light winds 1-2 m/s Cloud cover 2/8	43	50	65	Distant traffic noise: 45-49 Truck along Ellerton Drive: up to 65 Existing background noise level dominated by distant traffic (likely to be from Bungendore Street / Kings Highway)
NCA2.2 16 Geebung Place	17/03/14 03:13 pm Light winds 1-2 m/s Cloud cover 2/8	40	50	68	Distant road traffic and heavy vehicles: faintly audible Distant construction noise (excavator or the like): up to 45 Car door slam: 45-47 Constant insect noise Interference from resident: up to 66
NCA3 40 Taylor Place	07/03/14 08:42 am Wind calm Cloud cover 0/8	35	41	65	Distant traffic noise: 36-39 Household noise: up to 39 Aircraft: up to 52 Dog: 39-41 Birds: up to 43 Resident door slam: up to 65
NCA4 46 Severne Street	17/03/14 05:19 pm Light winds 1-2 m/s Cloud cover 2/8	34	42	65	Distant traffic: 33-35 Birds: 46-65 Hammering noise from odd number neighbour: up to 41
NCA5 35 Lonergan Drive	06/03/14 08:20 am Light winds 1-2 m/s Cloud cover 3/8	30	44	64	Light aircraft: up to 39 Local traffic: 32-36 Car traffic within Karbar: 39-45 Bus travelling uphill along residential street in Karabar: 48-52 Distant car radio noise: up to 31 Birds (cockatoo): up to 64
NCA6 40a Serverne Street	17/03/14 04:49 pm Mild winds 2-3 m/s Cloud cover 2/8	39	44	58	Distant traffic noise: 35-38 Hammering noise from neighbour: 39-41 Birds: 46-58
NCA7 26 Doeberl Place	17/03/14 06:31 pm Wind calm Cloud cover 1/8	36	40	56	Distant traffic from Old Cooma Road:36-39 Dog barking: 53-56

Noise Survey Location	Measurement Details	Measured Noise Level (dBA)			Description of Ambient Noise Sources – Typical Maximum Noise Levels LAmax
		LA90	LAeq	LAmax	
NCA8.2 12 Alfred Place	17/04/14 08:10 am Wind calm Cloud cover 1/8	42	55	79	Traffic on Old Cooma Road:44-47 Truck on ELP: 45-52 Exhaust from truck: 54-58 Birds: 65 Dog barking next door:75-79

3.2.3 Traffic Counting

Traffic data recorded during the survey period of NCA8.2 and Edwin Land Parkway road reserve and past traffic count data are shown in **Table 3**.

Table 3 Traffic Count Data

Traffic Counting Location		15 Hour[1]		9 Hour[2]	
		Light[3]	Heavy[4]	Light[3]	Heavy[4]
Concurrent Traffic Count (existing Edwin Land Parkway and Old Cooma Road Intersection)					
Edwin Land Parkway	Eastbound	2115	104	204	12
	Westbound	2112	120	210	11
Old Cooma Road (north of ELP)	Northbound	3206	240	297	24
	Southbound	3243	230	269	27
Old Cooma Road (south of ELP)	Northbound	1821	270	185	30
	Southbound	1883	264	203	29
Past Traffic Count Nov-Dec 2013 (Bungendore Road, Yass Road and existing Ellerton Drive intersection)					
Yass Road	Northbound	5403	548	818	73
	Southbound	5765	489	408	40
Bungendore Road (west of Yass Road)	Eastbound	10308	668	1049	69
	Westbound	10088	642	831	92
Bungendore Road (east of Yass Road)	Eastbound	5432	353	399	56
	Westbound	5069	249	527	41

Note 1: Time period for 15 Hour average daily traffic volume data is 7.00 am to 10.00 pm.
Note 2: Time period for 9 Hour average daily traffic volume data is 10.00 pm to 7.00 am.
Note 3: Vehicle types included in Light classification are Class 1 and 2 vehicles.
Note 4: Vehicle types included in Heavy classification are Class 3 to 12 vehicles.

4 NOISE AND VIBRATION GOALS

4.1 Operational Noise – NSW Road Noise Policy

4.1.1 Guideline Overview

For traffic operating on public roads, the NSW Government's *Road Noise Policy* (RNP) is appropriate for assessing potential road traffic noise impacts.

The NSW Government issued the RNP on 1 July 2011. The document identifies strategies that address the issue of road traffic noise from:

- Existing roads.
- New road projects.
- Road redevelopment projects.
- New traffic-generating developments.

The RNP noise criteria aim to protect amenity inside and immediately around permanent residences, schools, hospitals and other sensitive land uses, rather than at all points in a given locality, which would not be practical or possible. Although it is not mandatory to achieve the noise assessment criteria in the RNP, project proponents need to provide justification if it is not considered feasible or reasonable to achieve them.

The guideline recognises that there are generally more opportunities to minimise noise impacts from new roads and road corridors, especially those in greenfield locations, through judicious road design and land use planning. The scope to reduce noise impacts from existing roads and corridors is more limited.

The RNP criteria are applicable both at the time of project opening and also in a design year, typically taken to be ten years after project completion.

4.1.2 Noise Assessment Criteria – Residential Land Uses

Upon completion of the proposed Ellerton Drive extension, the entire Ellerton Drive is considered to be a sub-arterial road. **Table 4** summarises the RNP assessment criteria for residences to be applied for this project. These criteria are presented for assessment against facade noise levels as measured at the most affected point in front of a building.

Table 4 RNP Criteria – Residential Land Uses

Road Category	Type of Project/Land Use	Assessment Criteria (dBA)	
		Daytime (7 am – 10 pm)	**Night-time (10 pm – 7 am)**
Freeway/ arterial/ sub-arterial roads	1. existing residences affected by noise from new freeway/arterial/sub-arterial road corridors	$L_{Aeq(15hour)}$ 55 (external)	$L_{Aeq(9hour)}$ 50 (external)

In addition to the noise criteria in **Table 4**, the RNP describes a "Relative Increase Criteria" of 12 dB above existing traffic noise. This criterion is primarily intended to protect existing quiet areas from excessive changes in amenity. Most of the existing residences along the proposed extension are currently not affected by significant traffic noise. Therefore, the "Relative Increase Criteria" are also considered in this assessment.

It must be noted that not all properties that exceed the base criteria automatically qualify for consideration of noise mitigation. All properties that exceed the base criteria will be examined to see if acoustic benefits can be gained from changes in the proposed road alignment, or other similar measures that could provide acoustic benefit.

The ENMM fully details the procedures for which properties qualify for noise mitigation. This is a multi-step process and initially involves the identification of those properties where there is;

- Exceedance of the base objective; and
- The proposal results in a predicted change in the noise environment of 2dBA or more, when comparing the future scenario including the proposal and the 'future existing' scenario excluding the proposal;

Table 5 presents a matrix of conditions, indicating which properties are further considered for noise mitigation.

Table 5 Operational Noise Level Matrix

Overall Noise Level	**Change in Noise level**		
	Change <0 dBA (ie decrease in noise)	**0 < change ≤ 2 dBA (ie marginal increase)**	**Increase > 2 dBA (ie noticeable increase)**
< Base Criteria	No further consideration of noise mitigation		
Less than 2 dBA above Base Criteria	No further consideration of noise mitigation		Further consideration is given to the provision of noise mitigation
Between 2dBA to 5dBA above the base criteria	No further consideration of noise mitigation		
More than 5dBA above the base criteria (termed Acute noise level)	Further consideration is given to the provision of noise mitigation		

Where properties qualify for further consideration of noise mitigation, the options available are further assessed in terms of their:

- Reasonableness – which includes considerations of cost (ie the relationship between cost and noise reduction provided), equity, visual impacts, the change in noise levels etc); and
- Feasibility - ie engineering considerations, including whether it can be readily built, consideration of; stormwater access, safety issues, maintenance requirements, etc.

4.1.3 Sleep Disturbance

Guidance for the assessment of sleep disturbance given in the RNP is reproduced as follows:

> *"Triggers for, and effects of sleep disturbance from, exposure to intermittent noise such as noise from road traffic are still being studied. There appears to be insufficient evidence to set new indicators for potential sleep disturbance due to road traffic noise. The NSW Roads and Traffic Authority's Practice Note 3 (NSW Roads and Traffic Authority 2008) outlines a protocol for assessing and reporting on maximum noise levels and the potential for sleep disturbance."*

NSW Roads and Traffic Authority's *Environmental Noise Management Manual* (ENMM) – Practice Note III protocol for assessing the potential for sleep disturbance is determined by performing $L_{AFmax} - L_{Aeq(1hr)}$ calculation on individual vehicle passby noise measurements. The number of night-time passby events where the $L_{AFmax} - L_{Aeq(1hr)}$ difference is greater than 15 dB is to be determined.

With regard to reaction to potential sleep disturbance events, the RNP gives the following guidance:

> *From the research on sleep disturbance to date it can be concluded that:*
>
> - *maximum internal noise levels below 50–55 dB(A) are unlikely to awaken people from sleep*
> - *one or two noise events per night, with maximum internal noise levels of 65–70 dB(A), are not likely to affect health and wellbeing significantly.*

It is generally accepted that internal noise levels in a dwelling, with the windows open are 10 dB lower than external noise levels. Based on a worst case minimum attenuation, with windows open, of 10 dB, the first conclusion above suggests that short term external noises of 60 dBA to 65 dBA are unlikely to cause awakening reactions.

The second conclusion suggests that one or two noise events per night with maximum external noise levels of 75 dBA to 80 dBA are not likely to affect health and wellbeing significantly.

4.2 Construction Noise Goals

4.2.1 Construction Noise Metrics

The noise metrics used to describe construction noise emissions in the modelling and assessments are:

$L_{A1(1minute)}$ The "typical maximum noise level" for an event, used in the assessment of potential sleep disturbance during night-time periods. Alternatively, the assessment may be conducted using the L_{Amax} or maximum noise level.

$L_{Aeq(15minute)}$ The "energy average noise level" evaluated over a 15-minute period. This parameter is used to assess the potential construction noise impacts.

L_{A90} The "background noise level" in the absence of construction activities. This parameter represents the average minimum noise level during the daytime, evening and night-time periods respectively. The $L_{Aeq(15\ minute)}$ construction noise management levels are based on the L_{A90} background noise levels.

The subscript "A" indicates that the noise levels are filtered to match normal human hearing characteristics (ie A-weighted).

4.2.2 Noise Management Levels

Residential Receivers

The applicable construction noise goals (Noise Management Levels - NML) for this project are described in the *Interim Construction Noise Guideline* (ICNG - DECC 2009).

For construction work during standard hours, a Noise Management Level ($L_{Aeq(15minute)}$) of RBL + 10 dB applies for residential receivers. Construction work outside of the recommended standard hours should not be undertaken without strong justification. Where construction work outside standard hours is required, a Noise Management Level ($L_{Aeq(15minute)}$) of RBL + 5 dB applies for residential receivers.

These NMLs aim to represent the level above which there may be some community reaction to construction noise. Where the predicted levels exceed the noise management level, all feasible and reasonable work practices should be applied to minimise the potential noise impacts. The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.

Where $L_{Aeq(15minute)}$ construction noise levels are predicted to exceed 75 dBA, the relevant authority (consent, determining or regulatory) may require respite periods to be observed. This may include restricting the hours that the very noisy activities can occur, taking into account:

- Times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences).
- If the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.

The ICNG states that where construction works are planned to extend over more than two consecutive nights, the impact assessment should cover the maximum noise level from the proposed works. In addition to the NMLs, where construction would be required during the night-time period the potential for sleep disturbance to residential receivers should therefore be assessed.

The EPA's current approach to assessing potential sleep disturbance (*Application Notes to Industrial Noise Policy)* is to apply an initial screening criterion of background plus 15 dB and to undertake further analysis if the screening criterion cannot be achieved. The sleep disturbance screening criterion applies outside bedroom windows during the night-time period.

Where the screening criterion cannot be met, the additional analysis should consider the number of potential sleep disturbance events during the night, the level of exceedance and the noise from other events.

4.3 Construction Vibration Goals

The effects of vibration in buildings can be divided into three main categories – those in which the occupants or users of the building are inconvenienced or possibly disturbed, those where the building contents may be affected and those in which the integrity of the building or the structure itself may be prejudiced.

4.3.1 Human Comfort Vibration

The EPA's *Assessing Vibration: a technical guideline* provides guideline values for continuous, transient and intermittent events that are based on a Vibration Dose Value (VDV) rather than a continuous vibration level. The VDV is dependent upon the level and duration of the short-term vibration event, as well as the number of events occurring during the daytime or night-time period.

The VDVs recommended in the document for vibration of an intermittent nature (ie construction works where more than three distinct vibration events occur) are presented in **Table 6**.

Table 6 Acceptable Vibration Dose Values for Intermittent Vibration (m/s$^{1.75}$) (*Assessing Vibration: a technical guideline)*

Location	Daytime[1]		Night-time[1]	
	Preferred value	Maximum value	Preferred value	Maximum value
Critical areas[2]	0.10	0.20	0.10	0.20
Residences	0.20	0.40	0.13	0.26
Offices, schools, educational institutions and places of worship	0.40	0.80	0.40	0.80
Workshops	0.80	1.60	0.80	1.60

1 Daytime is 7.00 am to 10.00 pm and night-time is 10.00 pm to 7.00 am.
2 Examples include hospital operating theatres and precision laboratories where sensitive operations are occurring. These criteria are only indicative, and there may be a need to assess intermittent values against the continuous or impulsive criteria for critical areas.
Source: BS 6472–1992

4.3.2 Effects on Building Contents

People can perceive floor vibration at levels well below those likely to cause damage to building contents or affect the operation of typical equipment. For most receivers, the controlling vibration criterion will be the human comfort criterion, and it is therefore not normally required to set separate criteria in relation to the effect of construction vibration on most building contents.

Where appropriate, objectives for the satisfactory operation of critical instruments or manufacturing processes should be sourced from manufacturer's data and/or other published objectives

4.3.3 Structural Damage Vibration

Structural damage vibration limits are based on Australian Standard AS 2187: Part 2-2006 *Explosives - Storage and Use - Part 2: Use of Explosives* and British Standard BS 7385 Part 2-1993 *Evaluation and measurement for vibration in buildings Part 2*. These standards provide frequency-dependent vibration limits related to cosmetic damage, noting that cosmetic damage is very minor in nature, is readily repairable and does not affect the structural integrity of the building. The recommended vibration limits from BS7385 for transient vibration for minimal risk of cosmetic damage to residential and industrial buildings is shown in **Table 7**.

Table 7 Transient Vibration Guide Values for Minimal Risk of Cosmetic Damage (BS7385)

Line	Type of Building	Peak component particle velocity in frequency range of predominant pulse	
		4 Hz to 15 Hz	15 Hz and above
1	Reinforced or framed structures Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above	
2	Unreinforced or light framed structures Residential or light commercial type buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

4.3.4 Ground-Borne (Regenerated) Noise

Ground-borne (or regenerated) construction noise can be present on construction projects where vibration from activities such as rockbreaking, road heading, rotary cutting and rock drilling/sawing can be transmitted through the ground and into the habitable areas of nearby buildings. Ground-borne noise occurs when this vibration in the ground and/or building elements is regenerated as audible noise within areas of occupancy inside the building.

The NSW EPA's ICNG defines internal ground-borne noise goals for residential receivers of 40 dBA $L_{Aeq(15minute)}$ during the evening (6:00 pm to 10:00 pm) and 35 dBA $L_{Aeq(15minute)}$ during the night-time (10:00 pm to 7:00 am). The goals are only applicable when ground-borne noise levels are higher than airborne noise levels.

5 OPERATIONAL NOISE ASSESSMENT

5.1 Assessment Methodology

The 'build' and 'no build' operational scenarios have been assessed within one year of project opening and for the design year (10 years after opening). The noise modelling has been conducted using the SoundPLAN V7.1 suite of acoustics software implementing the Calculation of Road Traffic Noise (CORTN) prediction model for all calculations. The relevant traffic forecast data used is presented in **Table 8**.

Table 8 Traffic Forecast Data

Traffic Counting Location		15 Hour[1]		9 Hour[2]	
		Light[3]	Heavy[4]	Light[3]	Heavy[4]
Within One Year of Project Opening					
Ellerton Drive Extension	Northbound	1576	175	143	16
	Southbound	1865	207	186	21
Edwin Land Parkway	Eastbound	4228	207	435	25
	Westbound	2705	154	281	14
Old Cooma Road (north of ELP)	Northbound	7771	582	728	564
	Southbound	6013	426	564	57
Old Cooma Road (south of ELP)	Northbound	6120	907	552	88
	Southbound	5865	822	558	79
Yass Road	Northbound	7081	601	596	58
	Southbound	5539	561	483	43
Bungendore Road (west of Yass Road)	Eastbound	9200	596	864	57
	Westbound	9162	583	829	92
Bungendore Road (east of Yass Road)	Eastbound	6733	437	565	79
	Westbound	7617	374	649	51
Design Year (10 Years after Project Opening)					
Ellerton Drive Extension	Northbound	2017	106	132	7
	Southbound	3059	161	263	14
Edwin Land Parkway	Eastbound	5929	290	577	33
	Westbound	5006	284	500	26
Old Cooma Road (north of ELP)	Northbound	9040	677	905	74
	Southbound	7144	506	702	70
Old Cooma Road (south of ELP)	Northbound	10233	1517	957	153
	Southbound	10195	1430	975	139
Yass Road	Northbound	8457	717	710	69
	Southbound	7255	735	646	58
Bungendore Road (west of Yass Road)	Eastbound	9316	603	888	59
	Westbound	8054	513	721	80
Bungendore Road (east of Yass Road)	Eastbound	8220	533	694	97
	Westbound	8520	419	726	57

Note 1: Time period for 15 Hour average daily traffic volume data is 7.00 am to 10.00 pm.
Note 2: Time period for 9 Hour average daily traffic volume data is 10.00 pm to 7.00 am.
Note 3: Vehicle types included in Light classification are Class 1 and 2 vehicles.
Note 4: Vehicle types included in Heavy classification are Class 3 to 12 vehicles.

Road traffic noise levels were predicted using RMS and EPA recommended procedures, as detailed in the CORTN methodology. The input data for each section of the road for these calculations includes the total traffic count, the percentage of heavy vehicles within the total traffic flow and vehicle speed.

5.2 Noise Model Validation

The predicted operational noise levels for the existing scenario have been compared to the noise levels measured during the ambient noise survey, discussed in **Section 3**, for the purpose of model validation. This is shown in **Table 9**.

Table 9 Model Validation – Comparison of Predicted Noise Levels to Measured Noise Levels

Noise Logging Location	Noise Logging Address	Measured Existing Noise Levels (dBA)		Predicted Existing Noise Levels (dBA)		Comparison of Noise Levels – Predicted Minus Measured (dBA)	
		Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)
NCA8.2	12 Alfred Place	53	48	53	46	0	-2
ELP	Edwin Land Parkway Road Reserve	59	51	57	50	-2	-1

The NSW Environmental Noise Management Manual (ENMM) notes that "*it should be recognised that noise prediction modelling has some accuracy limitations and will commonly produce acceptable errors of around 2 dBA*". This approach to validation has been found to be acceptable on a number of past projects in NSW.

On the basis of the comparison of the noise model predictions with the baseline measurement results, it is concluded that the noise model provides results which enable a reliable assessment of the project.

5.3 Predicted Operational Noise Levels

The predicted operational noise levels for the within 1 year of opening 'no build' and 'build' scenarios, as well as the change in noise levels and the level above the RNP criteria are shown in **Table 10**.

The predicted operational noise levels for the design year (10 years after project opening) 'no build' and 'build' scenarios, as well as the relative increase in noise level and the level above the RNP criteria for the representative receivers in each Noise Catchment Area are shown in **Table 11**.

The modelled traffic speed was 60 km/hr from the existing section of Ellerton Drive to about Ch1200 and 80 km/hr from Ch1200 onwards to the Old Cooma Road intersection. The road pavement adopted in the noise model was dense graded asphalt (DGA)

Table 10 Within 1 Year of Opening – Predicted Operational Noise Levels

Representative Receiver Address	Predicted Noise Levels (dBA)				Relative Increase (dBA)		Year of Opening 'Build' Scenario Level Above RNP Criteria (dBA) i.e. LAeq(15hour) 55 LAeq(9hour) 50		Year of Opening 'Build' Scenario Level Exceed 12 dB 'Relative Increase Criteria'?		Year of Opening 'Build' Scenario Noise Level Considered Acute?[1]	
	Year of Opening – 'No Build' Scenario		Year of Opening – 'Build' Scenario									
	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)
NCA1 53 Thomas Royal Garden	43	36	64	57	20.9	20.7	8.9	6.7	YES	YES	No	No
NCA2 2 Tennyson Drive	43	36	60	52	16.4	15.8	4.7	2.2	YES	YES	No	No
NCA3 40 Taylor Place	37	30	58	51	21.3	20.9	3.4	1	YES	YES	No	No
NCA4 40 Severne Street	37	30	51	44	14.3	14.0	-	-	YES	YES	No	No
NCA5 26 Lonergan Drive	35	28	53	46	18.3	18.1	-	-	YES	YES	No	No
NCA6 40A Severne Street	38	31	57	49	18.7	18.4	1.5	-	YES	YES	No	No
NCA7 32 Doeberl Place	40	33	62	55	22.5	22.3	7.1	4.8	YES	YES	No	No
NCA8 108 Barracks Flat Drive	33	26	56	49	23.4	23.3	1.4	-	YES	YES	No	No
NCA8 20 Caroline Place	55	48	62	54	6.8	6.7	6.8	4.4	-	-	No	No

Note 1: Acute noise is defined as day $L_{Aeq(15hour)}$ 65dBA and night-time as $L_{Aeq(9hour)}$ 60dBA.

The results of the noise prediction for all receivers for the year of opening scenario are presented in **Appendix M**.

Table 11 Design Year – Predicted Operational Noise Levels

Representative Receiver Address	Predicted Noise Levels (dBA)				Relative Increase (dBA)		Design Year 'Build' Scenario Level Above RNP Criteria (dBA) i.e. LAeq(15hour) 55 LAeq(9hour) 50		Design Year 'Build' Scenario Level Exceed 12 dB 'Relative Increase Criteria'?		Design Year 'Build' Scenario Noise Level Considered Acute?[1]	
	Design Year – 'No Build' Scenario		Design Year – 'Build' Scenario									
	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)
NCA1 53 Thomas Royal Garden	43	36	60	52	17.2	16.0	5.3	2.1	YES	YES	No	No
NCA2 2 Tennyson Drive	44	37	60	52	15.8	14.6	4.7	1.5	YES	YES	No	No
NCA3 40 Taylor Place	41	34	58	50	16.8	15.6	2.9	-	YES	YES	No	No
NCA4 40 Severne Street	39	32	52	44	13.4	12.1	-	-	YES	YES	No	No
NCA5 26 Lonergan Drive	36	29	57	49	21.0	19.7	1.9	-	YES	YES	No	No
NCA6 40A Severne Street	39	32	57	49	18.5	17.2	2	-	YES	YES	No	No
NCA7 32 Doeberl Place	42	35	64	55	21.7	20.3	8.5	5.2	YES	YES	No	No
NCA8 108 Barracks Flat Drive	58	50	62	54	4.4	3.8	6.9	4.1	YES	YES	No	No
NCA8 20 Caroline Place	43	36	60	52	17.2	16.0	5.3	2.1	-	-	No	No

Note 1: Acute noise is defined as day $L_{Aeq(15hour)}$ 65dBA and night-time as $L_{Aeq(9hour)}$ 60dBA.

The results of the noise prediction for all receivers for the design year scenario are presented in **Appendix N**.

The predicted noise levels in **Table 11** show that the relative increase in noise levels between the design year 'build' and 'no build' scenarios range from 3.8 to 21.7 dB for both the daytime and night-time periods. The relative increase in noise levels at 8 out of the total 9 selected representative properties were predicted to be in excess of 12 dB, which exceeds that "Relative Increase Criteria" as discussed in **Section 4.1.2**.

Predicted noise levels for the design year 'build' scenario exceed the RNP $L_{Aeq(15hour)}$ daytime criteria by up to 8.5 dB and the $L_{Aeq(9hour)}$ night-time criteria by up to 5.2 dB.

Where exceedances of the RNP criteria are identified, feasible and reasonable noise mitigation measures should be assessed.

5.4 Assessment of Reasonable and Feasible Mitigation Measures

5.4.1 Procedure Overview

Where exceedances of the noise criteria are identified, the RNP describes noise mitigation measures to be considered in order of priority:

1. Road design and traffic management
2. Quieter pavement surfaces
3. In-corridor noise barriers/mounds
4. At-property treatments or localised barriers/mounds

The priority of mitigation measures recognises that noise control at the source is preferable over noise path control and noise mitigation at the receiver.

The RNP notes that it is not mandatory to achieve the noise assessment criteria, and that noise mitigation measures should be both feasible and reasonable. Selecting reasonable measures from those that are feasible involves judging whether the overall noise benefits outweigh the overall adverse social, economic and environmental effects, including the cost of the abatement measure. To make such a judgement, consideration may be given to noise impacts, noise mitigation benefits, the cost effectiveness of noise mitigation and community views.

5.4.2 Reasonable and Feasible Definition

Where the noise goals in the design year 'build' scenario are found to be exceeded as a result of a project, the RNP and the ENMM require the project to adopt "reasonable and feasible" mitigation measures to meet the targets.

Practice Note IV of the ENMM defines what "reasonable and feasible" factors may be considered when investigating noise mitigation measures.

"**Reasonableness**" relates to the application of wider judgements. The factors to be considered are:

- The noise reduction provided and the number of people protected
- The cost of mitigation, including the total cost and cost variations with different benefits provided
- Community views and wishes
- Visual impacts
- Existing and future noise levels, including changes in noise levels
- The benefits arising from the proposed road or road development

"**Feasibility**" relates to engineering considerations (what can be practically built) and may include:

- The inherent limitations of different techniques to reduce noise emissions from road traffic noise sources
- Safety issues, such as restrictions on road vision
- Road corridor site constraints such as space limitations
- Floodway and stormwater flow obstruction
- Access requirements
- Maintenance requirements

5.4.3 NCA1

The findings from the noise assessment of NCA1 are presented in **Table 12**.

Table 12 NCA1 – Noise Assessment Findings

Item		Description
Number of potentially affected residential properties	Total	26
	More than 1 storey	7 out of 26
	Exceed RNP Criteria[1]	26 out of 26
Range of predicted noise levels	LAeq(15hour)	54.3 – 63.4 dBA
	LAeq(9hour)	46.1 – 55.2 dBA
	Relative Increase (both LAeq(15hour) and LAeq(9hour))	3.3 – 19.9 dB

Note 1: including LAeq(15hour), LAeq(9hour) and Relative Increase Criteria

The modelled scenarios for NCA1 include sections of approximately 1.5 m high existing fences along the residential property boundaries. Based on observations made on site at 55 Thomas Royal Garden, the height of the existing fence was generally low relative to the elevations of the dwellings and the road and found to be insufficient in blocking direct line of sight from the dwelling to the road.

An aerial photograph of NCA1 is presented in **Figure 2**. Considering that the affected dwellings are closely situated to each other with a combined frontage of approximately 440 m, it is likely to be both reasonable and feasible that mitigation in the form upgrading the property boundary fence be provided.

It is therefore recommended that all existing fences (common with the project) be removed and replaced with an appropriate noise barrier. At a height of 3 to 3.6 m (dependent on location, see **Appendix P**), predictions show that the day and night time traffic noise levels would meet the relevant RNP criteria (including the Relative Increase Criteria) for all ground level receivers.

Double-Storey Properties

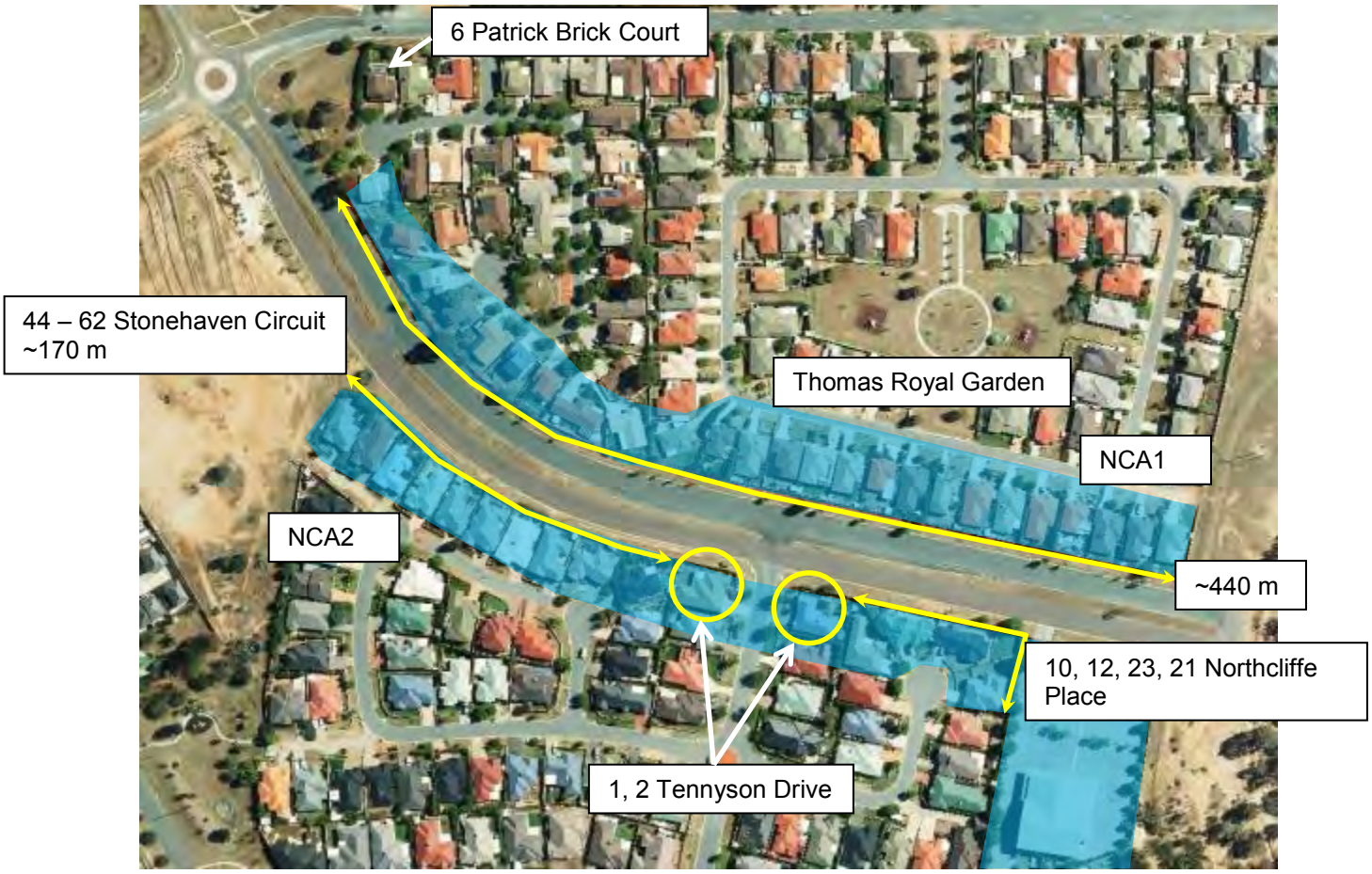
Seven out of the 26 properties were identified to consist of more than one storey. In our view, it is not likely to be feasible and reasonable to increase the height of the noise barrier in the attempt of achieving compliance for the 2nd storey receivers. It is likely that such barrier would be at least 6 m high over a length of about 230 m in order to be effective in providing noise reduction for the upper levels. If deemed reasonable and feasible in further assessment, SLR recommends that specific building treatments be provided for the 2nd storey of the relevant properties. This option is further discussed in **Section 5.4.9**.

Further information in relation to the recommended noise barrier is presented in **Appendix P**.

6 Patrick Brick Court

The location of this receiver is presented in **Figure 2**. The predicted noise levels at this property exceed the criteria by up to 2 dB. A noise barrier recommended above can be extended along the nature reserve at a height of 3 m (including the height of the existing earth mound) and this was predicted to provide a noise reduction of up to 3 dB. However, this may not be feasible considering extending this barrier only benefits one property. This property is a double storey property and the second storey is likely to be considered for building treatment as discussed above. On this basis, it is likely that the provision of building treatment for both levels of the property is likely to be a more feasible option compared to extending the length of the barrier.

Figure 2 Aerial Photograph – NCA1 and Part of NCA2



5.4.4 NCA2

The findings from the noise assessment of NCA2 are presented in **Table 13**.

Table 13 NCA2 – Noise Assessment Findings

Item		Description
Number of potentially affected residential properties	Total	20
	More than 1 storey	None
	Exceed RNP Criteria[1]	15 out of 20
Range of predicted noise levels	LAeq(15hour)	47.1 – 62.2 dBA
	LAeq(9hour)	39.1 – 54.1 dBA
	Relative Increase (both LAeq(15hour) and LAeq(9hour))	2.8 – 17.7 dB

Note 1: including LAeq(15hour), LAeq(9hour) and Relative Increase Criteria

An aerial photograph of part of NCA2 is presented in **Figure 2**.

44 – 62 Stonehaven Circuit

The modelled scenarios for these properties include sections of approximately 1.8 m high existing fences along the residential property boundaries. Out of these 10 properties, the day and night time criteria were exceeded at nine and three locations respectively. The average levels of exceedances were predicted to be 3 dB and 1 dB respectively. The relative increase criteria were predicted to be met at all locations.

It is therefore recommended that all existing fences (common with the project) be removed and replaced with an appropriate noise barrier. At a height of the 2.4 m, predictions show that the day and night time traffic noise levels would meet the relevant RNP criteria (including the Relative Increase Criteria) for all ground level receivers.

Further information in relation to the recommended noise barrier is presented in **Appendix P**.

Northcliffe Place

At these properties, the predicted noise levels were up to 7.4 dB in exceedance of the RNP criteria at 2 properties. If fence replacement is deemed feasible and reasonable in other properties in NCA1 and NCA2, it is likely that replacing the fence at Northcliffe Place residences is likely to be a suitable mitigation option. It was determined that the relevant criteria were predicted to be met with a 2.4 m high fence.

1, 2 Tennyson Drive

Due to driveway access requirements, it is likely that provision of noise barrier is not considered to be feasible along the side boundaries of these properties. Provision of barrier along the boundary of 2 Tennyson Drive was predicted to provide partial acoustic benefit. On this basis, if deemed reasonable and feasible in further assessment, it is likely that specific building treatment (in combination with partial treatment provided by barrier along the property where appropriate) is a feasible and reasonable mitigation option for these properties. This option is further discussed in **Section 5.4.9**.

5.4.5 NCA3

The findings from the noise assessment of NCA3 are presented in **Table 14**.

Table 14 NCA3 – Noise Assessment Findings

Item		Description
Number of potentially affected residential properties	Total	13
	More than 1 storey	None
	Exceed RNP Criteria[1]	10 out of 13
Range of predicted noise levels	LAeq(15hour)	49.4 – 57.9 dBA
	LAeq(9hour)	41.5 – 49.6 dBA
	Relative Increase (both LAeq(15hour) and LAeq(9hour))	5.2 – 19.3 dB

Note 1: including LAeq(15hour), LAeq(9hour) and Relative Increase Criteria

The existing residential properties within NCA3 are generally situated on larger blocks and do not have any boundary fences apart from wire fence. Six dwellings (30 – 42 Taylor Place) exceed the 55/50 dBA criteria by up to 1 to 3 dB. These dwellings also exceed the relative increase criteria by up to 6 to 7 dB. In addition, a further 4 dwellings exceed the relative increase criteria by up to 1 to 2.5 dB but were within the 55/50 dBA criteria.

It was determined that a section of approximately 650 m long noise barrier at a height of 3.6 m to 4.8 m is capable of providing a noise reduction of up to 8 dB and allows the number of properties exceeding the RNP criteria reduced from 10 to 3 (with 38, 40 and 42 Taylor Place still exceeding the relative increase criteria). This noise barrier provides a noise reduction of approximately 5 dB for these 3 residual properties and reduced the exceedance of the relative increase criteria to within 2.5 dB. This is considered to be a significant improvement. Further increments of the noise barrier height are possible in order to achieve full compliance with the relative increase criteria. However, it was found that a significant increase in height would be required to achieve the additional noise reduction (likely to require height in excess of 6.6 m) which is not likely to be considered feasible and reasonable.

Shall the noise barrier above be determined not to be feasible and reasonable, an alternative strategy that can be considered is the use of building treatment for the properties that exceed the RNP criteria. This option is further discussed in **Section 5.4.9**.

Further information in relation to the recommended noise barrier is presented in **Appendix P**.

Figure 3 Aerial Photograph – NCA3

5.4.6 NCA4, NCA5 and NCA6

The findings from the noise assessment of NCA4, NCA5 and NCA6 are presented in **Table 15**. An aerial photograph of these noise catchment areas is presented in **Figure 4**.

Table 15 NCA4, NCA5 and NCA6 – Noise Assessment Findings

Item		Description		
		NCA4	**NCA5**	**NCA6**
Number of potentially affected residential properties	Total	13	13	1
	More than 1 storey	None	2 out of 13	None
	Exceed RNP Criteria[1]	4 out of 11	6 out of 13	1 out of 1
Range of predicted noise levels	LAeq(15hour)	43.1 – 52.2 dBA	45.5 – 56.9 dBA	57.5 dBA
	LAeq(9hour)	35.5 – 44.0 dBA	37.5 – 48.6 dBA	49.2 dBA
	Relative Increase (both LAeq(15hour) and LAeq(9hour))	2.0 – 14.3 dB	5.4 – 21 dB	17.7 – 19

Note 1: including LAeq(15hour), LAeq(9hour) and Relative Increase Criteria

NCA4

All residential properties in NCA4 were found to comply with the 55/50 dBA criteria. On the other hand, 4 properties exceed the relative increase criteria by about 1 to 2.5 dB.

Based on guidelines provided by the RNP and ENMM, the construction of noise barrier for these properties is not likely to be considered reasonable for the following factors:

- In general, it is not reasonable to construct a barrier to achieve less than 5 dB of noise reduction
- In general, it is not likely to be reasonable to construct a barrier to benefit a small group of properties.

Considering that the level of exceedance of the relative increase criteria is within 2.5 dB, it may be feasible and reasonable that the use of quieter road surface (e.g. open graded or stone mastic asphalt) be used on the section along NCA4. This generally provides a 2 to 3 dB noise reduction when compared to dense graded asphalt, which is the currently intended pavement for the project. Alternatively, building treatment is likely to be another appropriate form of noise mitigation to be considered. This option is further discussed in **Section 5.4.9**.

NCA5

Two properties (26 and 35 Lonergan Drive) were determined to exceed the 55/50 dBA criteria by 1 to 2 dB. These properties were also predicted to exceed the relative increase criteria by up to 9 dB. In addition, a further 4 properties (13 Woodman Place and 22, 24 and 33 Lonergan Drive) exceed the relative increase criteria by 1 to 5 dB.

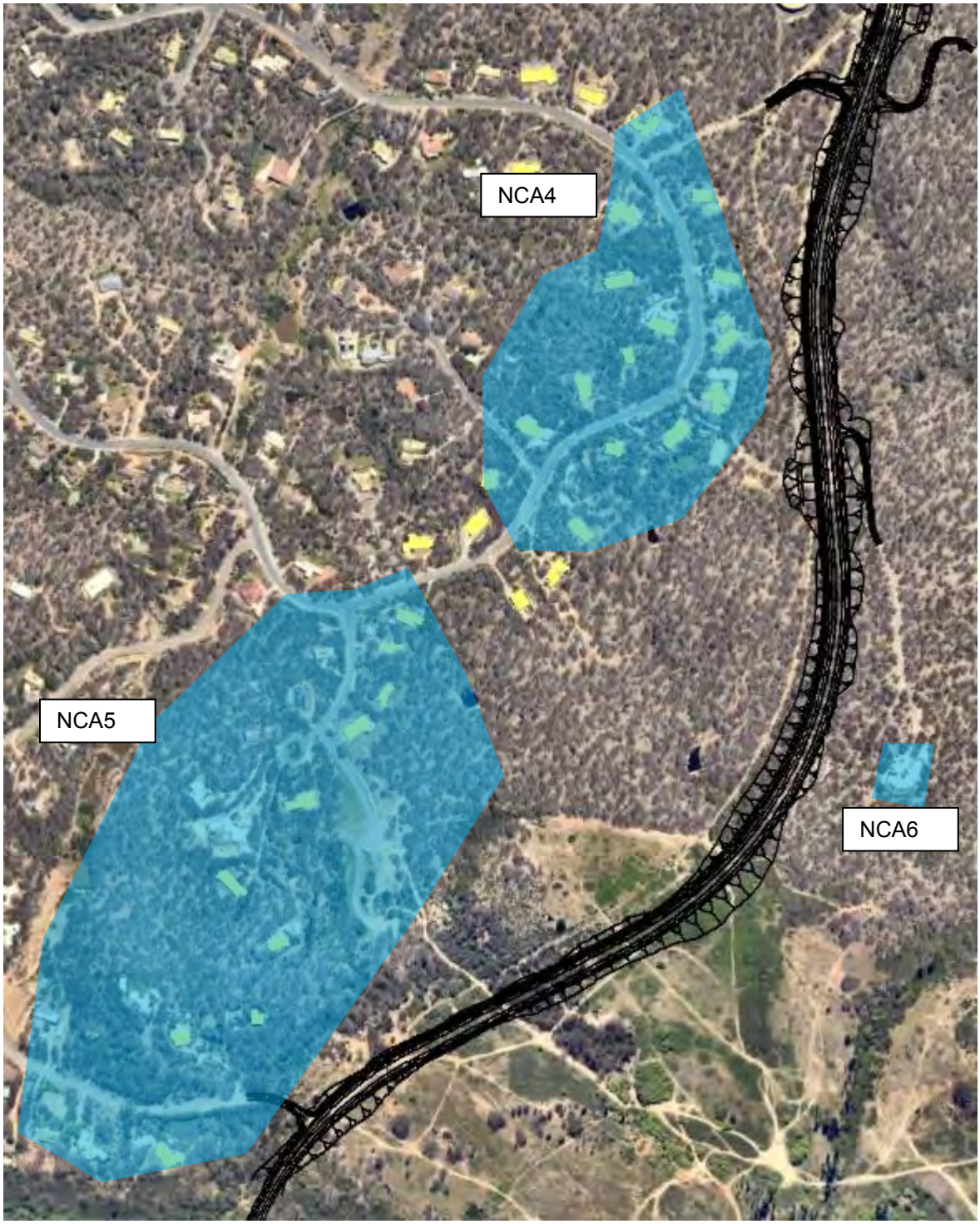
It was determined that sections of noise barrier totalling approximately 500 m at a height of 2.4 m and 3.6 m are capable of providing a noise reduction of up to 5 dB a certain locations. It was found that significant increments of height were found to be required in order to gain any further effective/noticeable noise reduction, which is not likely to be considered feasible and reasonable. These barriers provide compliance to the 55/50 dBA criteria at all properties. In addition, such noise barriers also provide compliance to the relative increase criteria at all properties apart from 35 Lonergan Drive and upper level of 26 Lonergan Drive. For these residual properties, it is recommended that provision of property treatment be further considered.

Further information in relation to the recommended noise barrier is presented in **Appendix P**.

NCA6

There is only one property within NCA6, 40A Severne Street. This property exceeds the relative increase criteria by up to 7 dB. Due to the isolated nature of this property, provision of noise barrier is not considered to be feasible and reasonable. Building treatment is likely to be the more appropriate form of noise mitigation to be considered. This option is further discussed in **Section 5.4.9**.

Figure 4 Aerial Photograph – NCA4, NCA5 and NCA6



5.4.7 NCA7

The findings from the noise assessment of NCA7 are presented in **Table 16**.

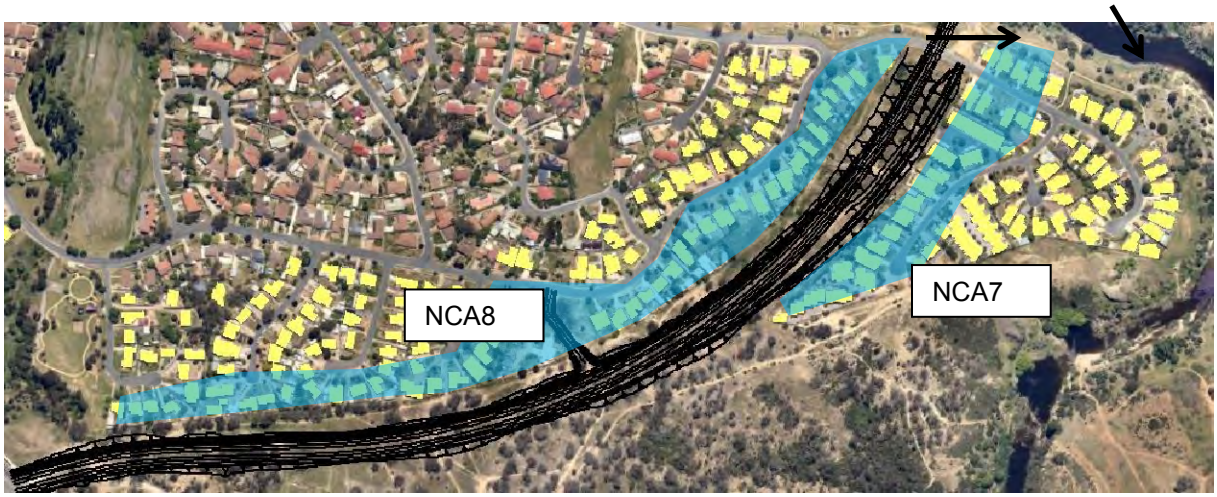
Table 16 NCA7 – Noise Assessment Findings

Item		Description
Number of potentially affected residential properties	Total	26
	More than 1 storey	9
	Exceed RNP Criteria[1]	26 out of 26
Range of predicted noise levels	LAeq(15hour)	54.3 – 62.7 dBA
	LAeq(9hour)	46.1 – 54.6 dBA
	Relative Increase (both LAeq(15hour) and LAeq(9hour))	12.2 – 23.6 dB

Note 1: including LAeq(15hour), LAeq(9hour) and Relative Increase Criteria

An aerial photograph of NCA7 and NCA8 is presented in **Figure 4**.

Figure 5 Aerial Photograph – NCA7 and NCA8



The modelled scenarios for NCA7 include sections of approximately 1.8 m high existing fences along the residential property boundaries. However, this existing fence is not sufficient to act as an effective noise barrier. Considering that the affected dwellings are closely situated to each other with a combined frontage of approximately 360 m, it is likely to be reasonable and feasible that mitigation in the form of upgrading the property boundary fence be provided. One other advantage of this option is that the recommended noise barrier along the property boundary also provides shielding for the traffic/vehicle acceleration noise associated with the on-ramp from Barracks Flat Drive onto the southbound traffic of the main alignment.

It is therefore recommended that all existing fence be removed and replaced with appropriate noise barrier. At a height of the 3.6 to 4.2 m along the property boundary of the Doeberl Place properties and a 2.4 m high barrier outside the southbound traffic lane on the bridge, it was predicted that the day and night time traffic noise levels would meet the relevant RNP criteria (excluding the Relative Increase Criteria) for all ground level receivers. These barriers were predicted to provide approximately 5 to 12 dB noise reduction for most ground level receivers. With this implemented, the Relative Increase Criteria of 12 dB is still exceeded at most properties. However, It was found that significant increments of height were required in order to gain any further effective/noticeable noise reduction (likely to require in excess of 6.6 m to achieve compliance to the relative increase criteria for ground level receivers) which is not likely to be considered feasible and reasonable.

Further information in relation to the recommended noise barrier is presented in **Appendix P**.

Double-Storey Properties

Nine out of 26 properties were identified to consist of more than one storey. In our view, it is not likely to be feasible and reasonable to increase the height of the noise barrier in the attempt of achieving compliance for the 2nd storey receivers. If deemed reasonable and feasible in further assessment, SLR recommends that specific building treatments be provided for the 2nd storey of the relevant properties. This option is further discussed in **Section 5.4.9**.

5.4.8 NCA8

The findings from the noise assessment of NCA8 are presented in **Table 17**.

Table 17 NCA8 – Noise Assessment Findings

Item		Description
Number of potentially affected residential properties	Total	39
	More than 1 storey	16
	Exceed RNP Criteria[1]	39 out of 39
Range of predicted noise levels	LAeq(15hour)	48.6 – 62.8 dBA
	LAeq(9hour)	40.5 – 55.0 dBA
	Relative Increase (both LAeq(15hour) and LAeq(9hour))	1.6 – 23.6 dB

Note 1: including LAeq(15hour), LAeq(9hour) and Relative Increase Criteria

Barracks Flat Drive Receivers

The modelled scenarios for these properties include sections of approximately up to 1.5 m high existing fences along the residential property boundaries. However, these existing fences are found to be not sufficient to act as an effective noise barrier. Considering that the affected dwellings are closely situated to each other with a combined frontage of approximately 500 m, it was determined that mitigation in the form of roadside barrier is likely to be the more feasible and reasonable option in achieving the noise reduction required.

With a roadside barrier of 2.4 to 3 m, it was predicted that the day and night time traffic noise levels would meet the relevant RNP criteria (excluding the Relative Increase Criteria) for most ground level receivers. These barriers were predicted to provide approximately 5 to 7 dB noise reduction for most ground level receivers. With this implemented, the Relative Increase Criteria of 12 dB is still exceeded at a number of properties. However it was determined that it is likely that noise wall heights in excess of 6 m are required to meet the relative increase criteria for ground level receivers, which is not likely to be considered feasible and reasonable. .

Further information in relation to the recommended noise barrier is presented in **Appendix P**.

Webber Place, Fitzgibbon Place, Caroline Place, Alfred Place

The modelled scenarios for these properties include sections of up to 1.8 m high existing fences along the residential property boundaries. Considering that the affected dwellings are closely situated to each other with a combined frontage of approximately 520 m, it was determined that mitigation in the form of roadside barrier is likely to be a feasible and reasonable option in achieving the noise reduction required.

With a roadside barrier of 3.6 m, it was predicted that the day and night time traffic noise levels would meet the relevant RNP criteria (including the Relative Increase Criteria) for most ground level receivers. These barriers were predicted to provide approximately 3 to 7 dB noise reduction for most ground level receivers. A number of properties at Alfred Place were found to exceed the criteria even after the implementation of noise barrier. This was however due to contribution from existing traffic noise from Old Cooma Road and was therefore considered to be acceptable.

Further information in relation to the recommended noise barrier is presented in **Appendix P**.

Elevated/Isolated Receivers and Double Storey Properties

A number of receivers have been identified to be at a much higher elevation or being much closer to the alignment than most of the adjacent assessed receivers. These receivers include:

- 12 Webber Place
- 17 Caroline Place
- 90 Barracks Flat Drive
- 18 Alfred Place
- 16 Alfred Place
- 14 Alfred Place

It was initially found that achieving compliance with the noise criteria requires that a noise barrier be more than 5 m high for these receivers. Compared to the noise barrier height requirements determined for the neighbouring receivers, noise barrier at such heights is not likely to be considered feasible and reasonable. It is therefore determined that building treatment is likely to be the more appropriate form of noise mitigation to be considered for these properties. This option is further discussed in **Section 5.4.9**. It was determined that a total of approximately 6 properties should be considered for building treatment.

5.4.9 Residual Architectural Property Treatments

Treatments to buildings usually involve higher performance windows, doors and seals to keep noise out. Building treatments effectively require occupants to keep their windows and doors closed and hence alternative ventilation is usually required to maintain adequate air flow. An obvious disadvantage is that building treatments would not have any effect on the noise levels outside the dwelling in their front or back yards.

The acoustic treatment of individual dwellings is generally not favoured and is generally the final resolution for reasons including:

- It may not be effective for lightweight buildings.
- It provides no protection to outdoor areas.
- Mechanical ventilation and/or air-conditioning is required, resulting in higher energy consumption.

Based on past experience, the following procedure is recommended to determine what extent of specific treatment is required:

- Inspect the relevant properties and determine the status of the dwelling, noting including and not limited to the type of construction, type of interior spaces most impacted by road noise, window sizes, glazing type etc.
- Conduct sound insulation testing to determine the existing noise reduction that can be provided by the existing construction.
- Determine whether any changes/modification/upgrade of the façade element is required based on existing sound insulation properties and type of spaces affected. Typically, if applicable, the weakest elements on the façade are the windows'/sliding doors' frames and glazing.
- Consult with relevant property owner/occupants in relation to specific personal preferences.
- Determine the most appropriate/preferred method of provided alternative means of natural ventilation. Examples of suitable products/method include Acoustica Aeropac Ventilator or similar, an in-ceiling ducted system to draw fresh air from the quiet side of the house to the rooms in concern.

Based on past experience, where the external noise level are 10 dB or less above the applicable RNP criteria, the acceptable internal noise levels may be achieved with windows closed on exposed facades using existing construction. In general, a light framed building with single glazed (closed) windows with sealed wall vents will provide an external to internal noise reduction of 20 dB. Therefore, in many cases, the extent of building treatment required is the provision of mechanical ventilation (subject to individual consultation with the dwelling owners) to ensure sufficient airflow inside the dwelling, so as to meet the requirements of the Building Code of Australia.

5.4.10 Summary

A summary of possible reasonable and feasible mitigation options is presented in **Table 18**. Further assessment and consideration should be conducted by the Project Team to determine the final mitigation treatments to be implemented.

Table 18 Possible Mitigation Strategies – NCA1 to NCA8

NCA	Possible Reasonable and Feasible Mitigation
1	Upgraded property boundary fence to a height of 3 to 3.6 m
	Building treatment for 2nd storey receivers (approximately 7 properties)
2	Upgraded property boundary fence to a height of 2.4 m
3	650 m long of road side noise barrier at 3.6 m to 4.8 m high. Alternatively, if this is deemed not feasible or reasonable, building treatment for receivers exceeding relevant criteria (approximately 10 properties)
4	Quieter road surface (e.g. open graded or stone mastic asphalt). Alternatively, if this is deemed not feasible or reasonable, building treatment for receivers exceeding relevant criteria
5	500 m long of road side noise barrier at 2.4 m to 3.6 m high, and/or building treatment for receivers exceeding relevant criteria (approximately 2 properties)
6	Building treatment for receivers exceeding relevant criteria (1 property)
7	Upgraded property boundary fence to a height of 3.6 to 4.2 m and 2.4 m high wall outside the southbound traffic lane on the bridge
	Building treatment for 2nd storey receivers, isolated receivers and receivers where fence is not feasible due to driveway access requirements (approximately 9 properties)
8	Road side noise barrier of 3.6 m high for receivers at Webber Place, Fitzgibbon Place, Caroline Place, Alfred Place
	Road side noise barrier of 2.4 to 3 m high for receivers at Barracks Flat Drive
	2.4 m high wall outside the northbound traffic lane on the bridge
	Building treatment for 2nd storey receivers, isolated receivers and receivers where fence is not feasible due to driveway access requirements (approximately 6 properties)

The following information are appended to this report for reference purposes:

- **Appendix O** - noise prediction for receivers with possible upgraded boundary fence for the design year scenario
- **Appendix P** - locations where upgraded boundary fence are recommended
- **Appendix Q** – $L_{Aeq(15hour)}$ noise contours with the implementation of noise barriers
- **Appendix R** – $L_{Aeq(9hour)}$ noise contours with the implementation of noise barriers
- **Appendix S** – $L_{Aeq(15hour)}$ noise contours with no mitigation
- **Appendix T** – $L_{Aeq(9hour)}$ noise contours with no mitigation

Based on the results presented in **Appendix O**, properties that may require further consideration of property treatment are highlighted Green.

6 CONSTRUCTION NOISE ASSESSMENT

6.1 Construction Works

6.1.1 Construction Scenarios

Based on our experience, the likely construction stages for the project and associated equipment are shown in **Table 19**. The table also contains Sound Power Level data for individual items of plant together with the combined Sound Power Level for each scenario.

Table 19 Construction Works

Stage	Scenario	Equipment[1]	No of Items	Max. L_{Aeq} Sound Power Level (dBA)		L_{Amax} Sound Power Level (dBA)	
				Individual Item	Activity	Individual Item	Activity
1	Clearing and Grubbing, Tree Removal[3]	Excavator (20 tonne)	1	99	109	105	116
		Truck (10 tonne)	1	98		103	
		Chainsaw	1	108		116	
2	Bored piling and precast placement	Bored piling rig	1	108	106	112	112
		Mobile Crane (25 tonne)	2	99		105	
		Truck	2	98		103	
3	Construction of New Kerbs, Drainage Pits and Pipes	Excavator (20 tonne)	1	99	119	105	124
		Truck (10 tonne)	1	98		103	
		Jackhammer*[2]	1	108		113	
		Excavator (Breaker)*[2]	1	121		124	
		Concrete Truck / Agitator	1	106		112	
		Concrete Pump	1	106		109	
		Vibratory Roller (~10 - 12 tonne)*	1	109		114	
4	Compaction of Road Pavement and Laying of Asphalt Paving	Scraper	1	118	123	123	125
		Dozer	1	110		114	
		Compactor	1	110		116	
		Vibratory Roller	1	109		114	
		Excavator	1	99		105	
		Grader	1	107		115	
		Water truck	1	107		114	
		Excavator mounted drill	1	121		124	
		Asphalt paving machine	1	120		125	
5	Noise Wall Construction[3]	Excavator (20 tonne)	1	99	110	105	112
		Truck (10 tonne)	1	98		103	
		Concrete Truck / Agitator	1	106		112	

Stage	Scenario	Equipment[1]	No of Items	Max. L_{Aeq} Sound Power Level (dBA)		L_{Amax} Sound Power Level (dBA)	
				Individual Item	Activity	Individual Item	Activity
		Concrete Pump	1	106		109	
		Mobile Crane (25 tonne)	1	99		105	

Note 1: * denotes "annoying" item of equipment, as defined in the ICNG, and as such includes a +5 dBA penalty to predictions.

Note 2: Overall SWL assumes a maximum 7.5 minutes on-time in any 15-minute period.

Note 3: These construction scenarios are included as a provision in the event that noise wall construction works or tree clearing around the works areas are required.

The *Interim Construction Noise Guideline* (ICNG) lists a number of construction activities which have been proven to be "annoying" and which require to have a 5 dB penalty applied to them. Annoying characteristics may include tones, impulses, low frequency noise and intermittent noise. The ICNG identifies the following proposed activities as being particularly annoying and as such, a 5 dB correction has been incorporated into the noise modelling process for them.

- use of power saws, such as used for cutting timber, rail lines, masonry, road pavement or steel work
- grinding metal, concrete or masonry
- rock drilling
- line drilling
- vibratory rolling
- bitumen milling or profiling
- jackhammering, rock hammering or rock breaking
- impact piling

6.2 Construction Noise Management Levels

As discussed in **Section 4.2**, the *NSW "Interim Construction Noise Guideline"* (ICNG) sets out the requirements for assessing the potential noise impacts at sensitive receivers. The process involves the following two steps:

1) Determine project specific Noise Management Levels (NMLs) for noise affected receivers.
2) Where the construction noise levels are predicted to exceed the NMLs, all feasible and reasonable work practices would be investigated to minimise noise emissions.

On the basis of the background noise logging results presented in **Table 1**, a summary of the NMLs during the daytime, evening and night-time periods is provided in **Table 20**.

Table 20 Construction Noise Management Levels

Receiver Group	Noise Management Levels - NMLs (dBA)		
	Daytime Period[1]	Evening Period[2]	Night-time Period[3]
NCA1	41	35	35
NCA2	46	38	35
NCA3 to NCA8	40	35	35

Note 1: Standard daytime construction hours: 7.00 am to 6.00 pm Monday to Friday, 8.00 am to 1.00 pm on Saturdays and no work on Sundays or Public Holidays.

Note 2: Out-of-hours evening hours: 6.00 pm to 10.00 pm.

Note 3: Out-of-hours night-time hours: 10.00 pm to 7.00 am Sunday to Friday, 10.00 pm Saturday to 8.00 am Sunday.

6.3 Assessment of Construction Works

For assessment purposes, it is assumed that construction works will be conducted during normal daytime working hours only. The standard daytime periods are 7.00 am to 6.00 pm Monday to Friday and 8.00 am to 1.00 pm Saturday.

Based on the scenarios and the sound power levels outlined in **Table 19**, construction noise levels have been predicted at the nearest receivers. The resultant daytime, evening and night-time $L_{Aeq(15minute)}$ noise level predictions, where appropriate, in addition to the number of properties with NML exceedances, are presented in **Table 21** for the various activities and compared with the relevant Noise Management Levels.

In practice, noise levels will depend on the number of plant items and equipment operating at any one time and their precise location relative to the receiver of interest. Noise levels will vary due to the movement of plant and equipment about the worksites and the concurrent operation of plant. In some cases, reductions in noise levels will occur when plant are located in cuttings or behind embankments, buildings or other items of equipment.

The predictions in **Table 21** are representative of the worst-case scenario with all equipment listed in **Table 19** operating simultaneously.

Table 21 Construction Noise Predictions

Receiver	Noise Level – $L_{Aeq(15minute)}$ (dBA)						
	Worst-case Predicted					NML	Exceedance
	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5		
NCA1	52	<30	62	66	53	41	Up to 21 dB
NCA2	52	<30	62	66	53	46	Up to 20 dB
NCA3	54	<30	64	68	55	40	Up to 24 dB
NCA4	52	<30	62	66	53	40	Up to 26 dB
NCA5	57	53	67	71	58	40	Up to 31 dB
NCA6	50	<30	60	64	51	40	Up to 24 dB
NCA7	58	62	68	72	59	40	Up to 32 dB
NCA8	48	60	58	62	49	40	Up to 22 dB

6.4 Findings

A worst-case exceedance of the daytime (standard construction hours) $L_{Aeq(15minute)}$ noise goal of up to 32 dB is predicted at the most affected sensitive receiver locations within the project area. While this level of exceedance is common for these types of construction activities at similar separation distances, mitigation measures should be undertaken to minimise the impact on the surrounding sensitive receivers.

All predicted noise levels at the identified representative noise-sensitive receivers during the proposed construction scenarios do not exceed 75 dBA $L_{Aeq(15minute)}$ and therefore are not considered to be Highly Noise Affected.

6.5 Mitigation Measures

6.5.1 Recommended Noise Mitigation

The expected noise management level exceedances are likely to be concerning for surrounding residents and particular effort should be directed towards the implementation of all reasonable noise mitigation and management strategies.

The standard suite of mitigation measures includes management measures such as community consultation, site inductions (with guidance on how to minimise noise and vibration) and the preparation of site specific construction noise and vibration management plans. The strategy also includes several recommendations for reducing the source noise levels of construction equipment via good planning and equipment selection.

Examples of mitigation measures which may be considered appropriate for these works are:

- Use of localised acoustic hoarding around significantly noisy items of plant (eg rock breaker), where practicable. This would be expected to provide between 5 dB and 10 dB of additional noise attenuation provided the line-of-sight between all receivers and the construction equipment is broken. The barrier is most affective when it is located either close to the noise source or the receiver.
- Scheduling of the higher Noise Management Level exceedance activities/locations to be undertaken predominantly during less noise-sensitive periods, where available and possible. The community should be consulted to assist in identifying less noise sensitive periods.
- Briefing of the work team in order to create awareness of the locality of sensitive receivers and the importance of minimising noise emissions.
- Ensuring any spoil is placed and not dropped into awaiting trucks.
- Establishing load points as far as practicable from sensitive receivers.
- Use of less noise-intensive equipment, where reasonable and feasible.
- Non-tonal reversing alarms fitted to all construction vehicles.
- Scheduling of respite periods and possible provision of temporary re-location where continuously noisy night-time activities are required.

In order to minimise the potential noise and vibration impacts upon nearby sensitive receivers, construction works should be undertaken during the EPA's standard daytime construction periods (7.00 am to 6.00 pm Monday to Friday and 8.00 am to 1.00 pm on Saturdays) where possible.

Out of Hours Works should be minimised as far as is practicable.

6.5.2 Requirements of the Construction Noise and Vibration Management Plan

Prior to construction, when more specific information is available in relation to the proposed construction works, a site specific Construction Noise and Vibration Management Plan (CNVMP) would be prepared. This would address each major stage of the construction works and identify the appropriate mitigation and management measures, consistent with the requirements of the *Interim Construction Noise Guideline*.

The objectives of the CNVMP are as follows:

- Assist in ensuring that the noise emissions during the construction works comply with the noise management levels and goals nominated in **Section 4.2**.
- Determine noise and vibration monitoring, reporting and response procedures.
- Describe specific mitigation treatments, management methods and procedures to be implemented to control noise and vibration during construction.
- Describe construction timetabling to minimise noise impacts including time and duration restrictions, respite periods and frequency.
- Describe procedures for notifying residents of construction activities likely to affect their amenity through noise and vibration.
- Define contingency plans to be implemented in the event of non-compliances and/or noise complaints.

In addition to the noise mitigation measures outlined in **Section 6.5.1**, as a minimum, for the proposed daytime works, it is recommended that the project undertake community consultation (letterbox drops) and representative noise monitoring during the early works.

The purpose of letter box drops is to provide specific notification of the duration and timing of the construction activities so that residents are informed about the proposed works ahead of time.

The purpose of the monitoring is to validate the construction noise predictions and confirm that the noise levels from individual equipment are not excessive.

For out of hours works (OOHW), additional noise management is recommended including individual briefings and phone calls to consult with the affected residents. Typically, any OOHW would be subject to a separate approval on a case-by-case basis.

7 CONCLUSION

The Queanbeyan City Council (QCC) proposes to construct a 4.6 km long extension to the Ellerton Drive. The existing Ellerton Drive connects to Yass Road and Bungendore Street at a roundabout and terminates approximately 850 m southeast of this roundabout. The proposal is to extent Ellerton Drive from its current terminus to the existing Old Cooma Road and Edwin Land Parkway intersection, forming the fourth leg of this intersection. This will be two lane single carriageway roadway and was identified to be required by 2017.

SLR Consulting (Australia) Pty Ltd (SLR) has been engaged by Opus International Consultants (Opus) to conduct a noise impact assessment for the proposed extension. This is required as part of the design and documentation processes undertaken by Opus. The objective of SLR's engagement was to assess the potential noise impacts of the operation of the proposed extension.

All of the identified potentially impacted sensitive receivers were grouped into 8 Noise Catchment Areas. In March – April 2014, SLR conducted ambient noise monitoring at 11 locations to determine the existing ambient noise environment. In addition, concurrent traffic count was also conducted at the existing Edwin Land Parkway and Old Cooma Road intersection for model validation purposes.

7.1 Operational noise criteria

Upon completion of the proposed Ellerton Drive extension, the entire Ellerton Drive is considered to be a sub-arterial road. The RNP assessment criteria applicable for this project is determine to be:

Road Category	**Type of Project/Land Use**	**Assessment Criteria (dBA)**	
		Daytime (7 am – 10 pm)	**Night-time (10 pm – 7 am)**
Freeway/ arterial/ sub-arterial roads	1. existing residences affected by noise from new freeway/arterial/sub-arterial road corridors	$L_{Aeq(15hour)}$ 55 (external)	$L_{Aeq(9hour)}$ 50 (external)

In addition to the noise criteria above, the RNP describes a "Relative Increase Criteria" of 12 dB above existing traffic noise. This criterion is primarily intended to protect existing quiet areas from excessive changes in amenity. Most of the existing residences along the proposed extension are currently not affected by significant traffic noise. Therefore, the "Relative Increase Criteria" are also considered in this assessment.

7.2 Validation of Noise model

Validation of the noise model was performed based on noise monitoring conducted at the Edwin Land Parkway road reserve and 12 Alfred Place, Karabar. The variations between the model-predicted noise levels and the measured noise levels were within ±2 dB. In accordance to guidelines provided by NSW Environmental Noise Management Manual, these variances are considered to be acceptable. Therefore, it was determined that the noise model provides results which enable a reliable assessment of the project.

7.3 Operational Noise Assessment Findings

The modelled traffic speed was 60 km/hr from the existing section of Ellerton Drive to about Ch1200 and 80 km/hr from Ch1200 onwards to the Old Cooma Road intersection. The road pavement adopted in the noise model was dense graded asphalt (DGA).

The following summarises the findings of the noise prediction and assessment conducted for the design year (2027, 10 years after project opening). It should however be noted that further assessment and investigation is required to determine whether the suggest mitigations are reasonable and feasible (e.g. taking into account preferences within the community etc.)

- NCA1
    - 26 out of 26 receivers exceed the relevant RNP criteria
    - Level of exceedance of the $L_{Aeq(15hour)}$ and $L_{Aeq(9hour)}$ was up to 9 dB
    - Level of exceedance of the Relative Increase Criteria was up to 8 dB
    - Possible feasible and reasonable mitigation:
        - Upgraded property boundary fence to a height of 3 to 3.6 m
        - Building treatment for 2nd storey receivers (approximately 7 properties)
- NCA2
    - 15 out of 20 receivers exceed the relevantRNP criteria
    - Level of exceedance of the $L_{Aeq(15hour)}$ and $L_{Aeq(9hour)}$ was up to 8 dB
    - Level of exceedance of the Relative Increase Criteria was up to 6 dB
    - Possible feasible and reasonable mitigation:
        - Upgraded property boundary fence to a height of 2.4 m
- NCA3
    - 10 out of 13 receivers exceed the relevant RNP criteria
    - Level of exceedance of the $L_{Aeq(15hour)}$ and $L_{Aeq(9hour)}$ was up to 6 dB
    - Level of exceedance of the Relative Increase Criteria was up to 11 dB
    - Possible feasible and reasonable mitigation:
        - 650 m long of road side noise barrier at 3.6 m to 4.8 m high.
        - Alternatively, if road barrier is not considered feasible and reasonable, building treatment for receivers exceeding relevant criteria (approximately 10 properties)
- NCA4
    - 4 out of 11 receivers exceed the relevant RNP criteria
    - No exceedance of the $L_{Aeq(15hour)}$ and $L_{Aeq(9hour)}$
    - Level of exceedance of the Relative Increase Criteria was up to 5 dB
    - Possible feasible and reasonable mitigation:
        - Quieter road surface (e.g. open graded or stone mastic asphalt).
        - Alternatively, if road barrier is not considered feasible and reasonable, building treatment for receivers exceeding relevant criteria (approximately 4 properties)
- NCA5
    - 4 out of 10 receivers exceed the relevant RNP criteria
    - No exceedance of the $L_{Aeq(15hour)}$ and $L_{Aeq(9hour)}$
    - Level of exceedance of the Relative Increase Criteria was up to 7 dB

- Possible feasible and reasonable mitigation:
  - 500 m long of road side noise barrier at 2.4 m to 3.6 m high
  - Alternatively, if road barrier is not considered feasible and reasonable, building treatment for receivers exceeding relevant criteria (approximately 2 properties)

- NCA6
  - 1 out of 1 receiver exceeds that relevant RNP criteria
  - Level of exceedance of the $L_{Aeq(15hour)}$ and $L_{Aeq(9hour)}$ was up to 7 dB
  - Level of exceedance of the Relative Increase Criteria was up to 12 dB
  - Possible feasible and reasonable mitigation:
    - Building treatment for receivers exceeding relevant criteria (1 property)
- NCA7
  - 26 out of 26 receivers exceed the relevant RNP criteria
  - Level of exceedance of the $L_{Aeq(15hour)}$ and $L_{Aeq(9hour)}$ was up to 10 dB
  - Level of exceedance of the Relative Increase Criteria was up to 13 dB
  - Possible feasible and reasonable mitigation:
    - Upgraded property boundary fence to a height of 3.6 to 4.2 m
    - 2.4 m high wall outside the southbound traffic lane on the bridge
    - Building treatment for 2nd storey receivers, isolated receivers and receivers where fence is not feasible due to driveway access requirements (approximately 9 properties)
- NCA8
  - 39 out of 42 receivers exceed the relevant RNP criteria
  - Level of exceedance of the $L_{Aeq(15hour)}$ and $L_{Aeq(9hour)}$ was up to 10 dB
  - Level of exceedance of the Relative Increase Criteria was up to 14 dB
  - Possible feasible and reasonable mitigation:
    - Road side noise barrier of 3.6 m high for receivers at Webber Place, Fitzgibbon Place, Caroline Place, Alfred Place.
    - Road side noise barrier of 2.4 to 3 m for receivers at Barracks Flat Drive
    - 2.4 m high wall outside the northbound traffic lane on the bridge
    - Building treatment for 2nd storey receivers, isolated receivers and receivers where fence is not feasible due to driveway access requirements (approximately 6 properties)

7.4 Construction Noise

Based on the typical construction stages assumed in the assessment, it was found that the predicted noise levels exceed the noise affected noise management levels determined based on the measured Rating Background Level within the project area. The worst level of exceedance was predicted to be 32 dB. It was recommended that a standard suite of mitigation measures be implemented in order to mitigate and reduce the potential noise impact associated with the construction of the project.

1 Sound Level or Noise Level

The terms "sound" and "noise" are almost interchangeable, except that in common usage "noise" is often used to refer to unwanted sound.

Sound (or noise) consists of minute fluctuations in atmospheric pressure capable of evoking the sense of hearing. The human ear responds to changes in sound pressure over a very wide range. The loudest sound pressure to which the human ear responds is ten million times greater than the softest. The decibel (abbreviated as dB) scale reduces this ratio to a more manageable size by the use of logarithms.

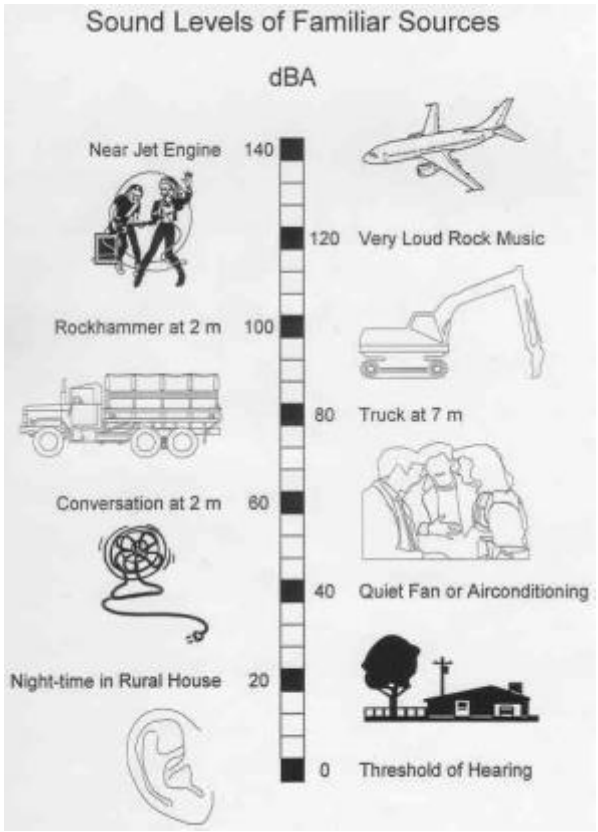
The symbols SPL, L or L_P are commonly used to represent Sound Pressure Level. The symbol L_A represents A-weighted Sound Pressure Level. The standard reference unit for Sound Pressure Levels expressed in decibels is 2×10^{-5} Pa.

2 "A" Weighted Sound Pressure Level

The overall level of a sound is usually expressed in terms of dBA, which is measured using a sound level meter with an "A-weighting" filter. This is an electronic filter having a frequency response corresponding approximately to that of human hearing.

People's hearing is most sensitive to sounds at mid frequencies (500 Hz to 4000 Hz), and less sensitive at lower and higher frequencies. Thus, the level of a sound in dBA is a good measure of the loudness of that sound. Different sources having the same dBA level generally sound about equally loud.

A change of 1 dBA or 2 dBA in the level of a sound is difficult for most people to detect, whilst a 3 dBA to 5 dBA change corresponds to a small but noticeable change in loudness. A 10 dBA change corresponds to an approximate doubling or halving in loudness. The figure below lists examples of typical noise levels



Other weightings (eg B, C and D) are less commonly used than A-weighting. Sound Levels measured without any weighting are referred to as "linear", and the units are expressed as dB(lin) or dB.

3 Sound Power Level

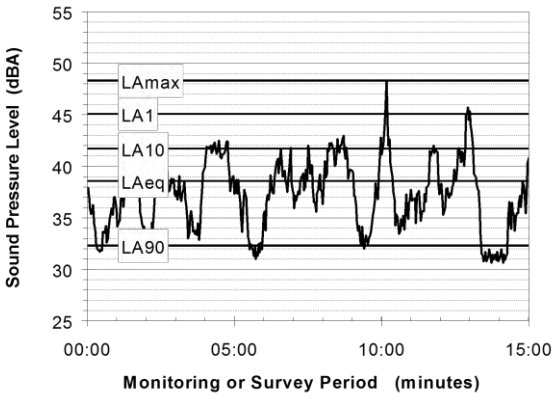
The Sound Power of a source is the rate at which it emits acoustic energy. As with Sound Pressure Levels, Sound Power Levels are expressed in decibel units (dB or dBA), but may be identified by the symbols SWL or L_W, or by the reference unit 10^{-12} W.

The relationship between Sound Power and Sound Pressure may be likened to an electric radiator, which is characterised by a power rating, but has an effect on the surrounding environment that can be measured in terms of a different parameter, temperature.

4 Statistical Noise Levels

Sounds that vary in level over time, such as road traffic noise and most community noise, are commonly described in terms of the statistical exceedance levels L_{AN}, where L_{AN} is the A-weighted sound pressure level exceeded for N% of a given measurement period. For example, the L_{A1} is the noise level exceeded for 1% of the time, L_{A10} the noise exceeded for 10% of the time, and so on.

The following figure presents a hypothetical 15 minute noise survey, illustrating various common statistical indices of interest.



Of particular relevance, are:

L_{Amax} The maximum noise level during the 15 minute interval

L_{A1} The noise level exceeded for 1% of the 15 minute interval.

L_{A10} The noise level exceed for 10% of the 15 minute interval. This is commonly referred to as the average maximum noise level.

L_{A90} The noise level exceeded for 90% of the sample period. This noise level is described as the average minimum background sound level (in the absence of the source under consideration), or simply the background level.

L_{Aeq} The A-weighted equivalent noise level (basically the average noise level). It is defined as the steady sound level that contains the same amount of acoustical energy as the corresponding time-varying sound.

When dealing with numerous days of statistical noise data, it is sometimes necessary to define the typical noise levels at a given monitoring location for a particular time of day. A standardised method is available for determining these representative levels.

This method produces a level representing the "repeatable minimum" L_{A90} noise level over the daytime and night-time measurement periods, as required by the EPA. In addition the method produces mean or "average" levels representative of the other descriptors (L_{Aeq}, L_{A10}, etc).

5 Tonality

Tonal noise contains one or more prominent tones (ie distinct frequency components), and is normally regarded as more offensive than "broad band" noise.

6 Impulsiveness

An impulsive noise is characterised by one or more short sharp peaks in the time domain, such as occurs during hammering.

7 Frequency Analysis

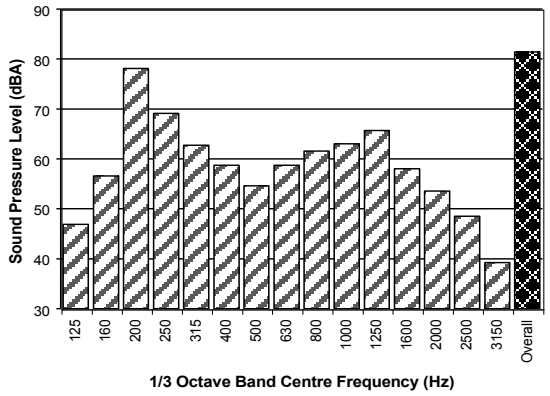
Frequency analysis is the process used to examine the tones (or frequency components) which make up the overall noise or vibration signal. This analysis was traditionally carried out using analogue electronic filters, but is now normally carried out using Fast Fourier Transform (FFT) analysers.

The units for frequency are Hertz (Hz), which represent the number of cycles per second.

Frequency analysis can be in:

- Octave bands (where the centre frequency and width of each band is double the previous band)
- 1/3 octave bands (3 bands in each octave band)
- Narrow band (where the spectrum is divided into 400 or more bands of equal width)

The following figure shows a 1/3 octave band frequency analysis where the noise is dominated by the 200 Hz band. Note that the indicated level of each individual band is less than the overall level, which is the logarithmic sum of the bands.



8 Vibration

Vibration may be defined as cyclic or transient motion. This motion can be measured in terms of its displacement, velocity or acceleration. Most assessments of human response to vibration or the risk of damage to buildings use measurements of vibration velocity. These may be expressed in terms of "peak" velocity or "rms" velocity.

The former is the maximum instantaneous velocity, without any averaging, and is sometimes referred to as "peak particle velocity", or PPV. The latter incorporates "root mean squared" averaging over some defined time period.

Vibration measurements may be carried out in a single axis or alternatively as triaxial measurements. Where triaxial measurements are used, the axes are commonly designated vertical, longitudinal (aligned toward the source) and transverse.

The common units for velocity are millimetres per second (mm/s). As with noise, decibel units can also be used, in which case the reference level should always be stated.

A vibration level V, expressed in mm/s can be converted to decibels by the formula $20 \log (V/V_o)$, where V_o is the reference level (10^{-9} m/s). Care is required in this regard, as other reference levels may be used by some organizations.

9 Human Perception of Vibration

People are able to "feel" vibration at levels lower than those required to cause even superficial damage to the most susceptible classes of building (even though they may not be disturbed by the motion). An individual's perception of motion or response to vibration depends very strongly on previous experience and expectations, and on other connotations associated with the perceived source of the vibration. For example, the vibration that a person responds to as "normal" in a car, bus or train is considerably higher than what is perceived as "normal" in a shop, office or dwelling.

10 Over-Pressure

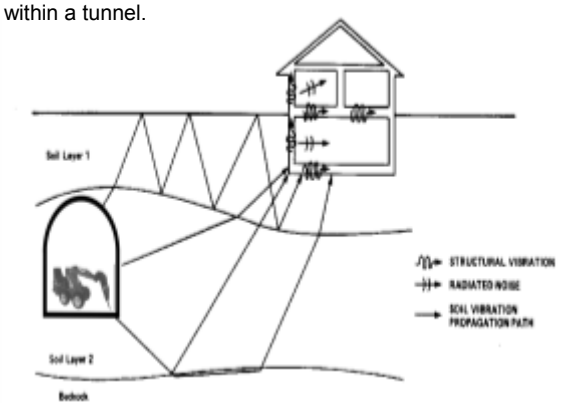
The term "over-pressure" is used to describe the air pressure pulse emitted during blasting or similar events. The peak level of an event is normally measured using a microphone in the same manner as linear noise (ie unweighted), at frequencies both in and below the audible range.

11 Ground-borne Noise, Structure-borne Noise and Regenerated Noise

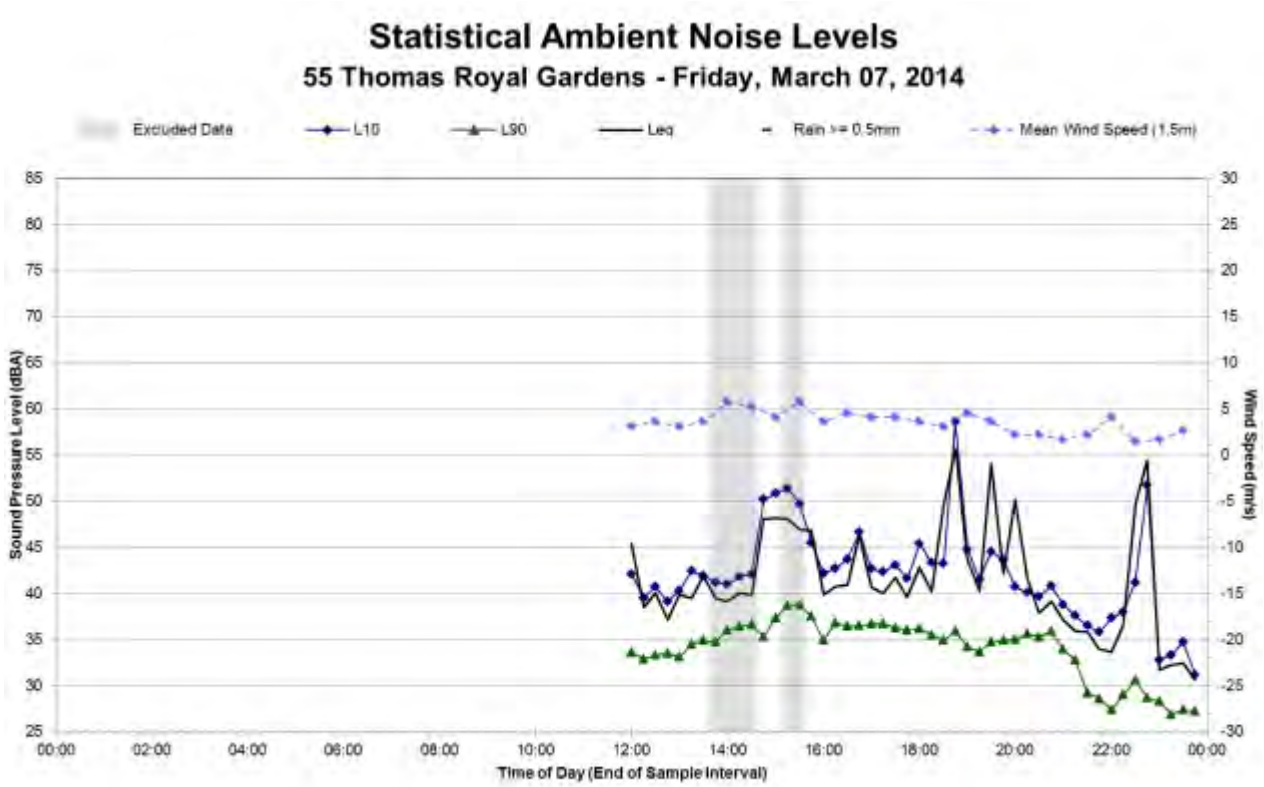
Noise that propagates through a structure as vibration and is radiated by vibrating wall and floor surfaces is termed "structure-borne noise", "ground-borne noise" or "regenerated noise". This noise originates as vibration and propagates between the source and receiver through the ground and/or building structural elements, rather than through the air.

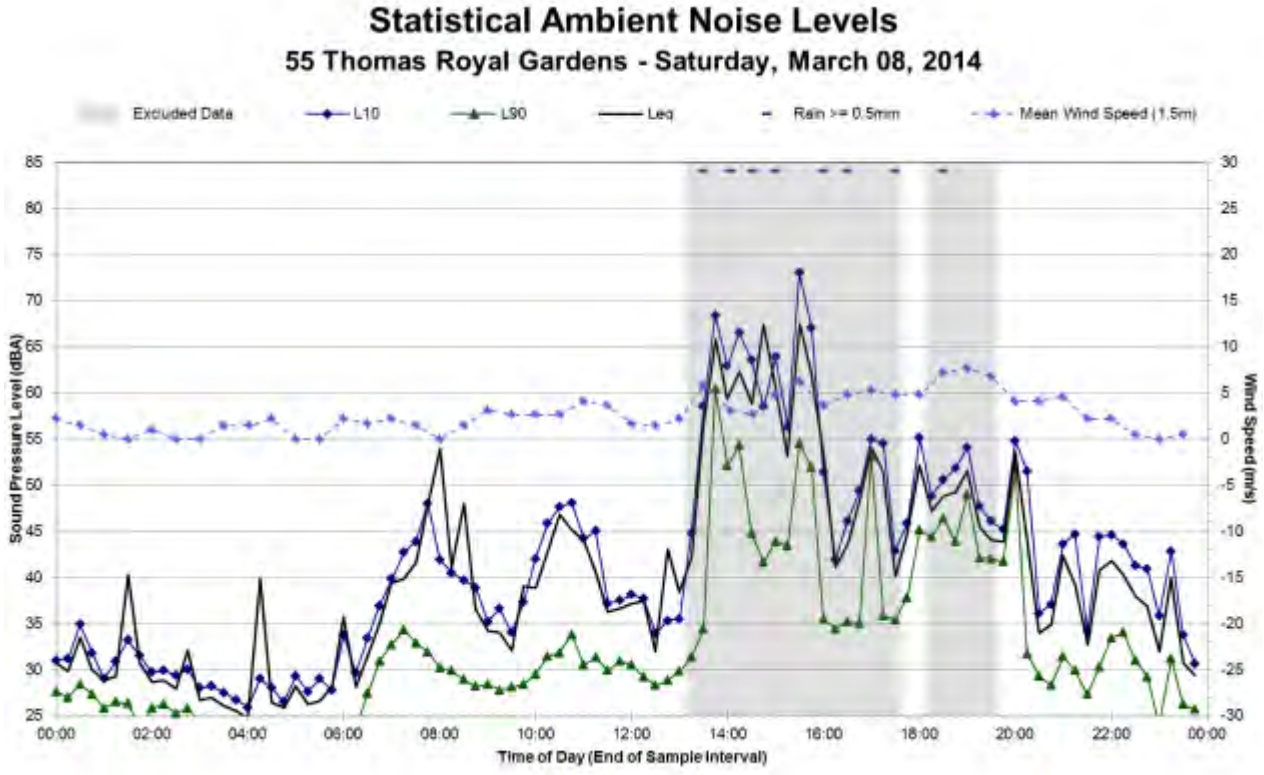
Typical sources of ground-borne or structure-borne noise include tunnelling works, underground railways, excavation plant (eg rockbreakers), and building services plant (eg fans, compressors and generators).

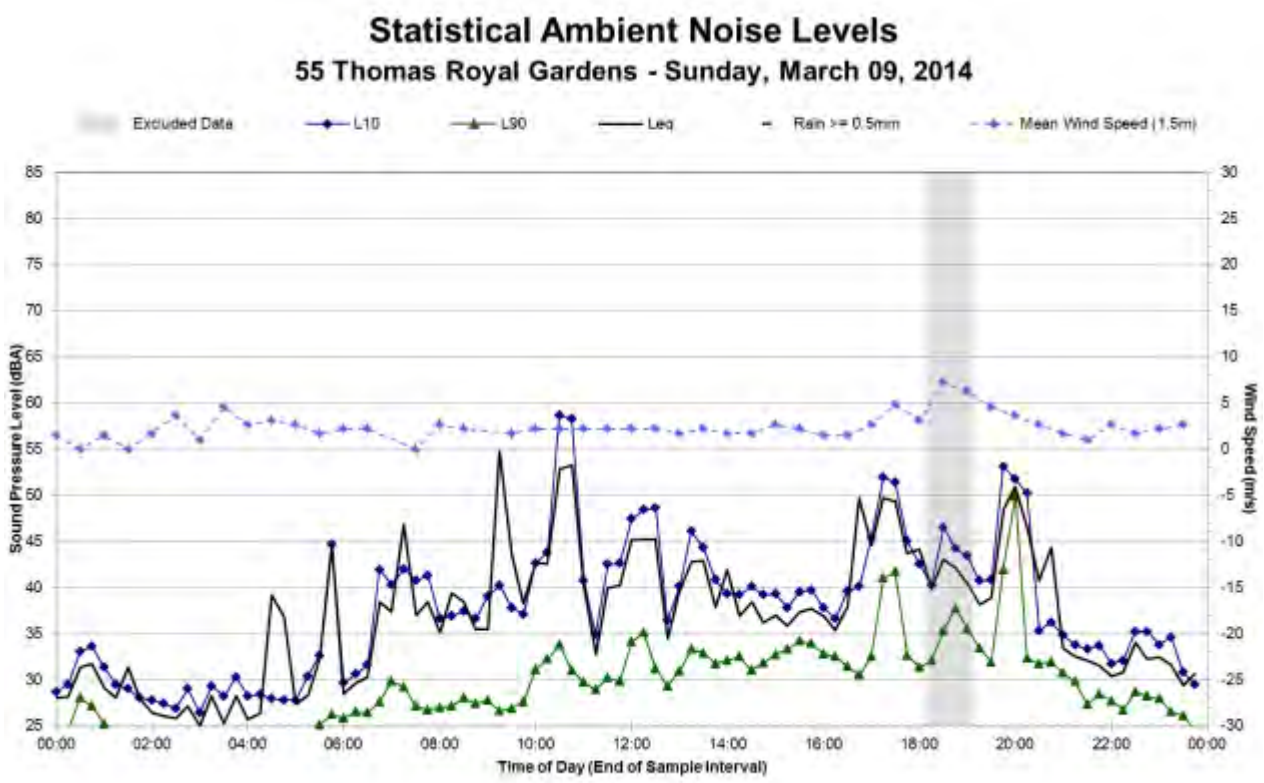
The following figure presents the various paths by which vibration and ground-borne noise may be transmitted between a source and receiver for construction activities occurring within a tunnel.

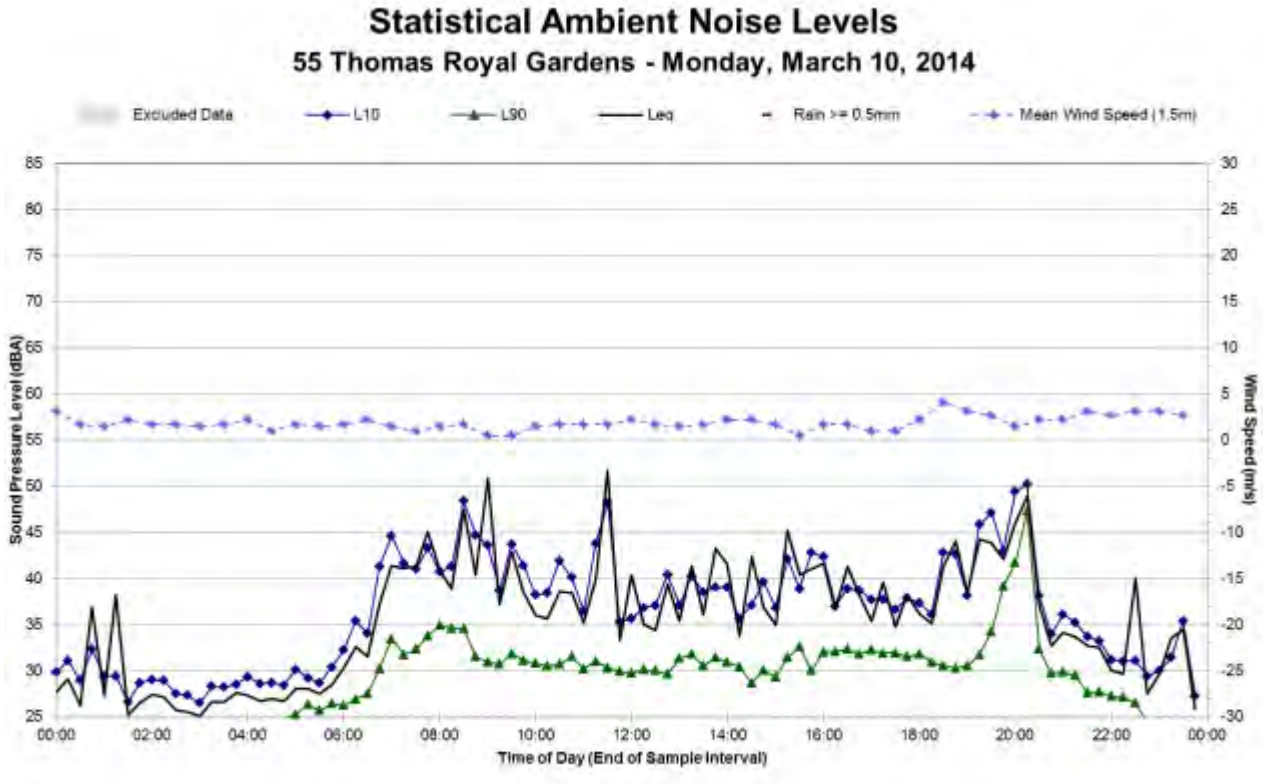


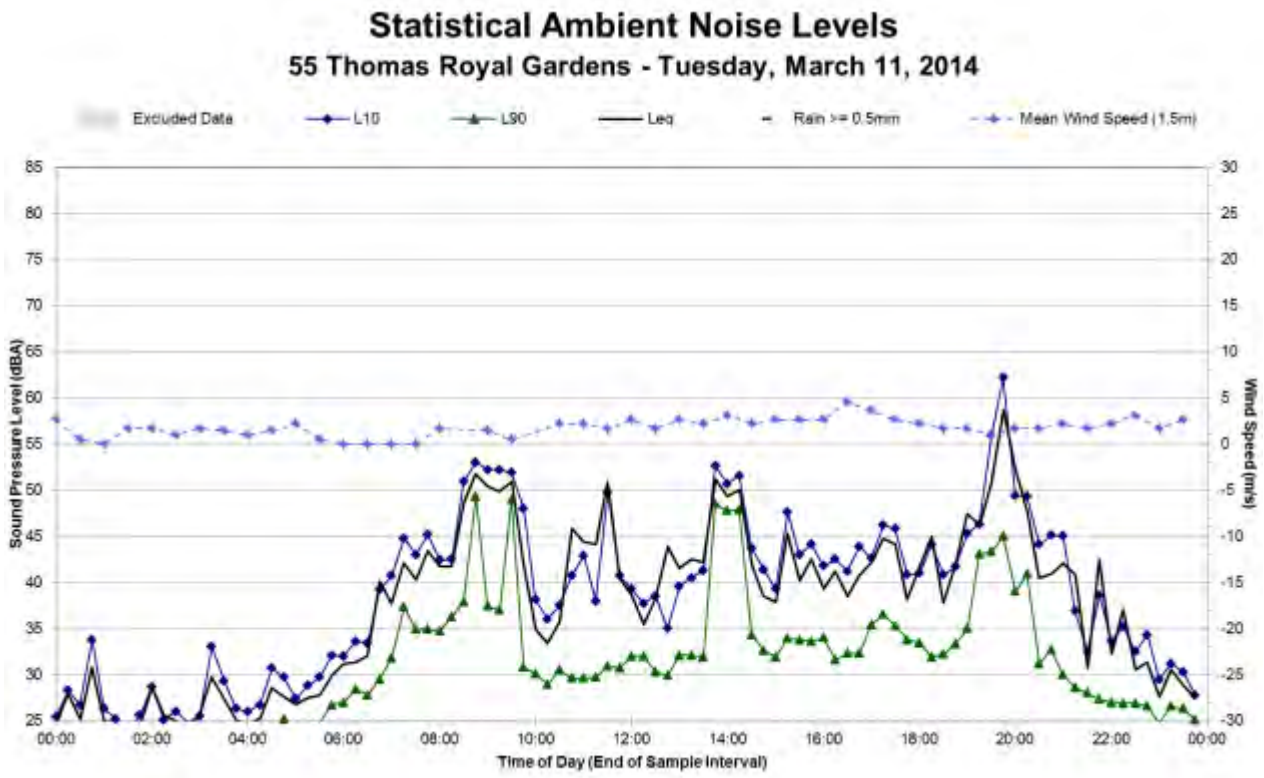
The term "regenerated noise" is also used in other instances where energy is converted to noise away from the primary source. One example would be a fan blowing air through a discharge grill. The fan is the energy source and primary noise source. Additional noise may be created by the aerodynamic effect of the discharge grill in the airstream. This secondary noise is referred to as regenerated noise.

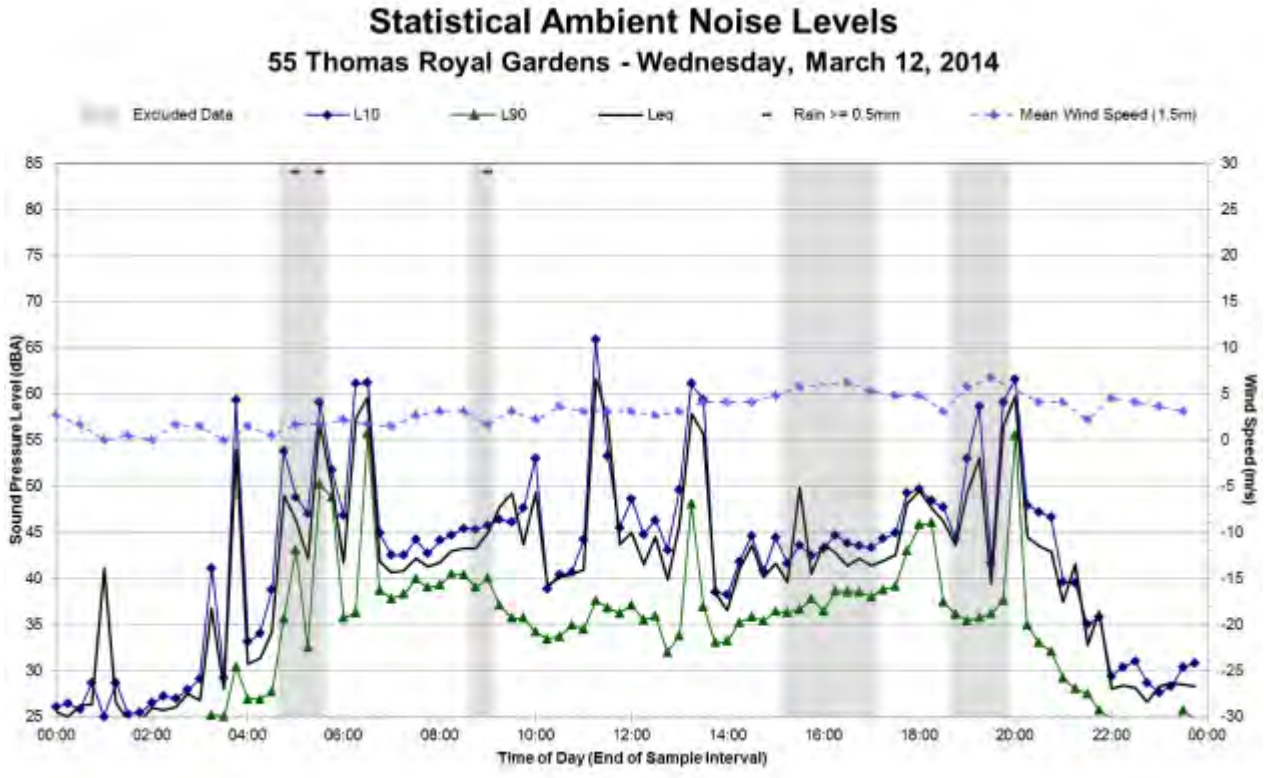

Statistical Ambient Noise Levels
55 Thomas Royal Gardens - Friday, March 07, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

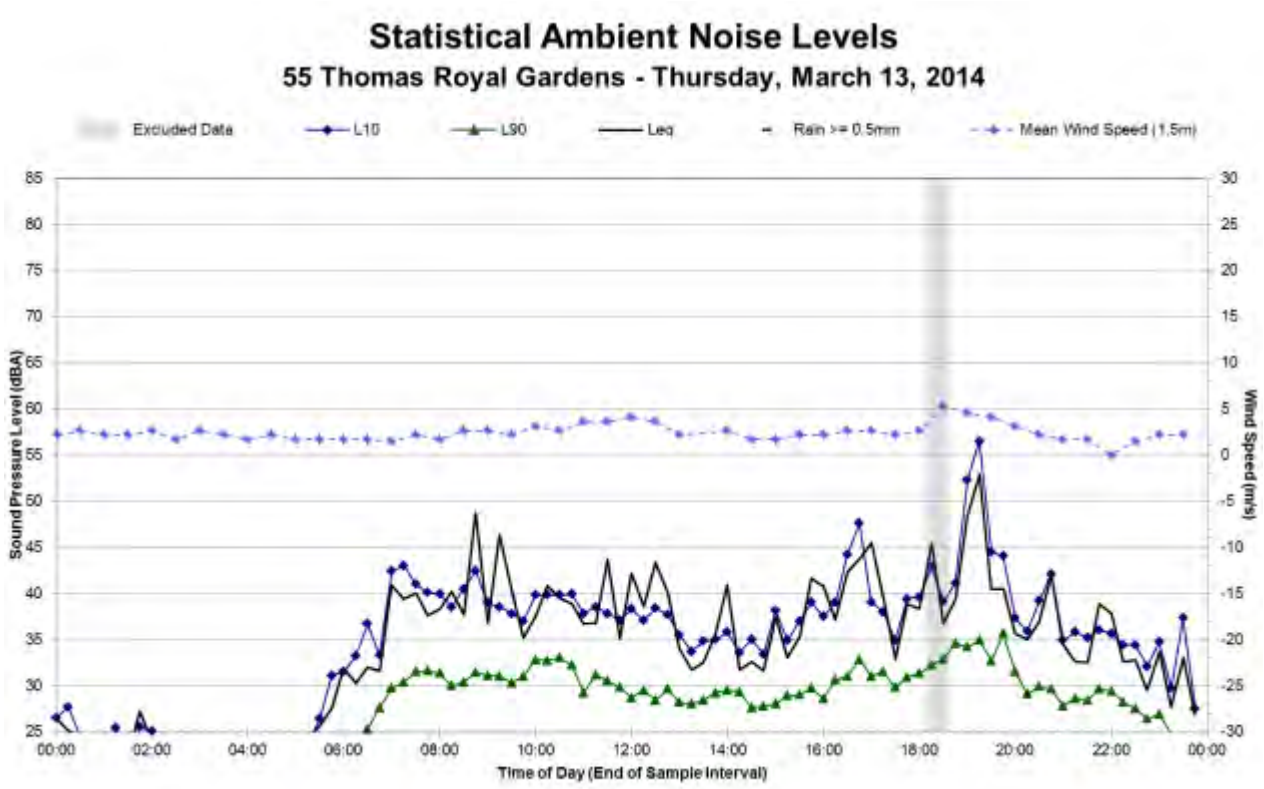

Statistical Ambient Noise Levels
55 Thomas Royal Gardens - Saturday, March 08, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

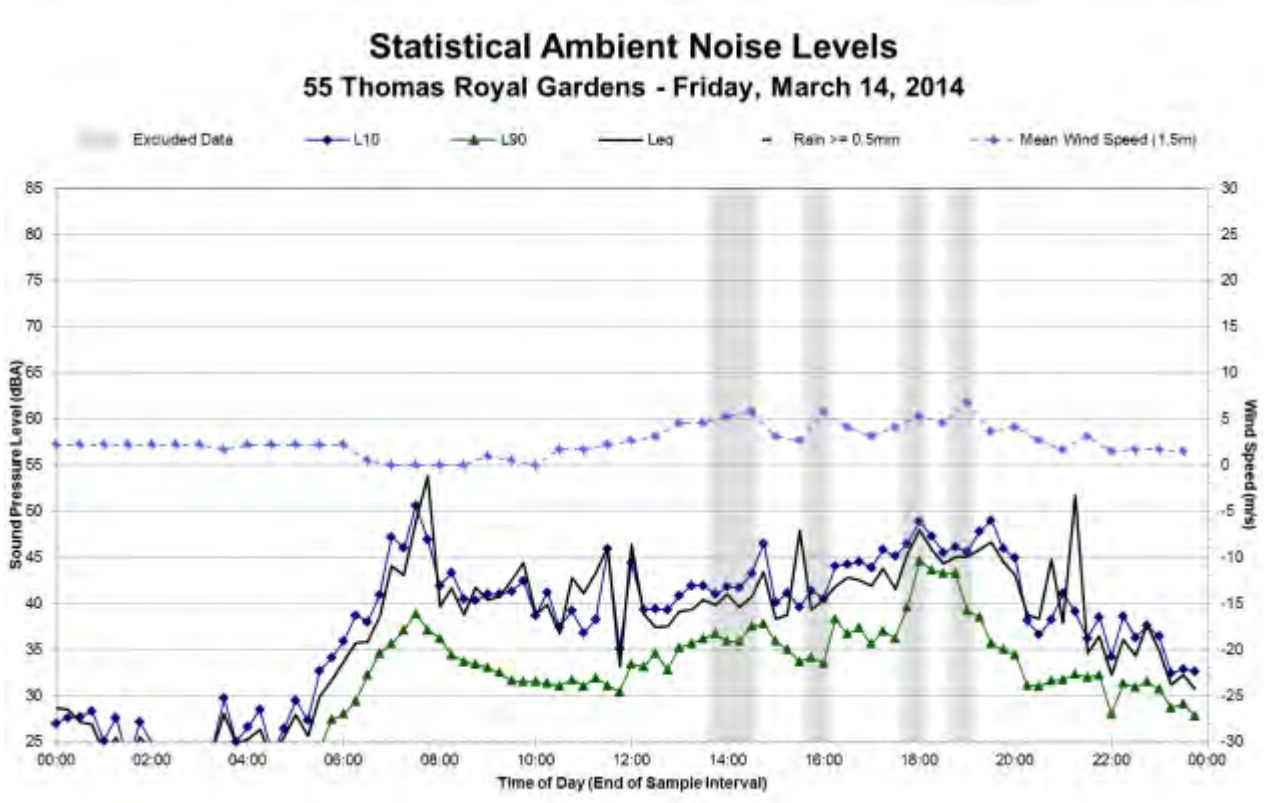

Statistical Ambient Noise Levels
55 Thomas Royal Gardens - Sunday, March 09, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

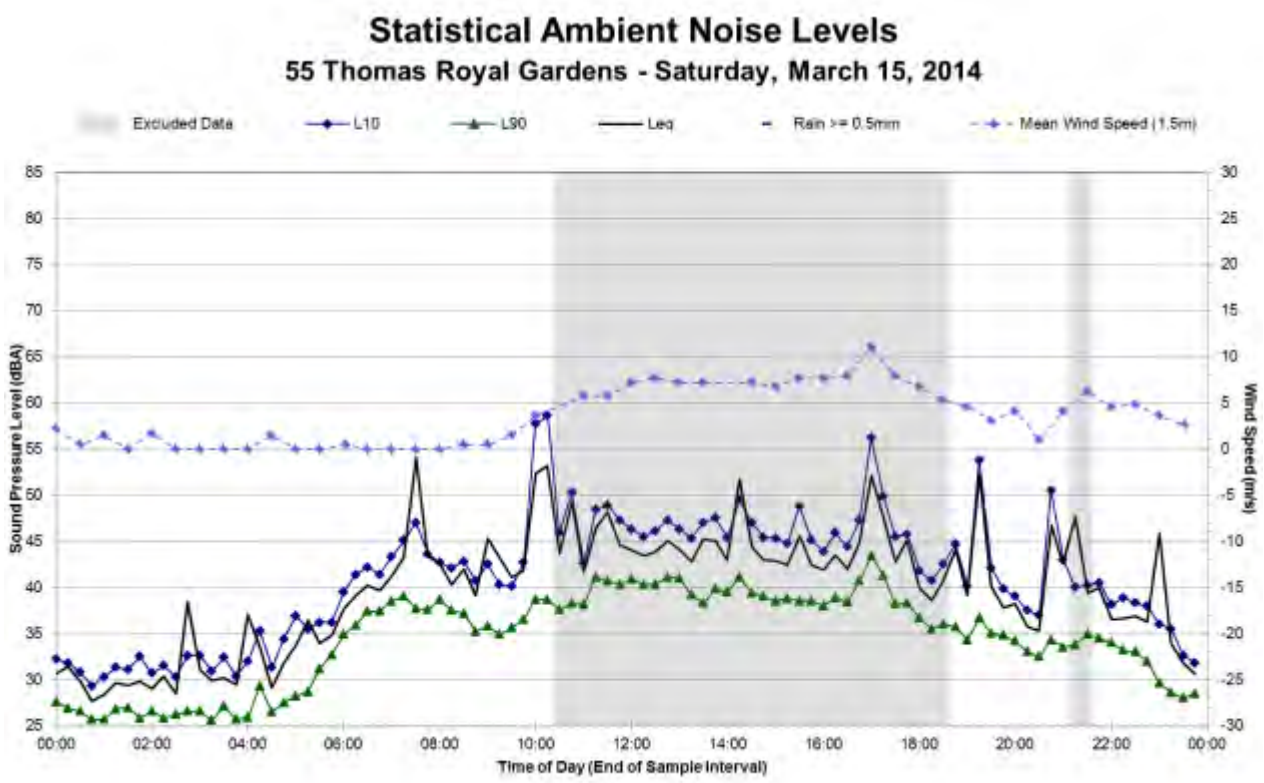

Statistical Ambient Noise Levels
55 Thomas Royal Gardens - Monday, March 10, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

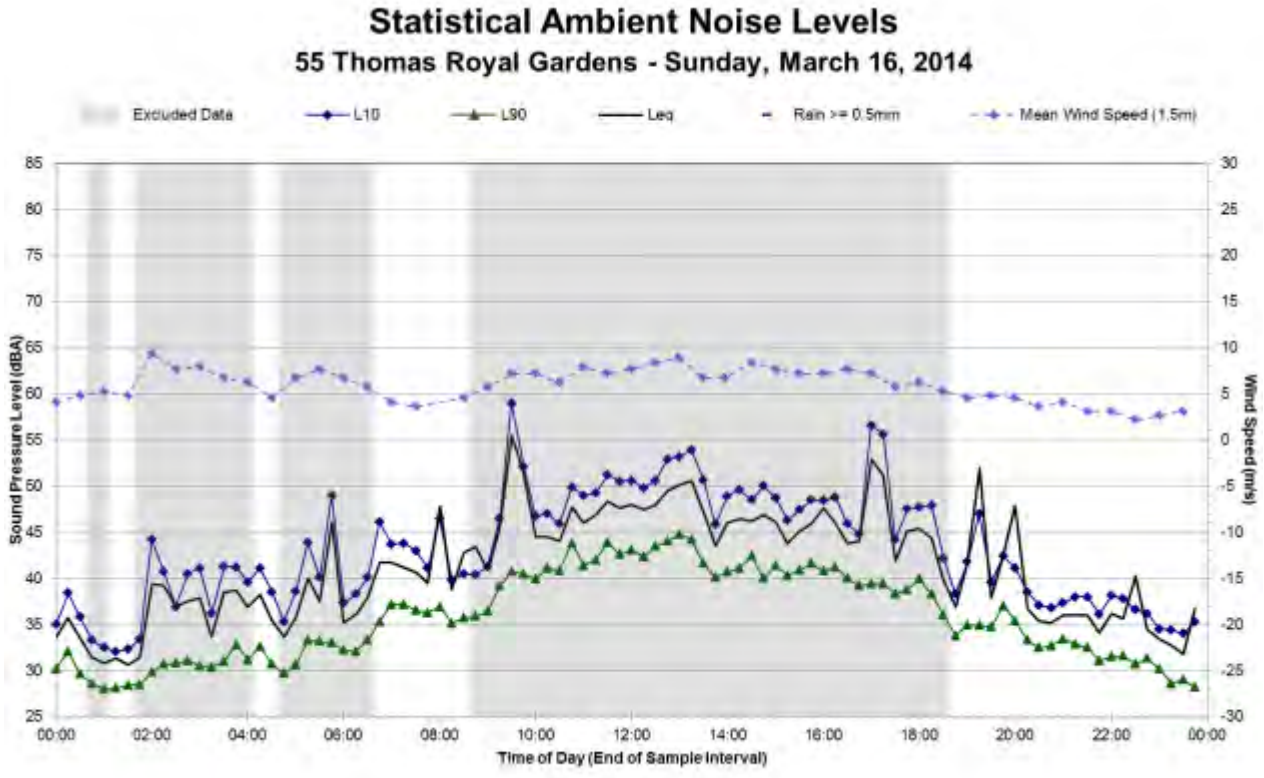

Statistical Ambient Noise Levels
55 Thomas Royal Gardens - Tuesday, March 11, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

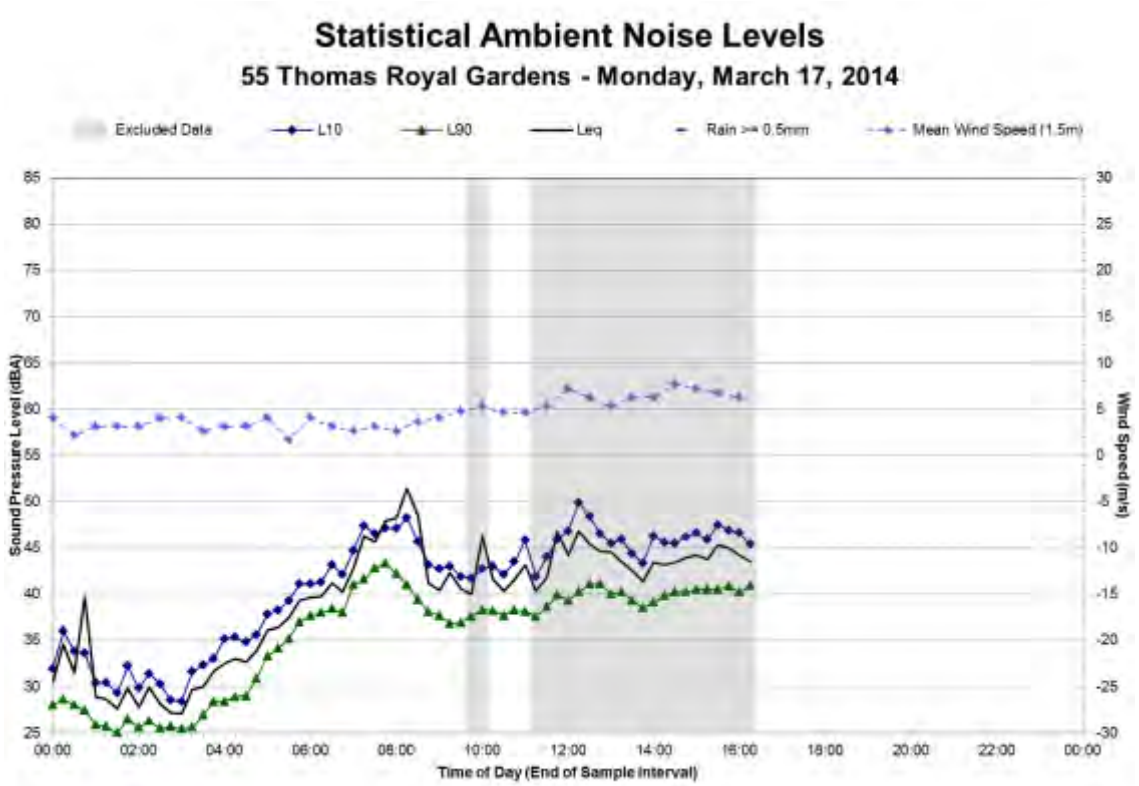

Statistical Ambient Noise Levels
55 Thomas Royal Gardens - Wednesday, March 12, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

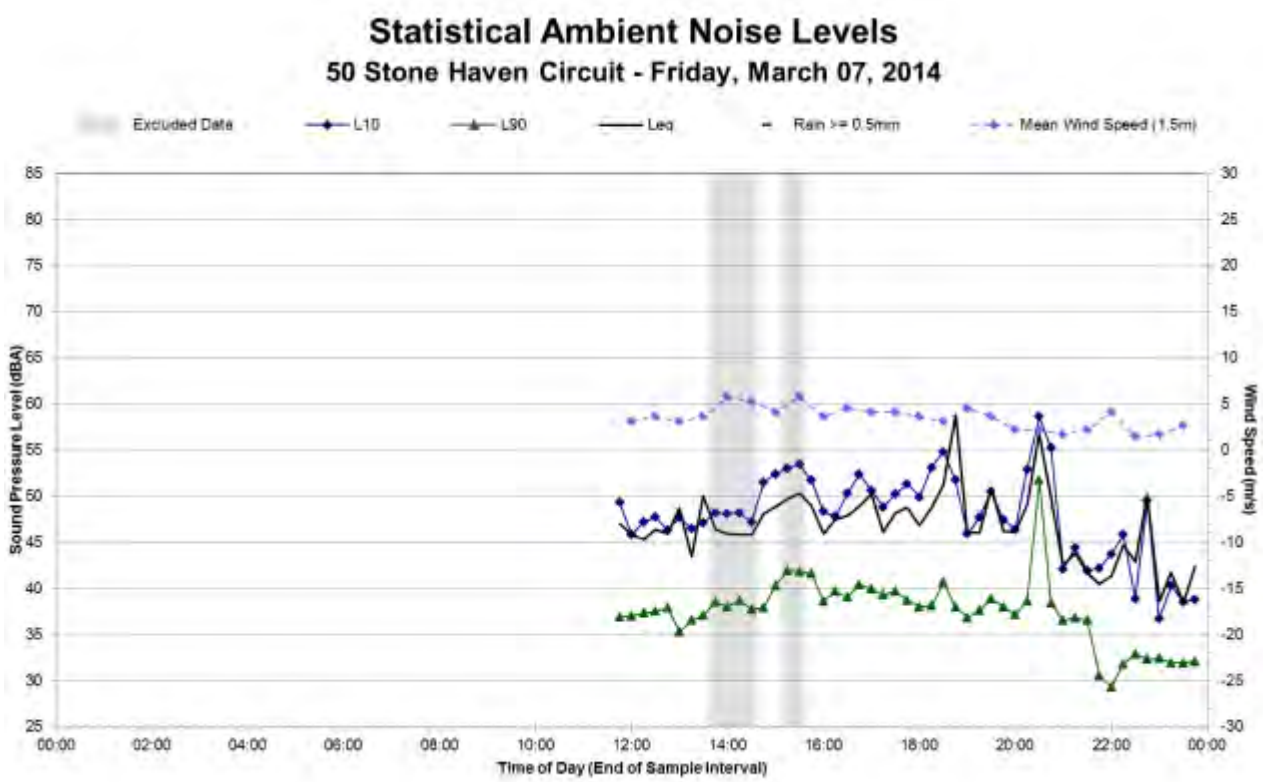

Statistical Ambient Noise Levels
55 Thomas Royal Gardens - Thursday, March 13, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

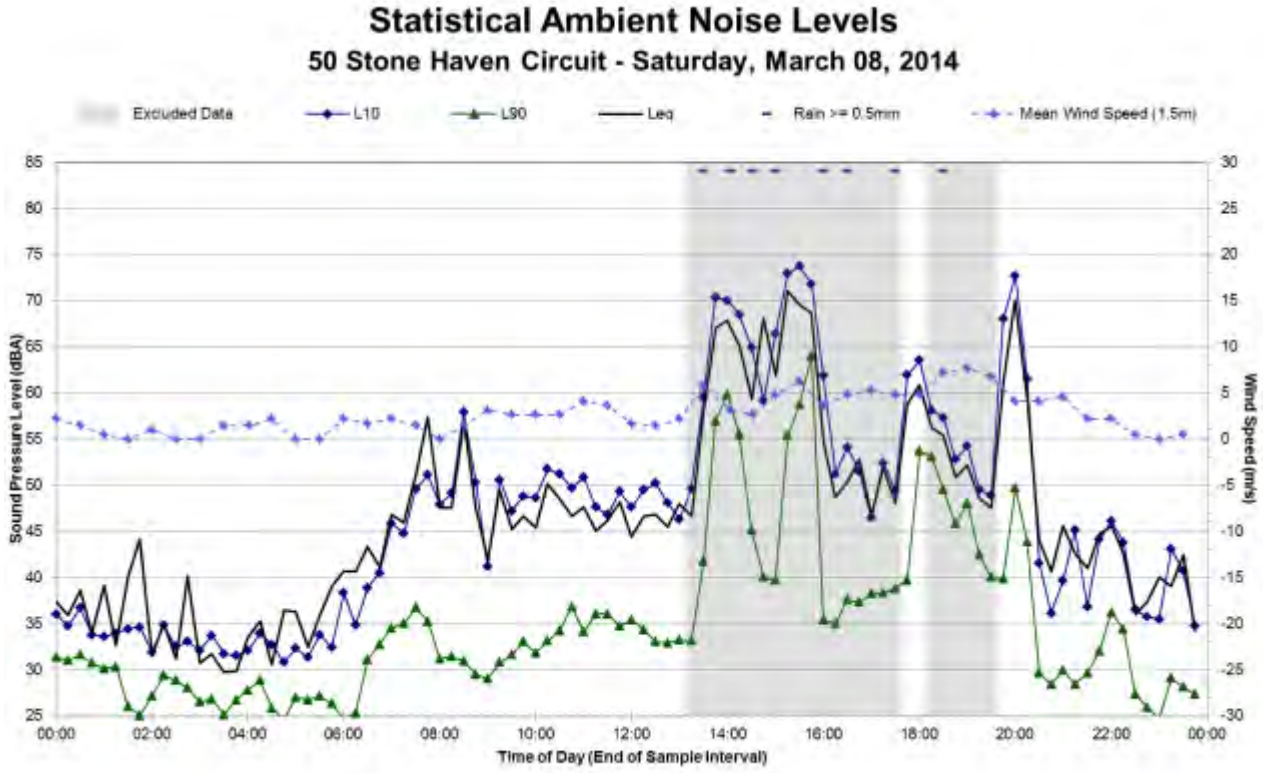

Statistical Ambient Noise Levels
55 Thomas Royal Gardens - Friday, March 14, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

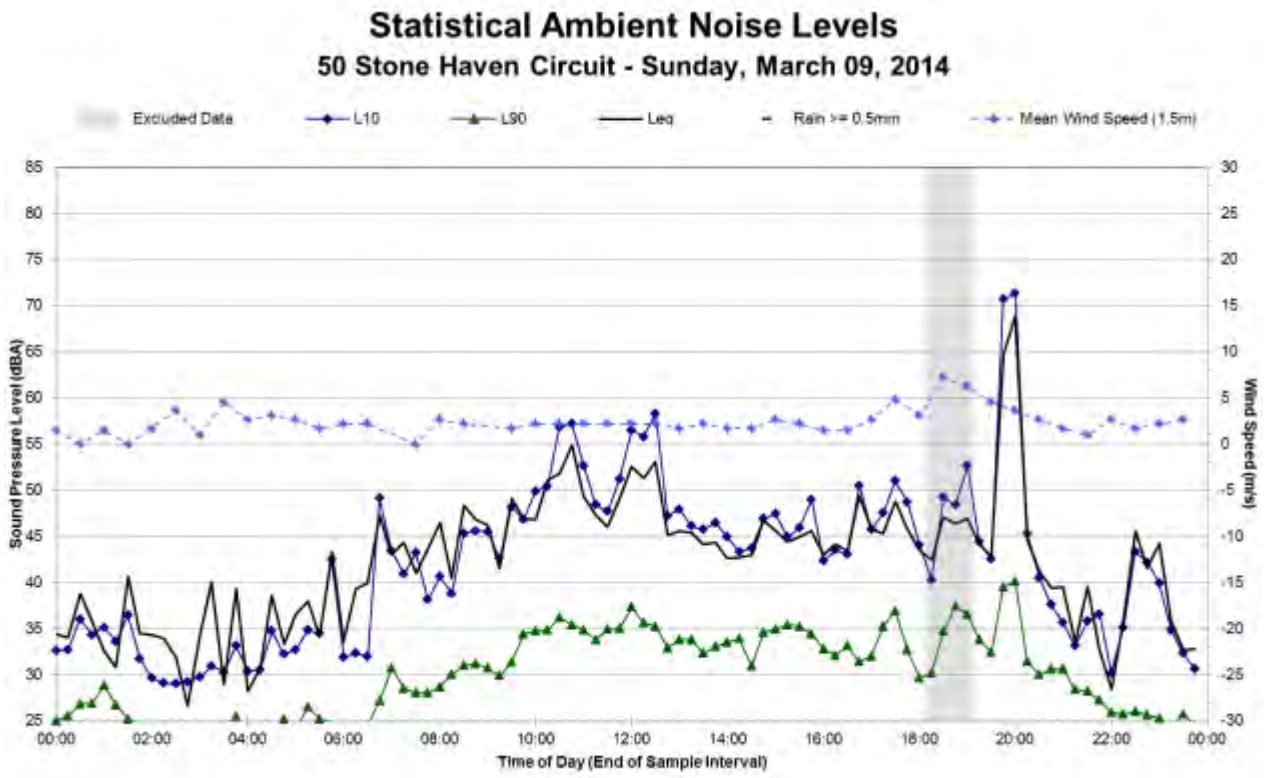

Statistical Ambient Noise Levels
55 Thomas Royal Gardens - Saturday, March 15, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

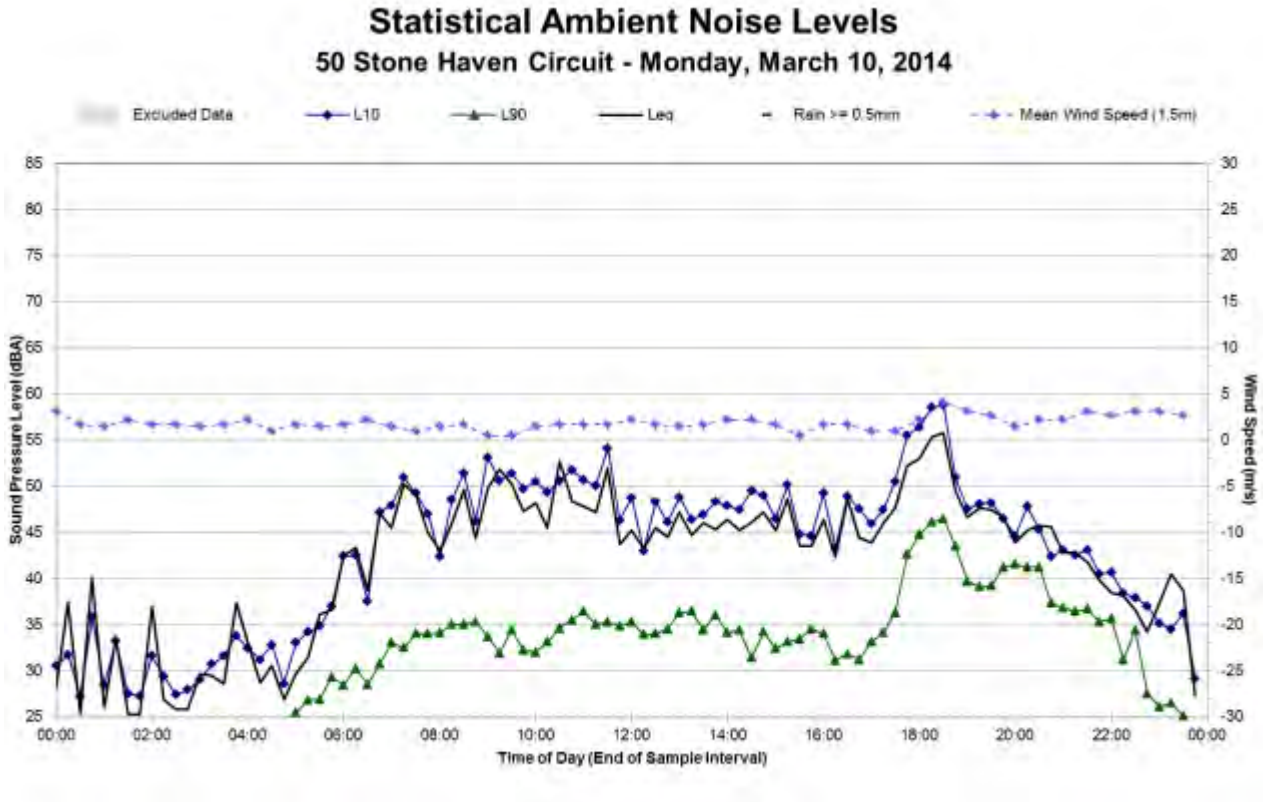

Statistical Ambient Noise Levels
55 Thomas Royal Gardens - Sunday, March 16, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

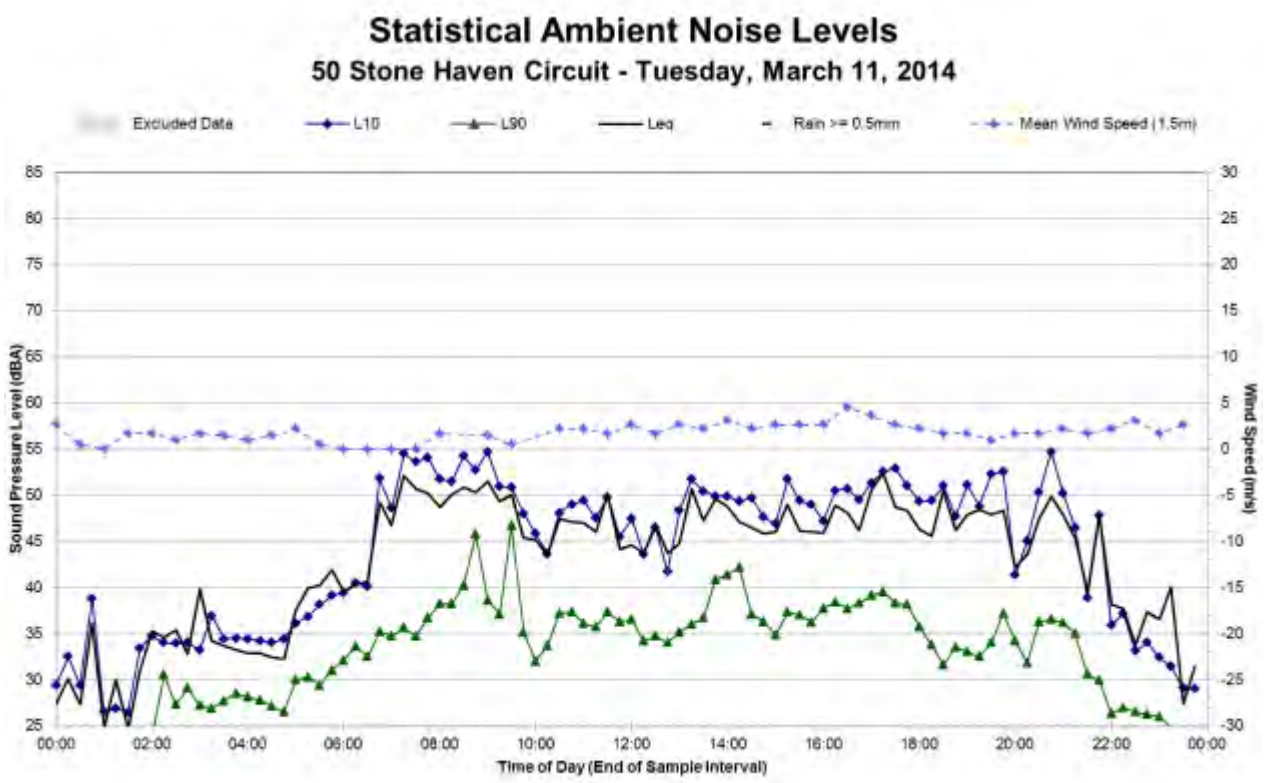

Statistical Ambient Noise Levels
55 Thomas Royal Gardens - Monday, March 17, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

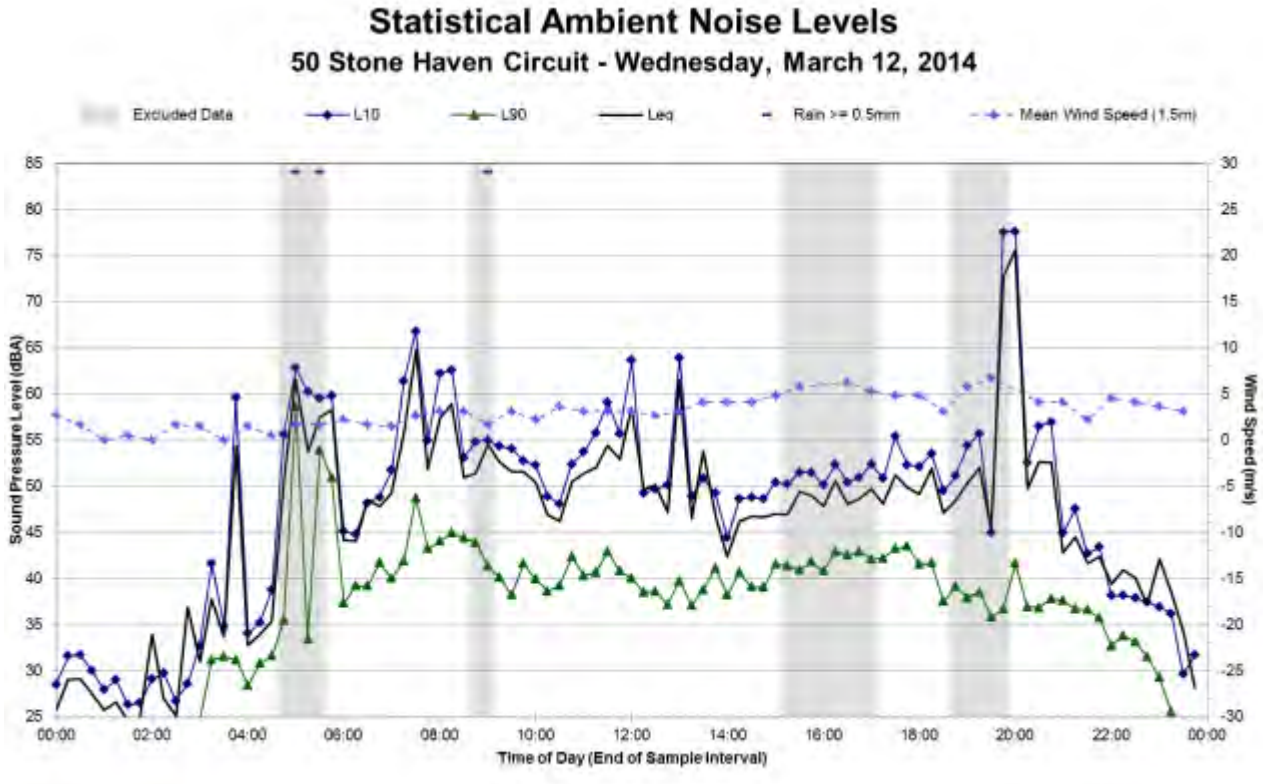

Statistical Ambient Noise Levels
50 Stone Haven Circuit - Friday, March 07, 2014
Excluded Date
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

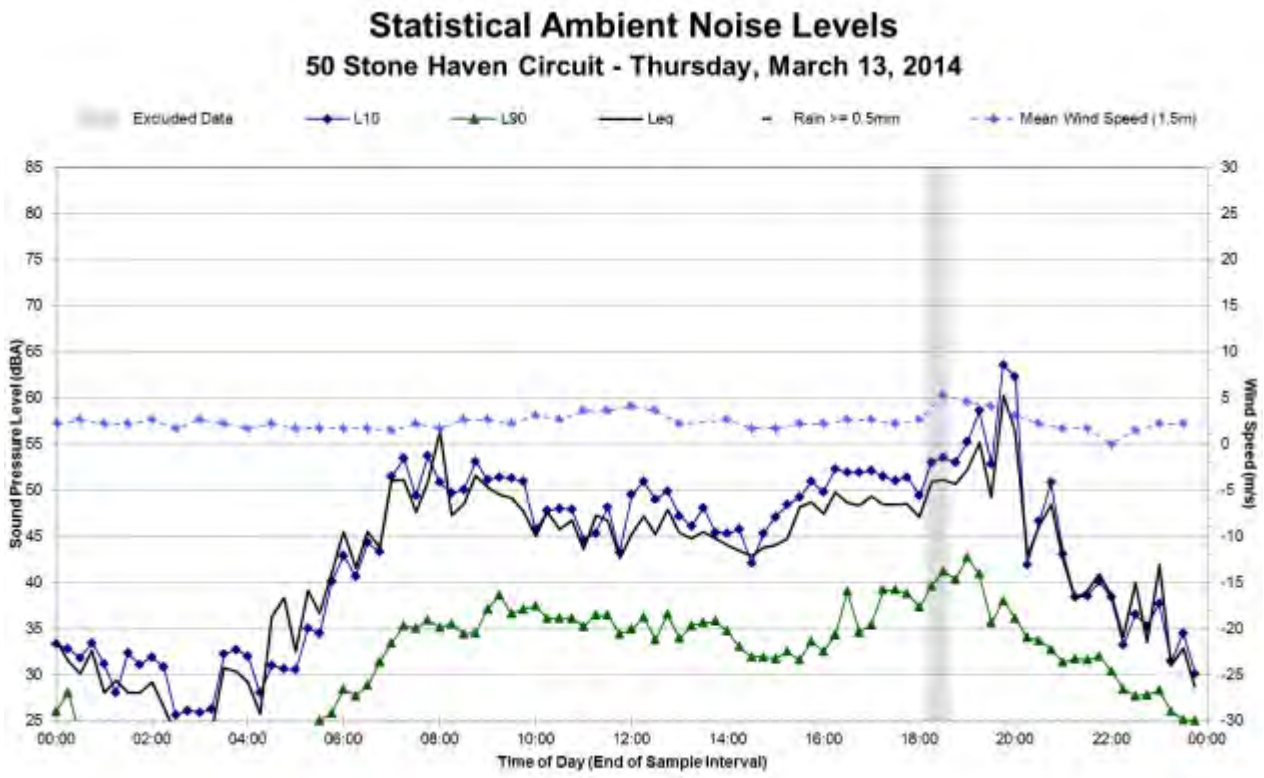

Statistical Ambient Noise Levels
50 Stone Haven Circuit - Saturday, March 08, 2014
Excluded Date
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

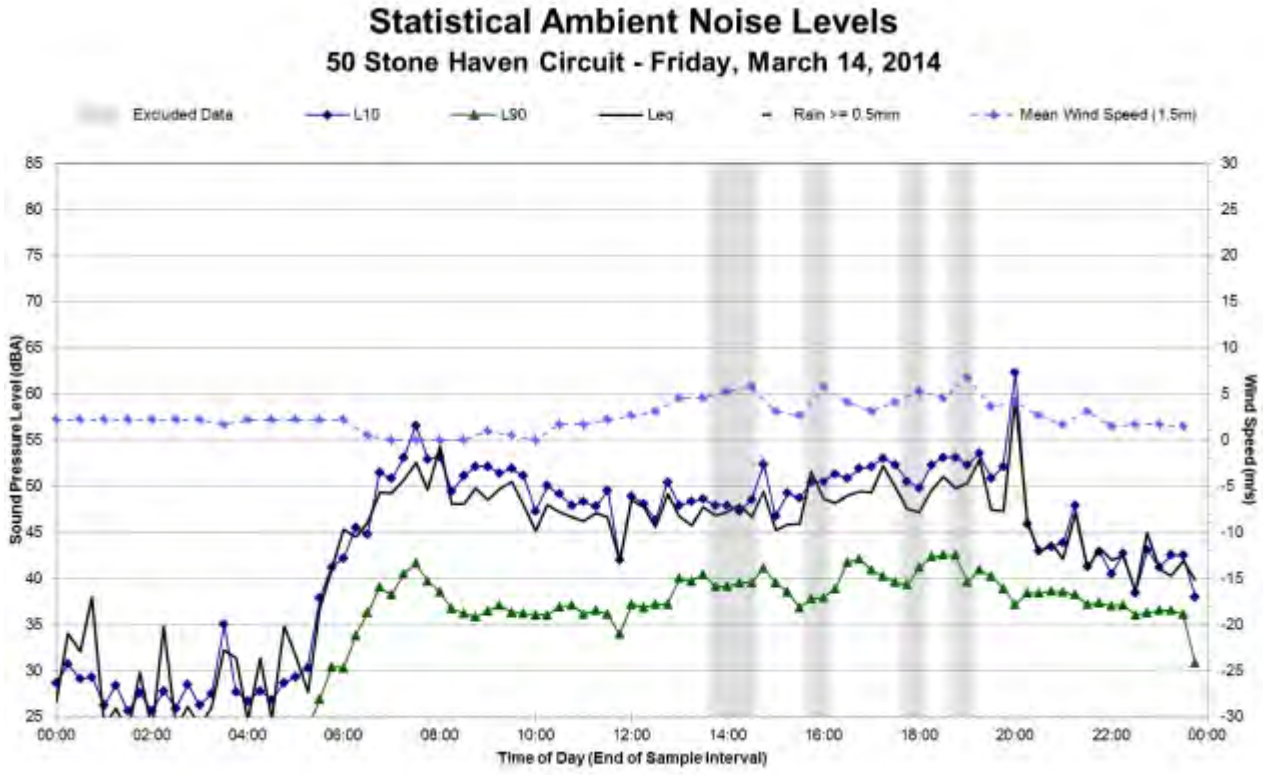

Statistical Ambient Noise Levels
50 Stone Haven Circuit - Sunday, March 09, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

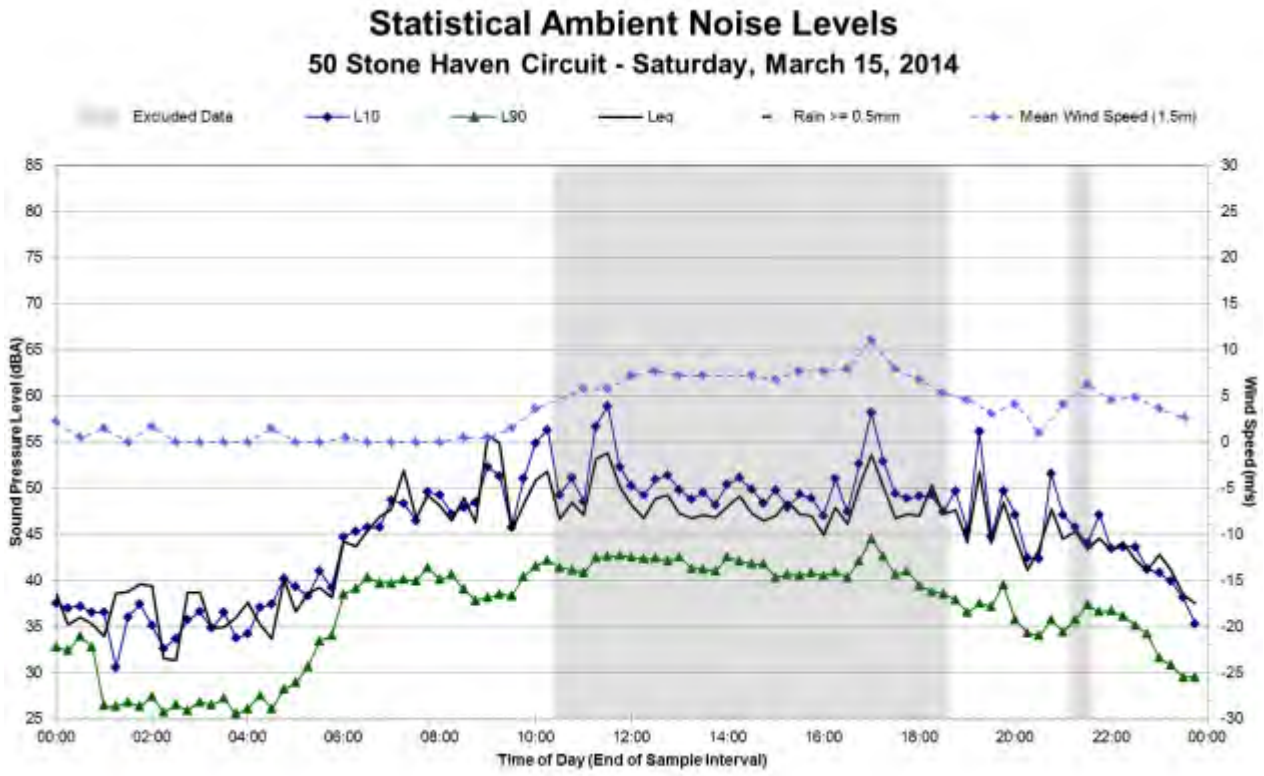

Statistical Ambient Noise Levels
50 Stone Haven Circuit - Monday, March 10, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

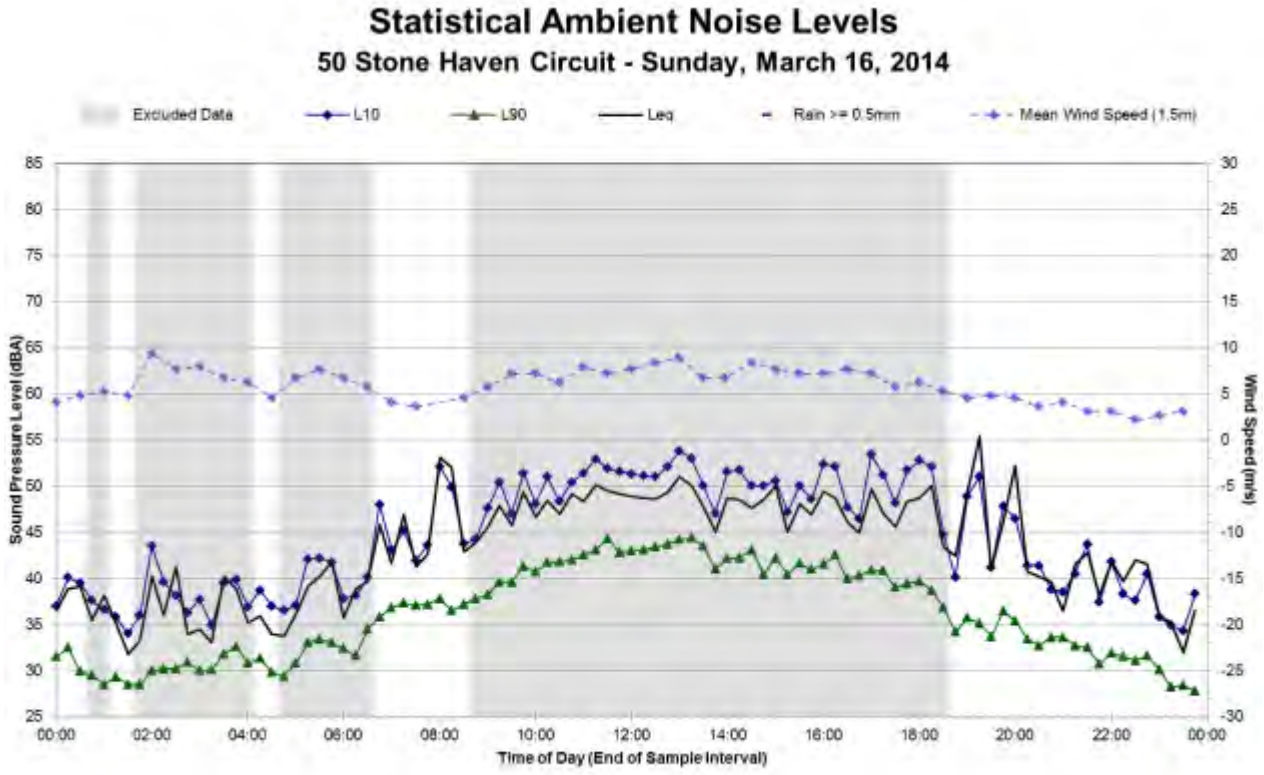

Statistical Ambient Noise Levels
50 Stone Haven Circuit - Tuesday, March 11, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

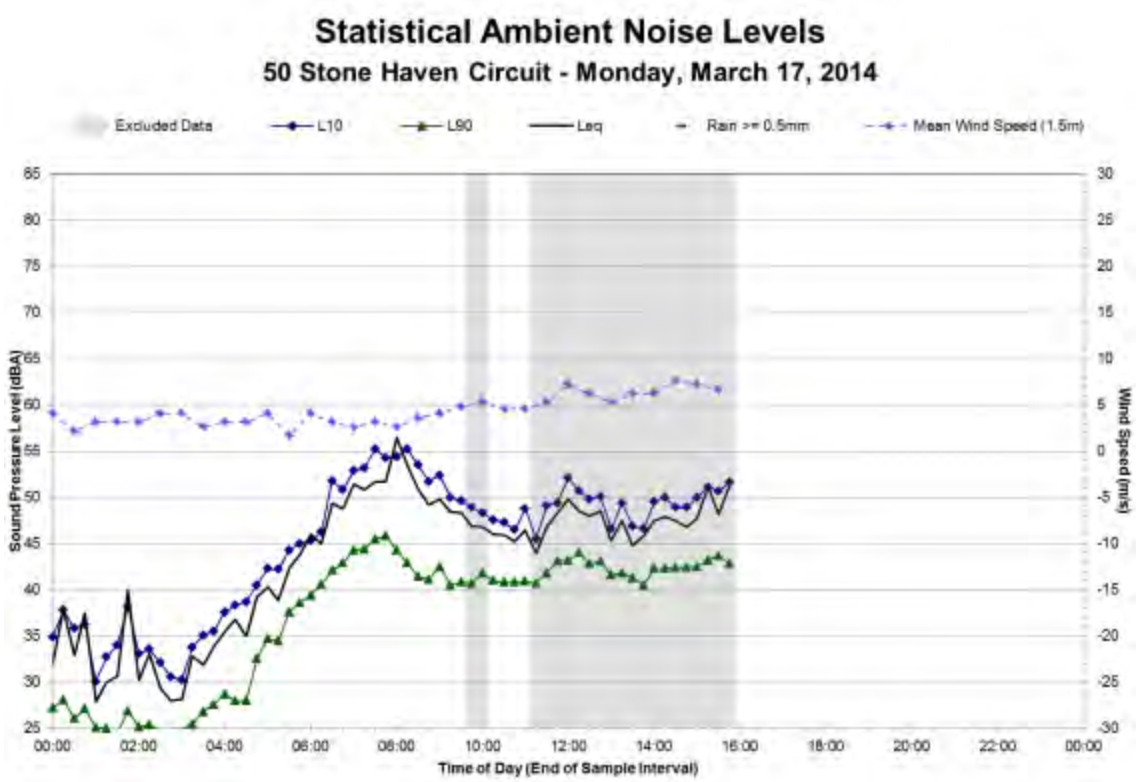

Statistical Ambient Noise Levels
50 Stone Haven Circuit - Wednesday, March 12, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

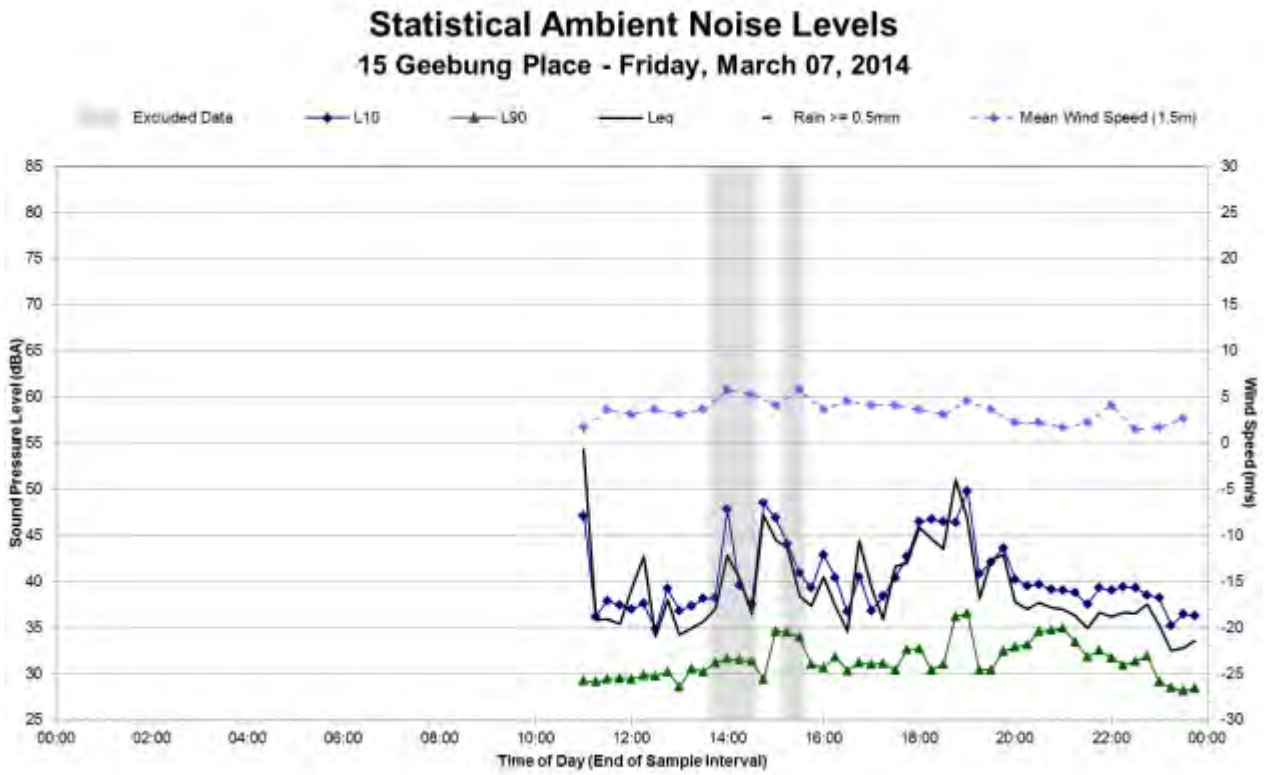

Statistical Ambient Noise Levels
50 Stone Haven Circuit - Thursday, March 13, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

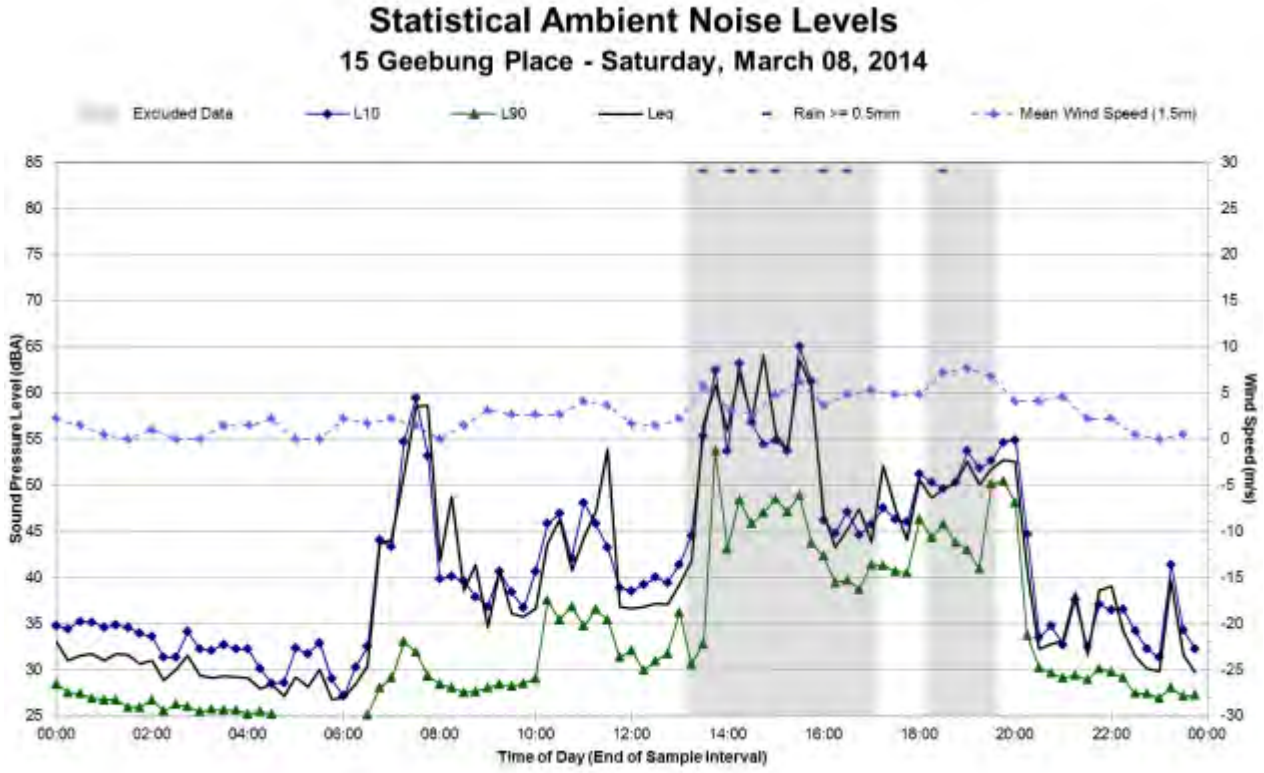

Statistical Ambient Noise Levels
50 Stone Haven Circuit - Friday, March 14, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

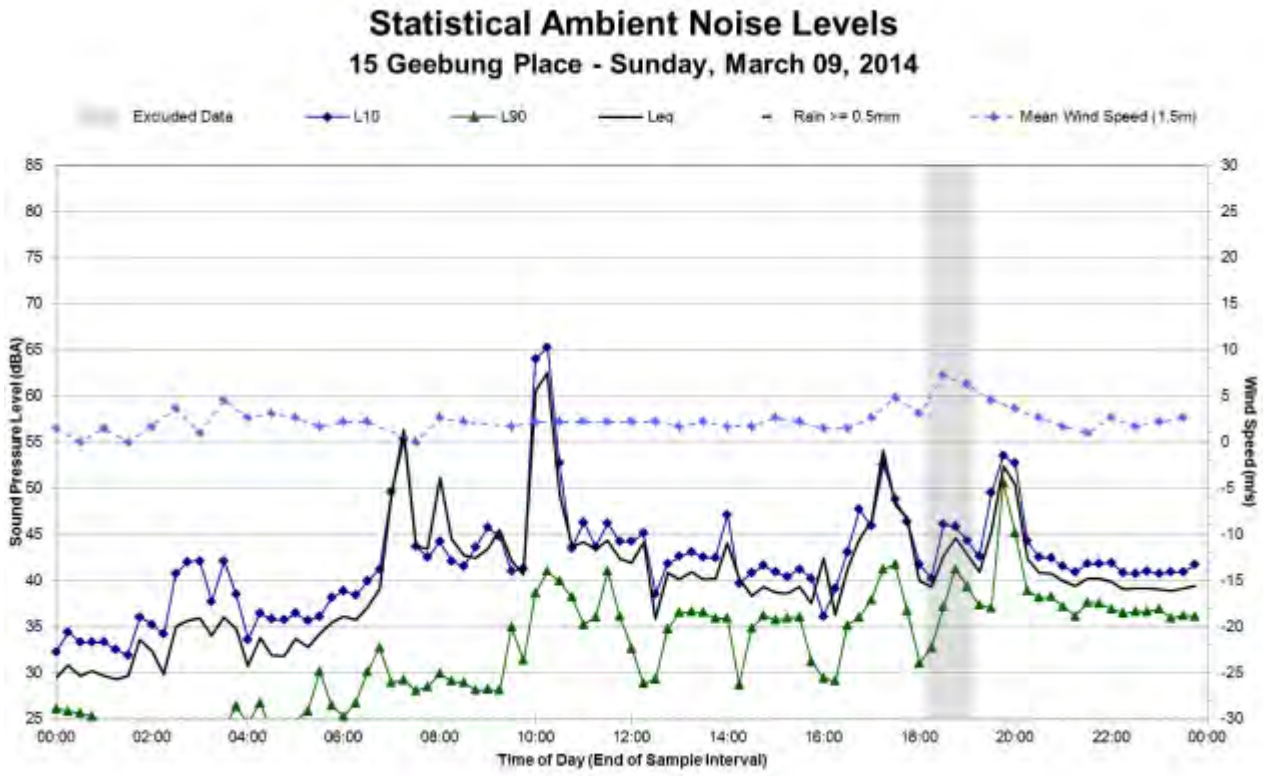

Statistical Ambient Noise Levels
50 Stone Haven Circuit - Saturday, March 15, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

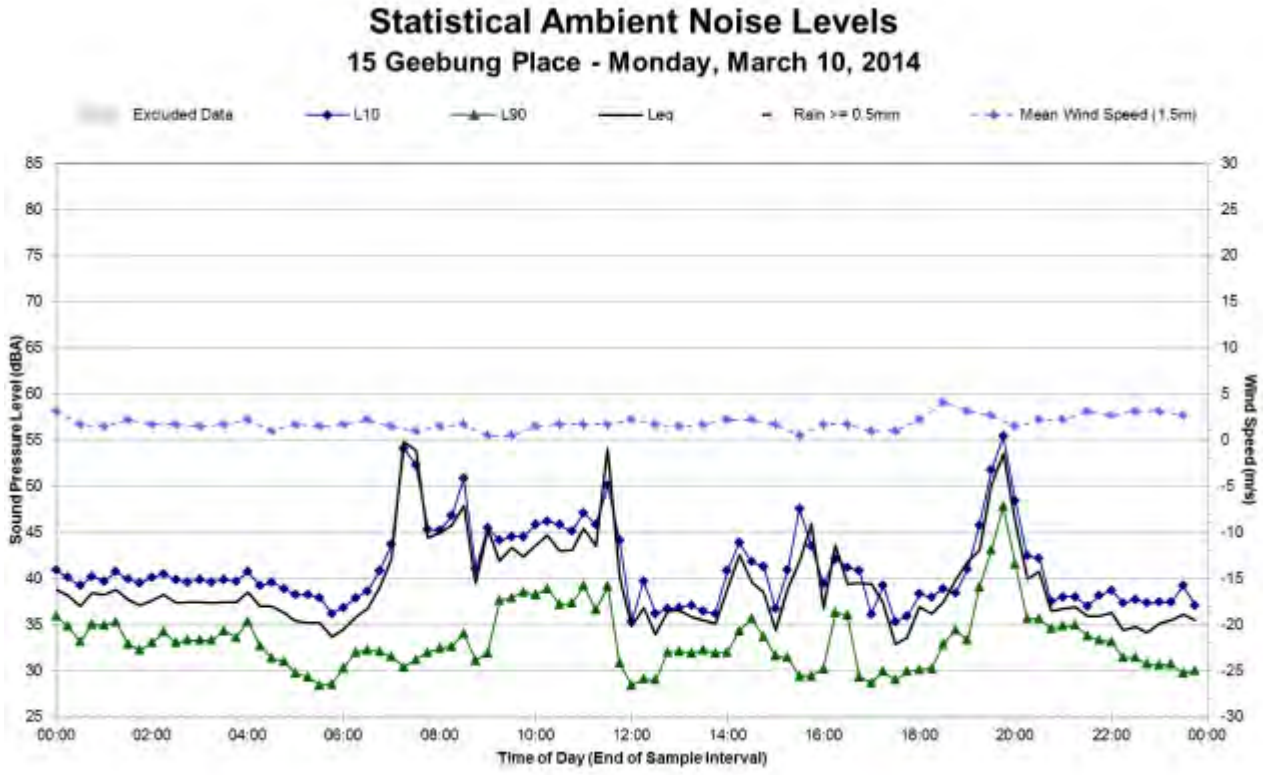

Statistical Ambient Noise Levels
50 Stone Haven Circuit - Sunday, March 16, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

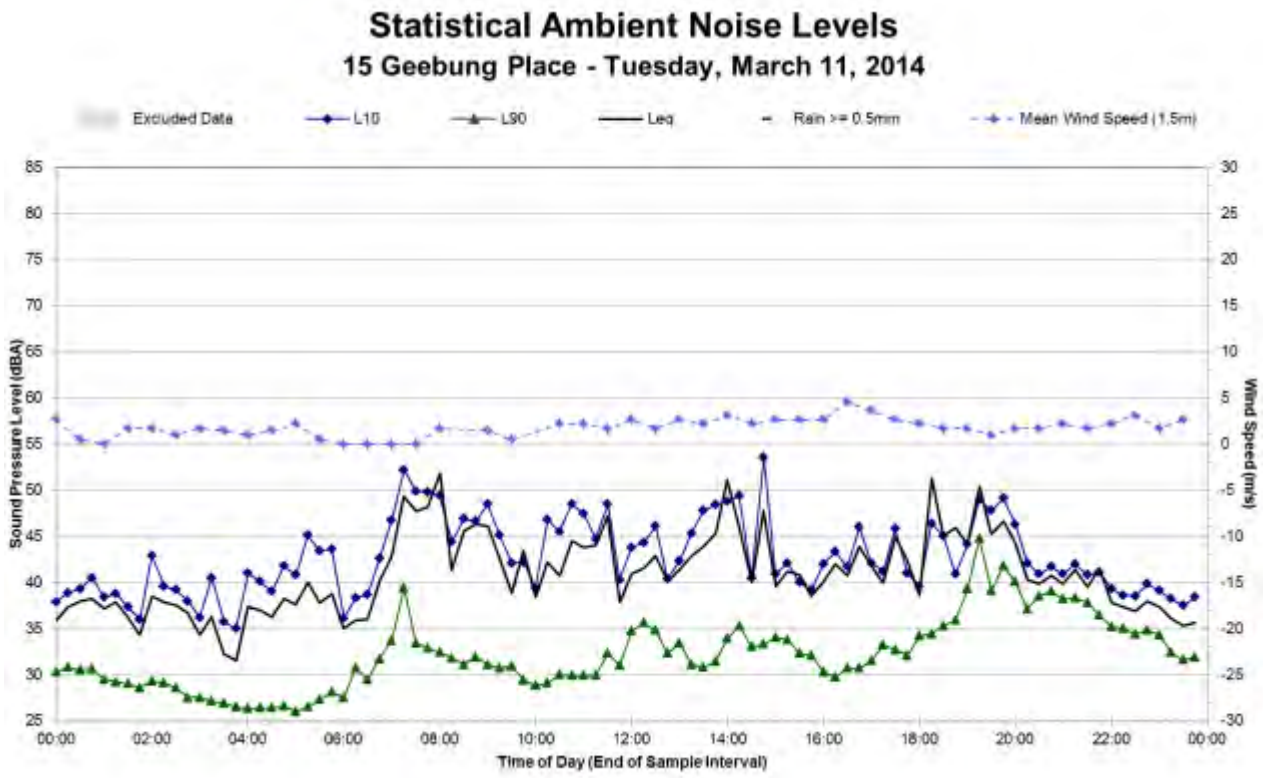

Statistical Ambient Noise Levels
50 Stone Haven Circuit - Monday, March 17, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

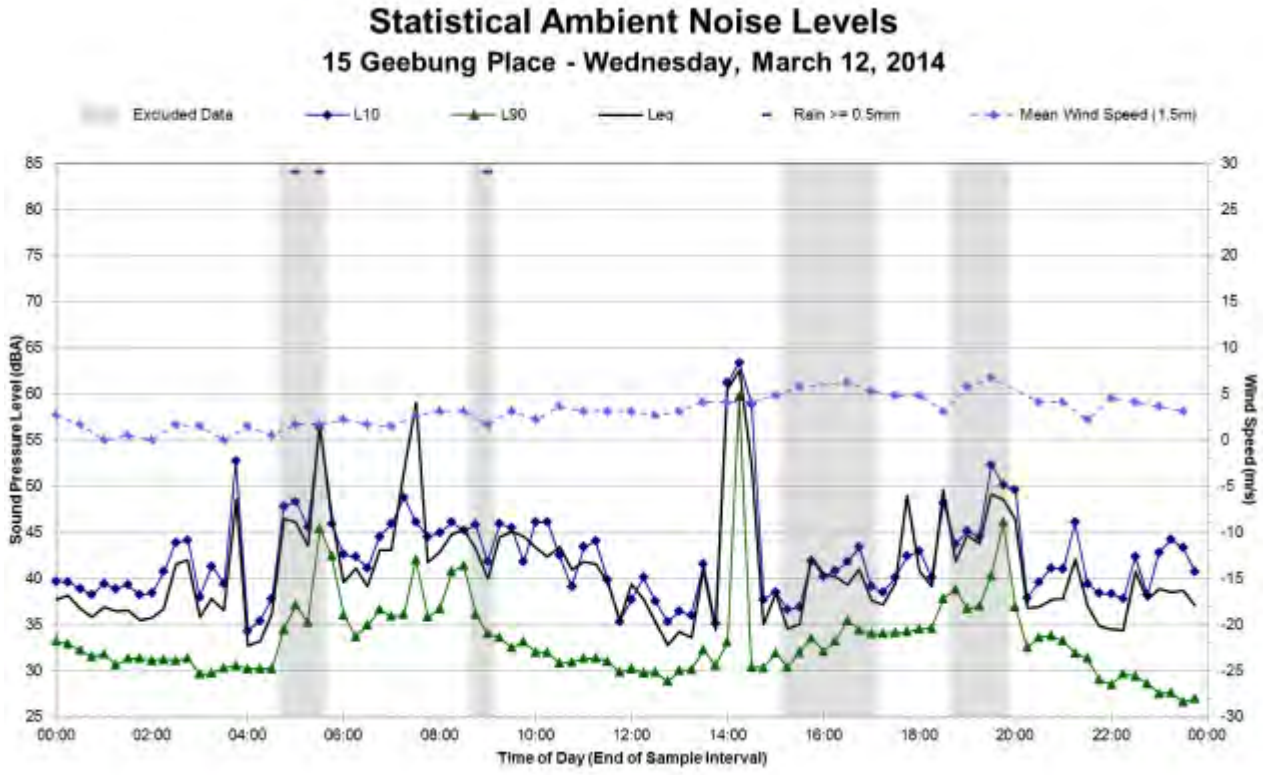

Statistical Ambient Noise Levels
15 Geebung Place - Friday, March 07, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

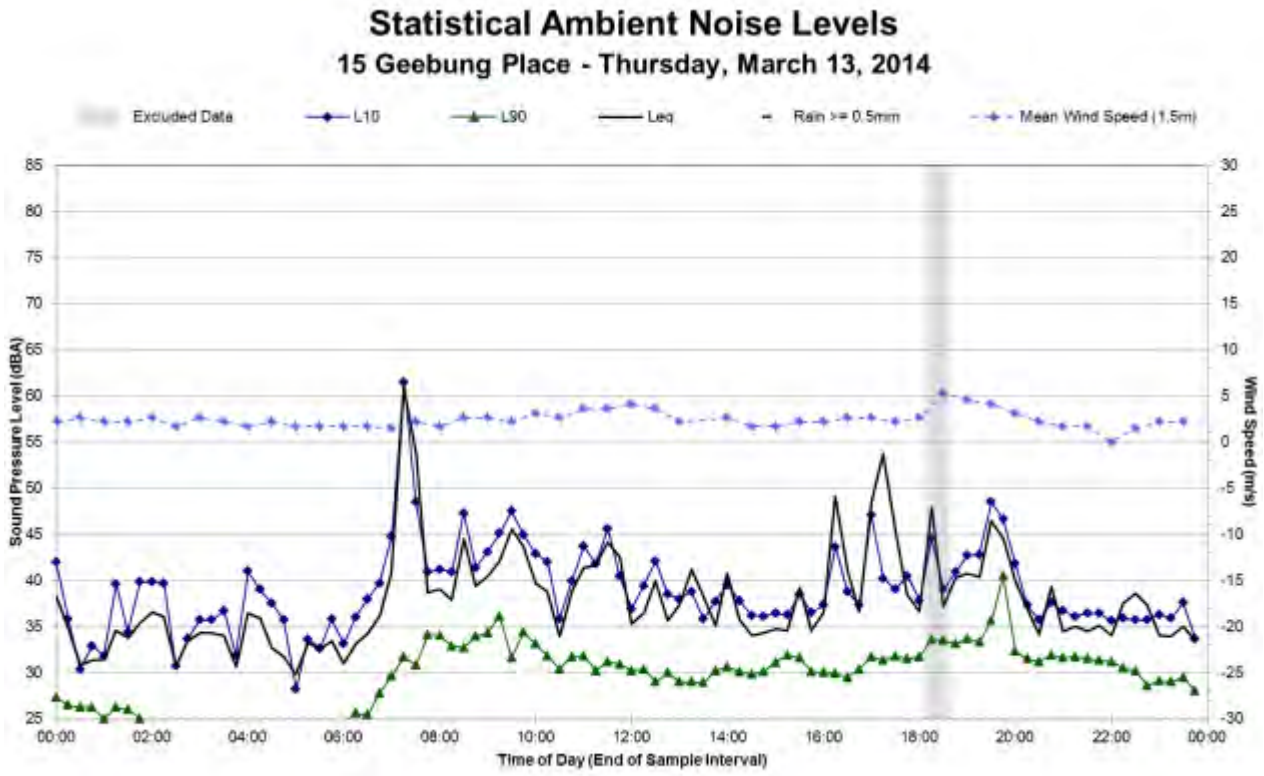

Statistical Ambient Noise Levels
15 Geebung Place - Saturday, March 08, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

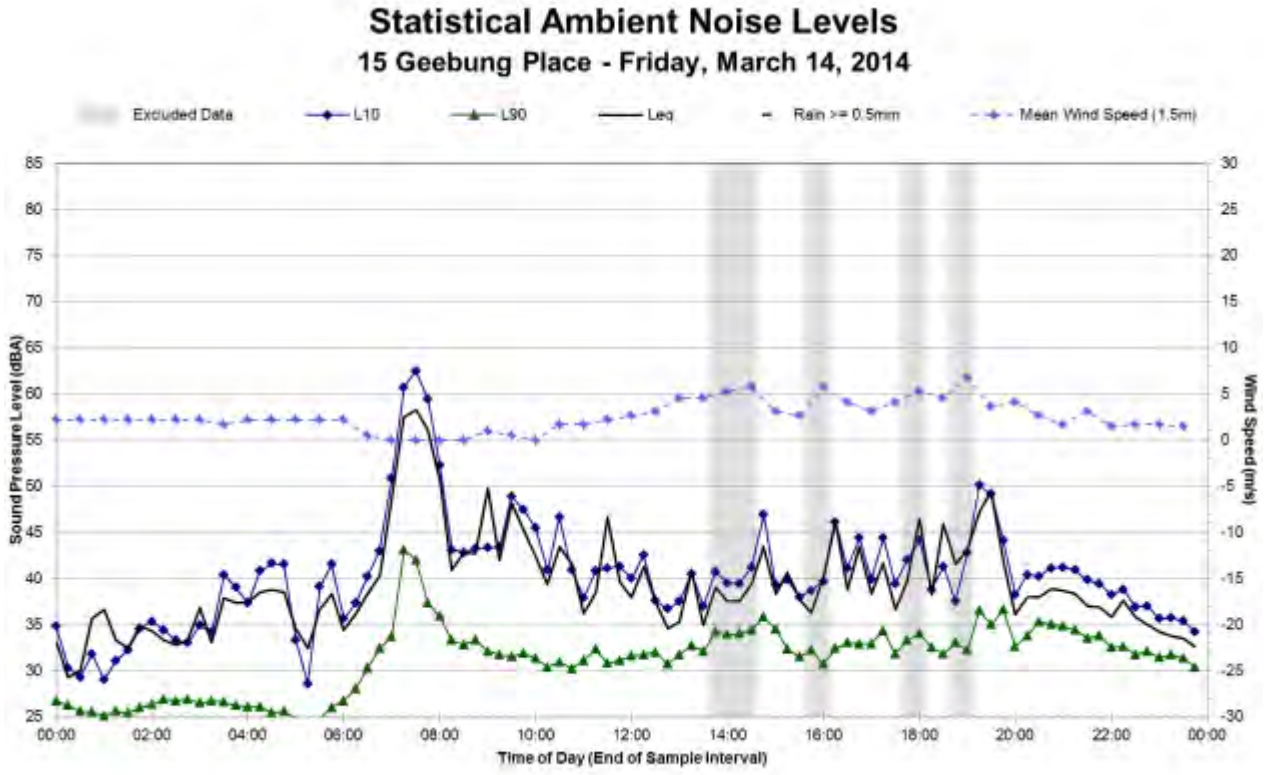

Statistical Ambient Noise Levels
15 Geebung Place - Sunday, March 09, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

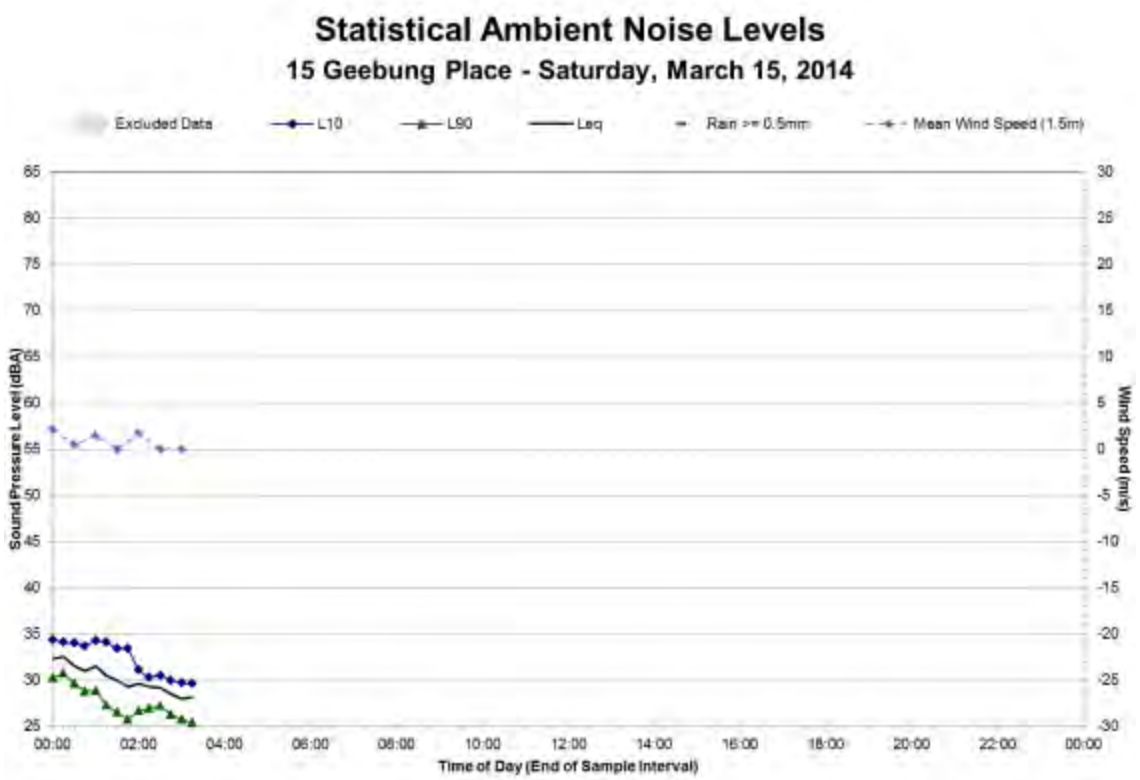

Statistical Ambient Noise Levels
15 Geebung Place - Monday, March 10, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

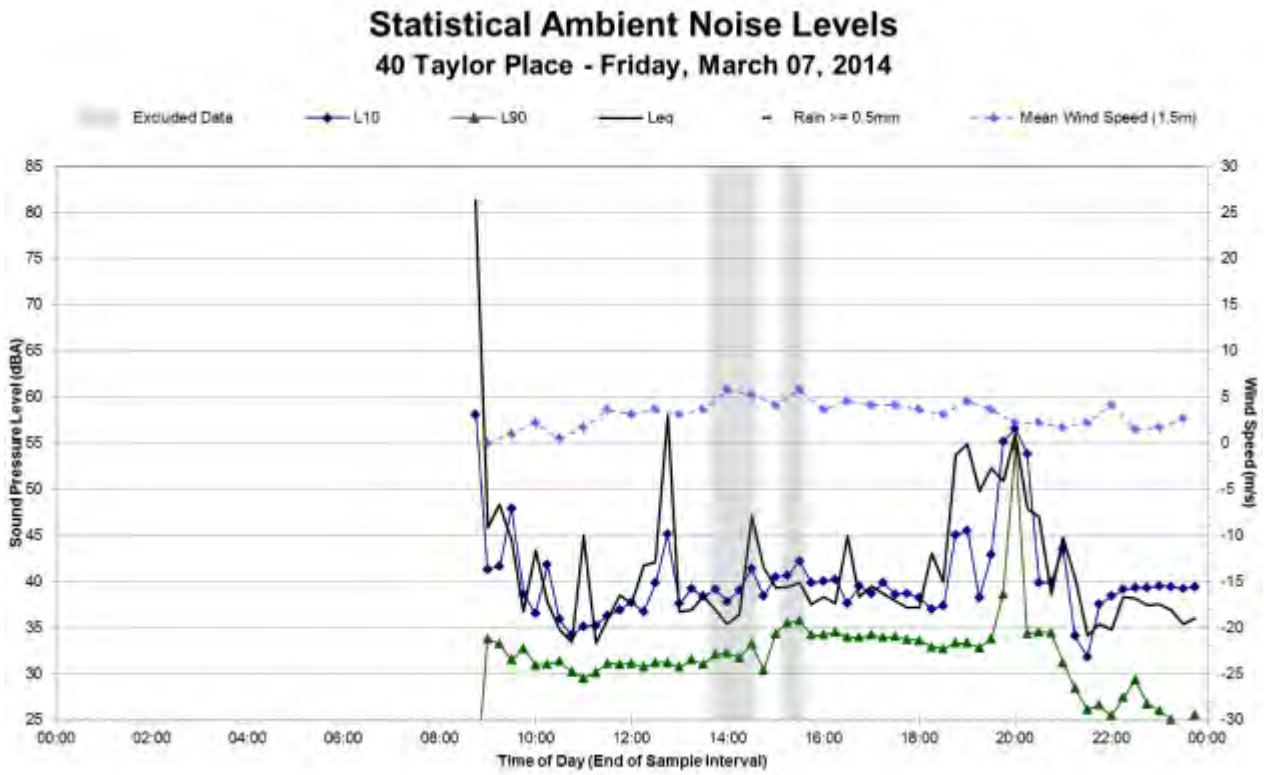

Statistical Ambient Noise Levels
15 Geebung Place - Tuesday, March 11, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

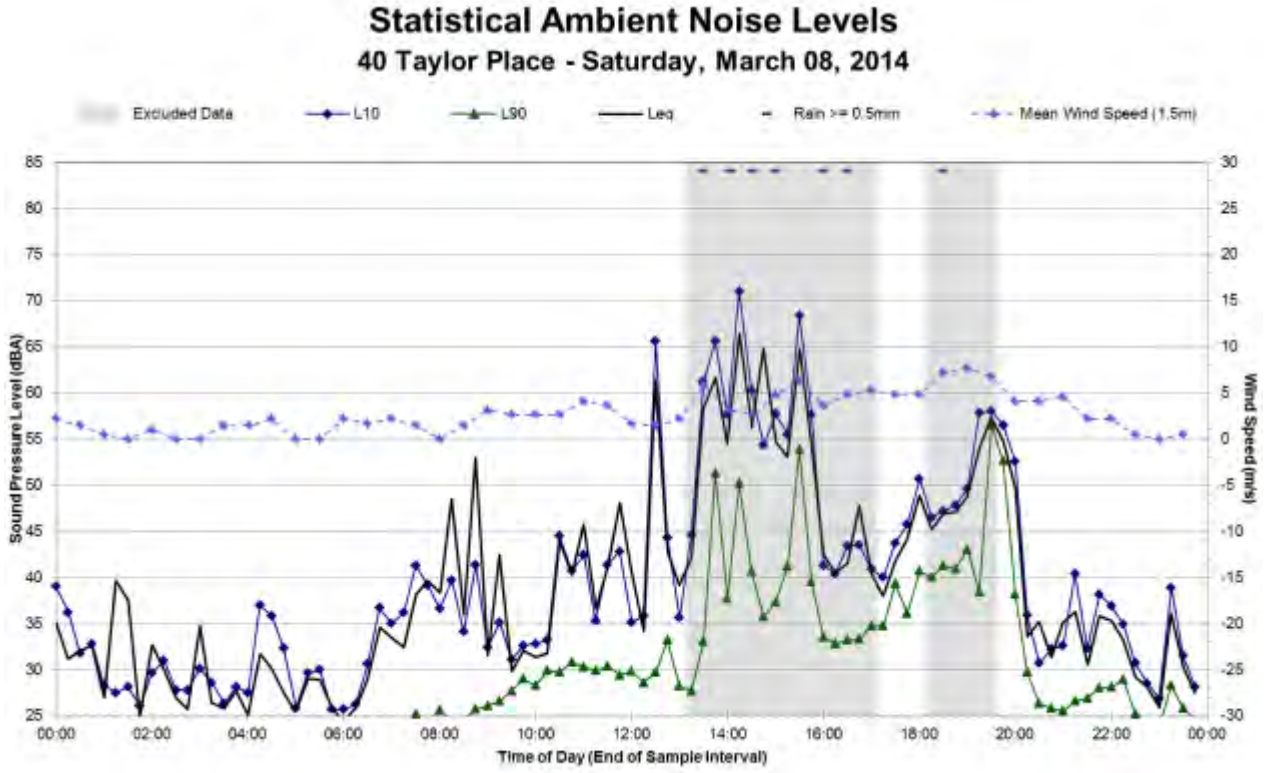

Statistical Ambient Noise Levels
15 Geebung Place - Wednesday, March 12, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

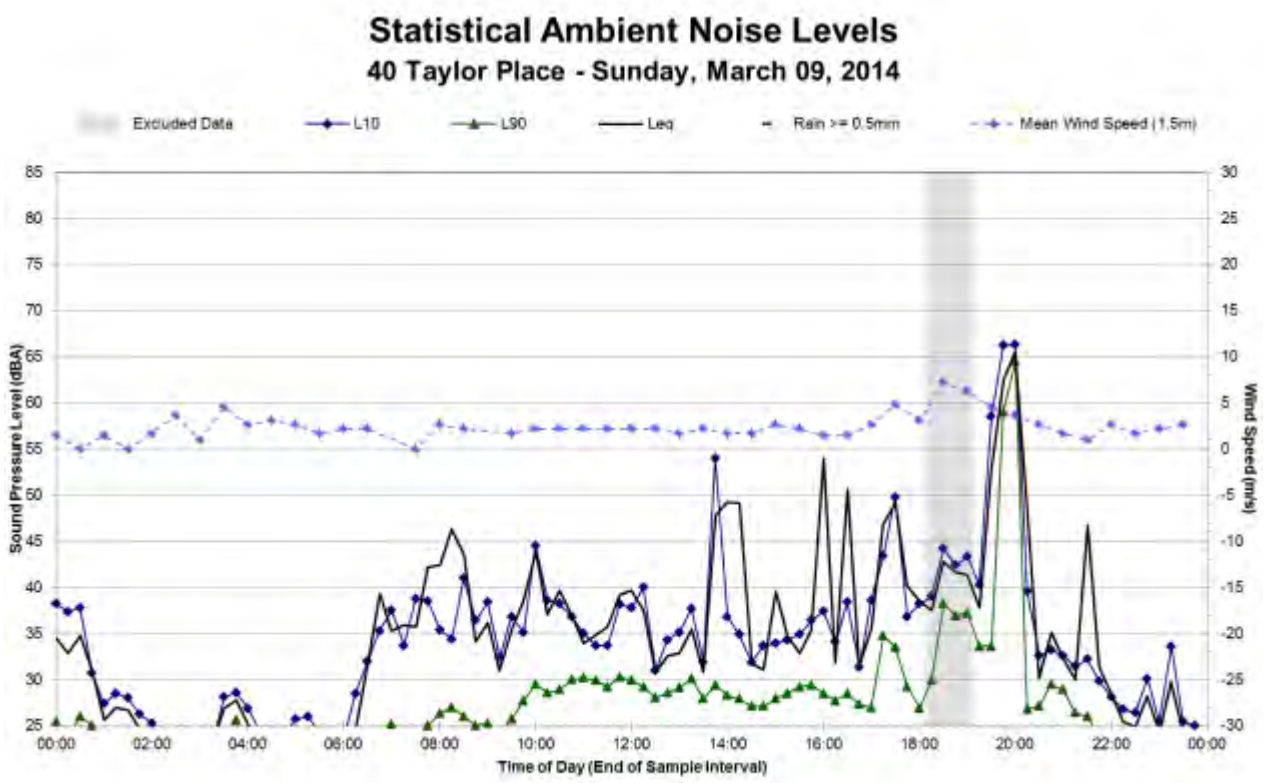

Statistical Ambient Noise Levels
15 Geebung Place - Thursday, March 13, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

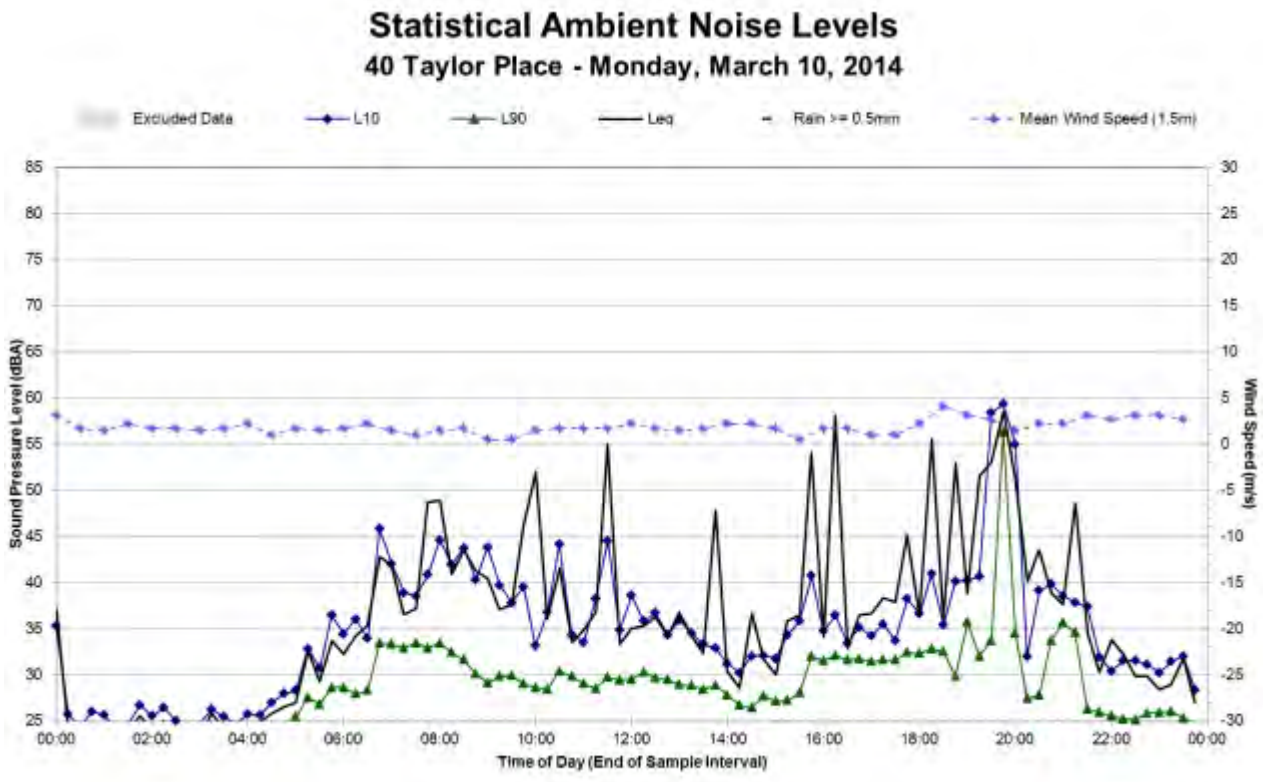

Statistical Ambient Noise Levels
15 Geebung Place - Friday, March 14, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

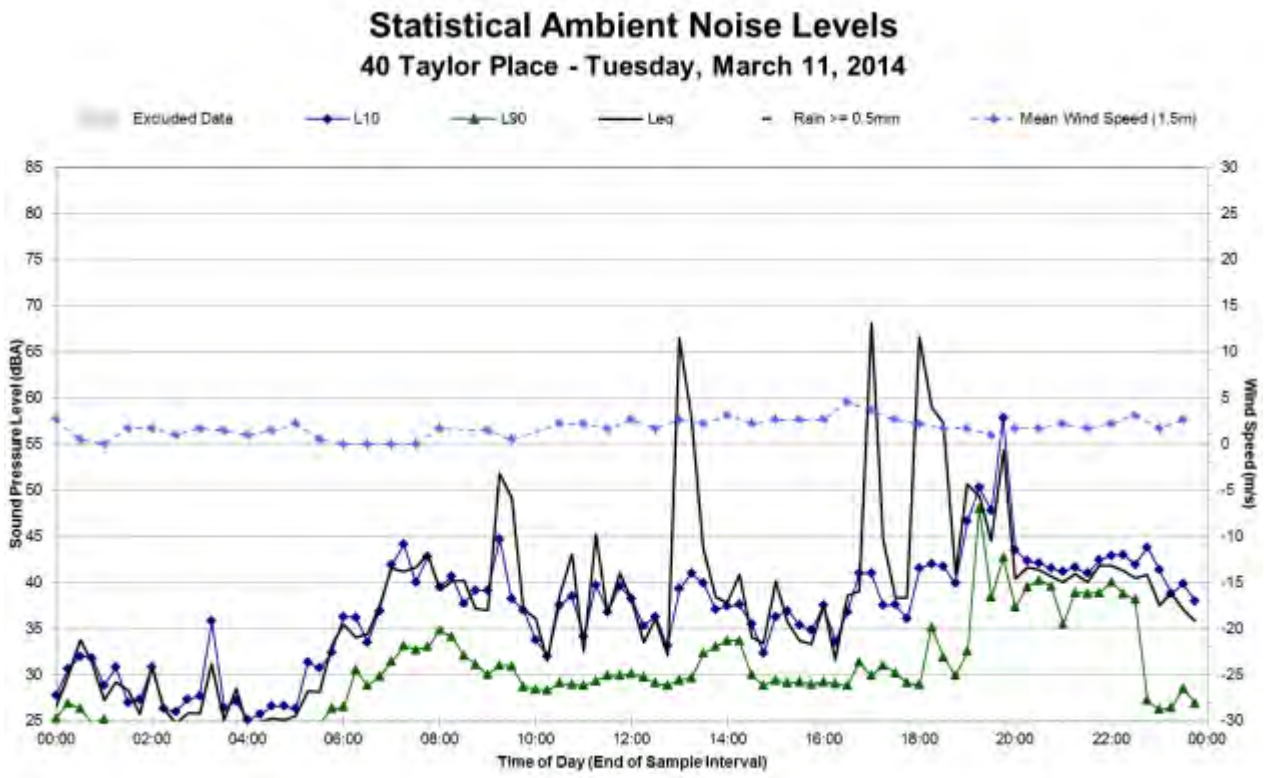

Statistical Ambient Noise Levels
15 Geebung Place - Saturday, March 15, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

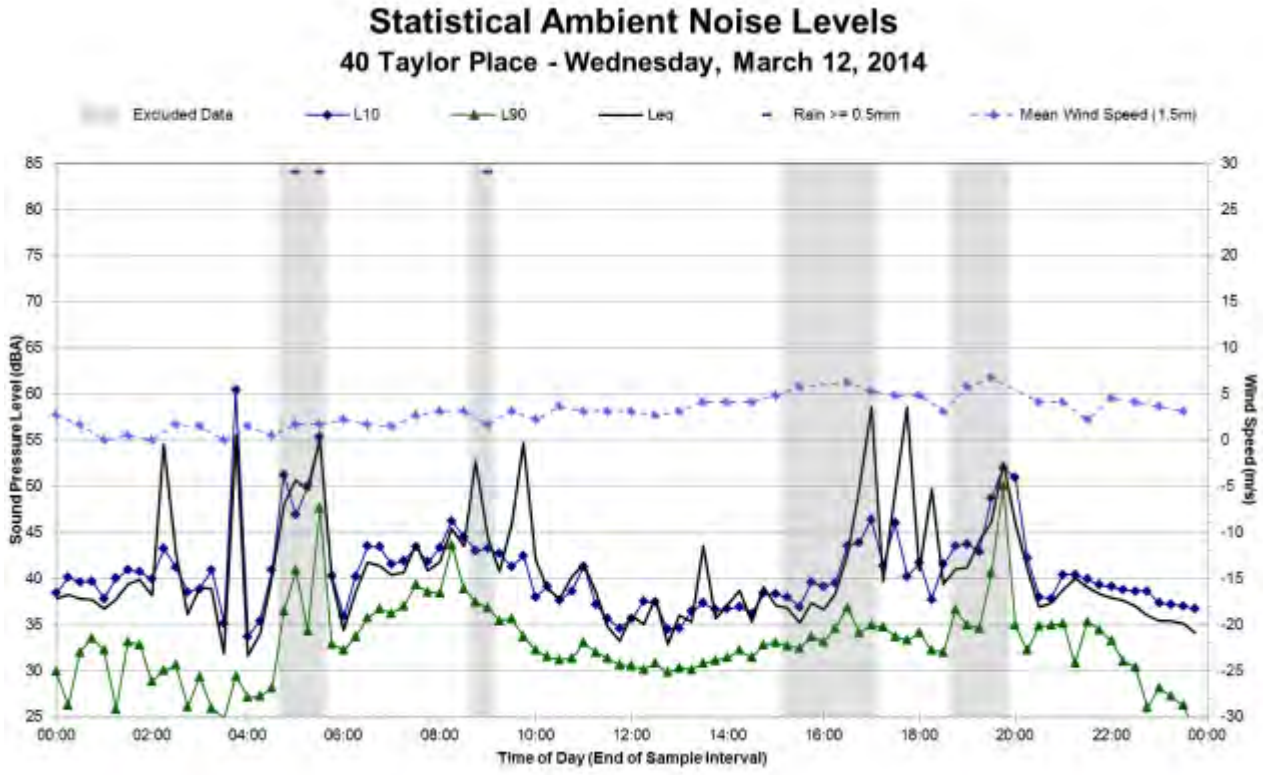

Statistical Ambient Noise Levels
40 Taylor Place - Friday, March 07, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

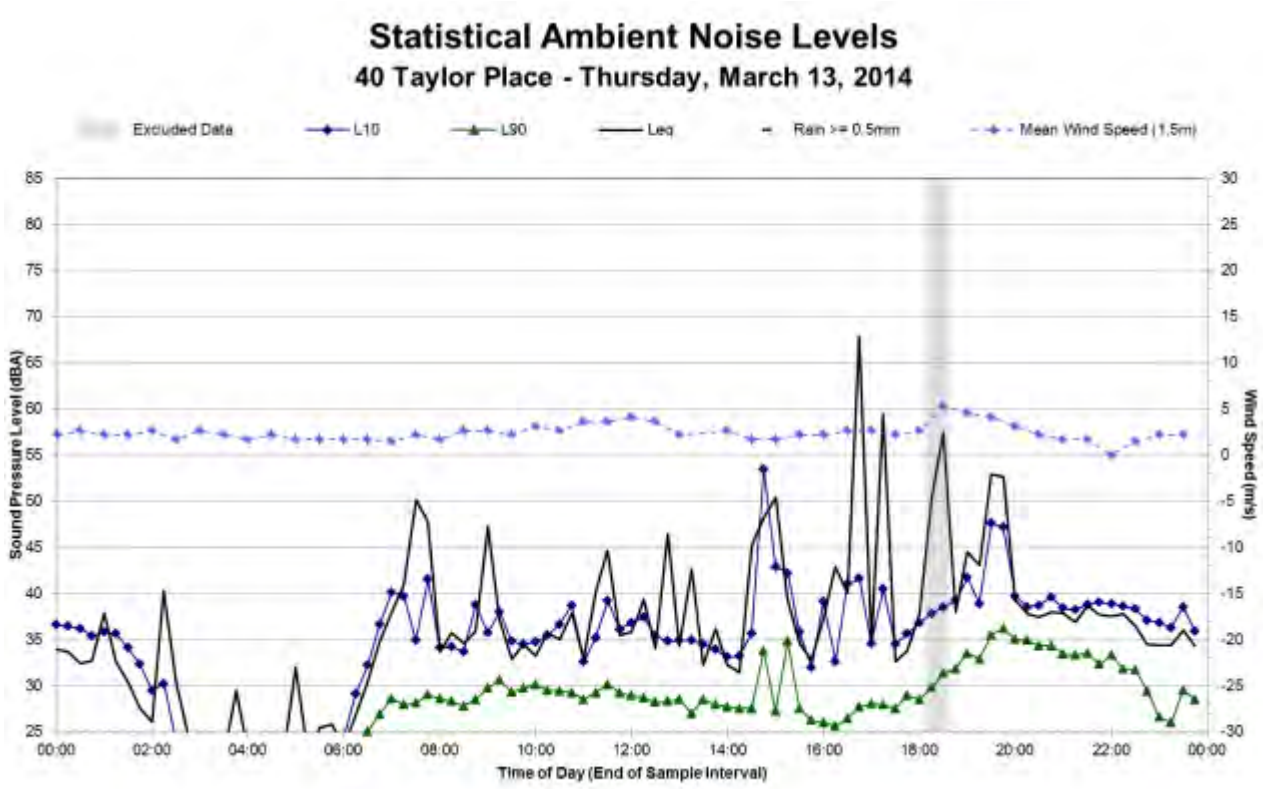

Statistical Ambient Noise Levels
40 Taylor Place - Saturday, March 08, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

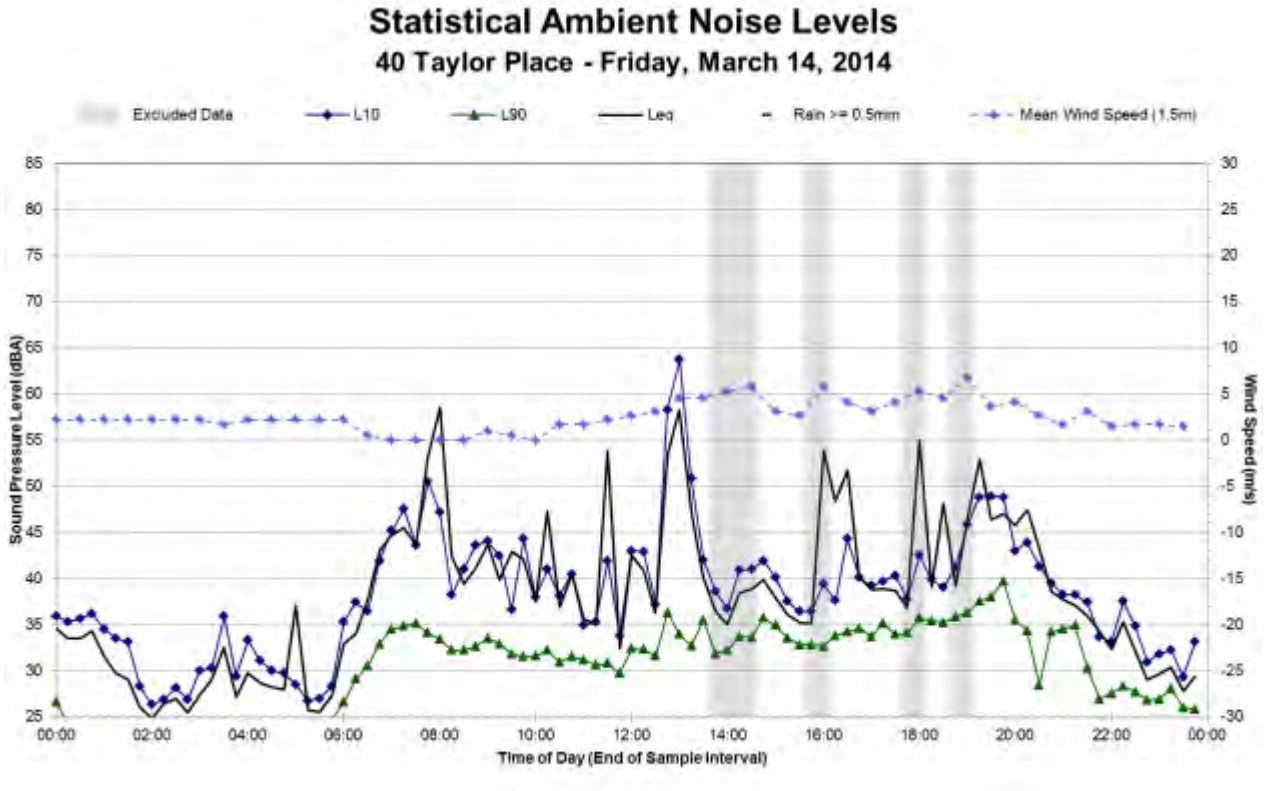

Statistical Ambient Noise Levels
40 Taylor Place - Sunday, March 09, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
40 Taylor Place - Monday, March 10, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
40 Taylor Place - Tuesday, March 11, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
40 Taylor Place - Wednesday, March 12, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
40 Taylor Place - Thursday, March 13, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
40 Taylor Place - Friday, March 14, 2014
Excluded Data
L10
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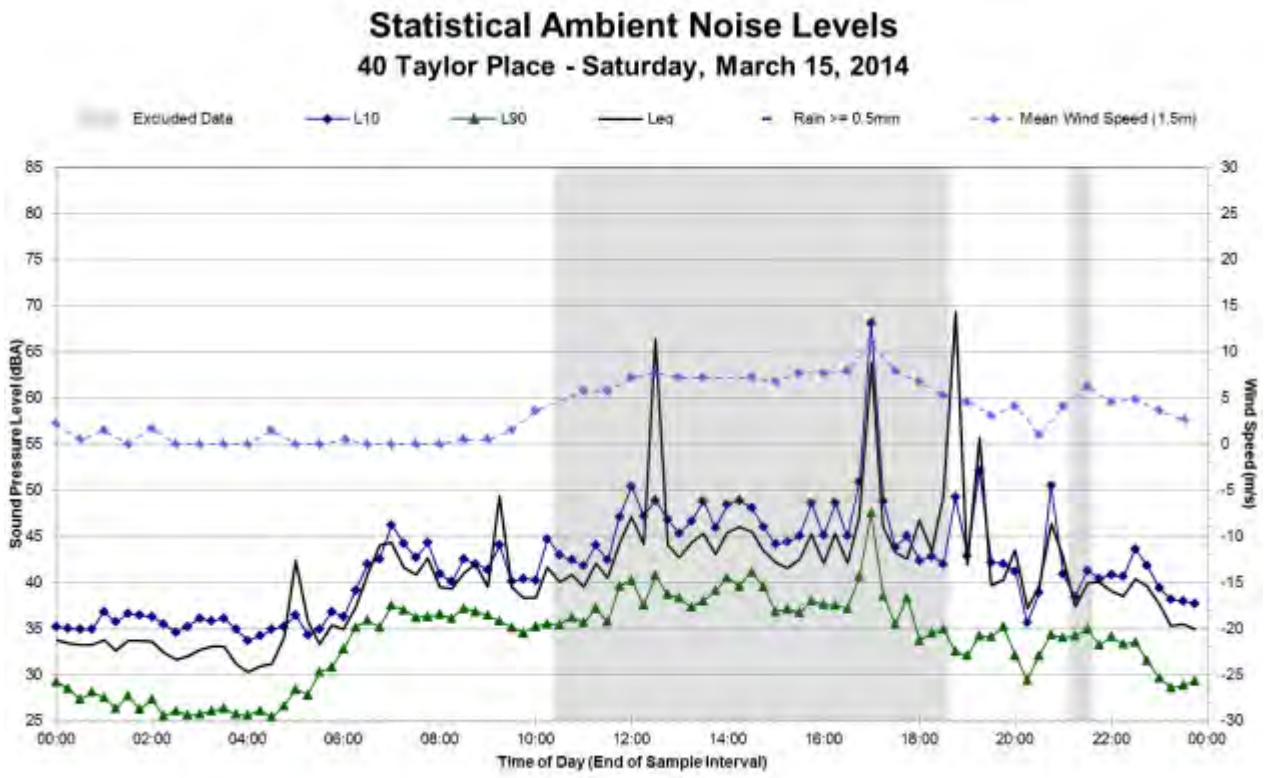
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
40 Taylor Place - Saturday, March 15, 2014
Excluded Data
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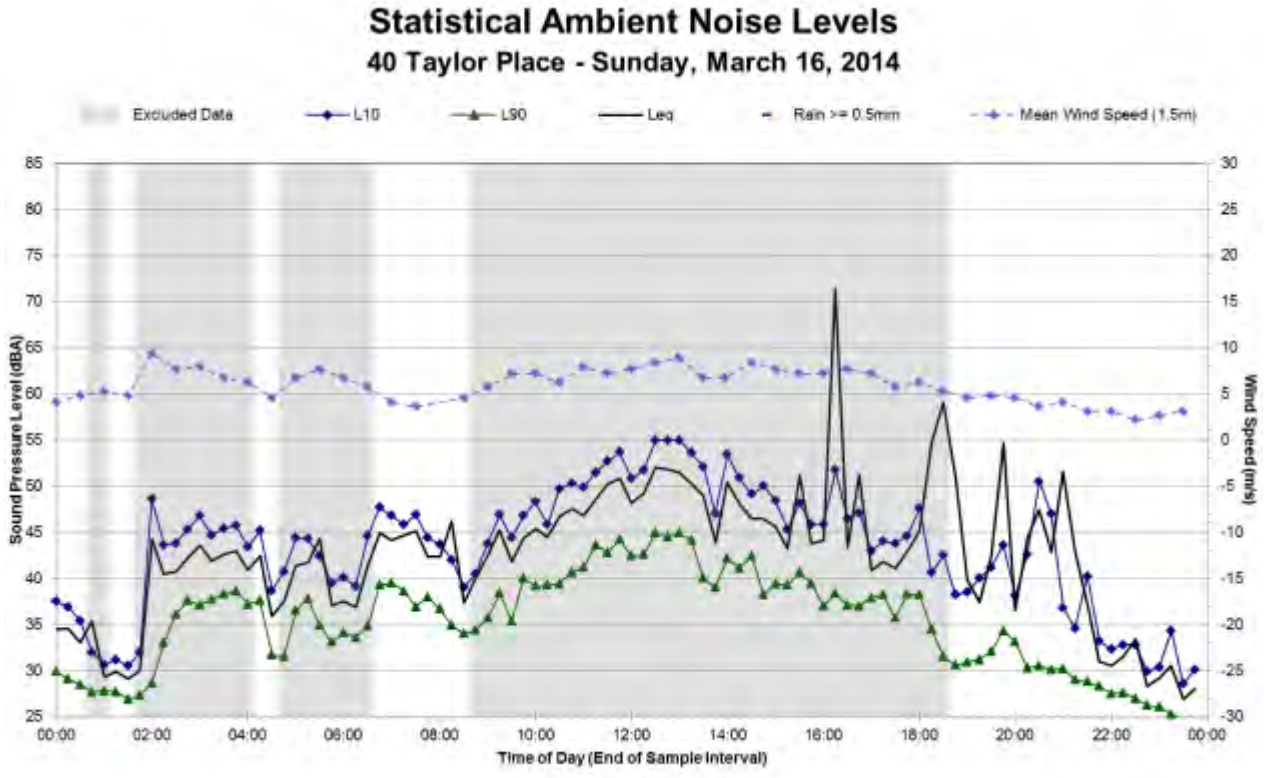
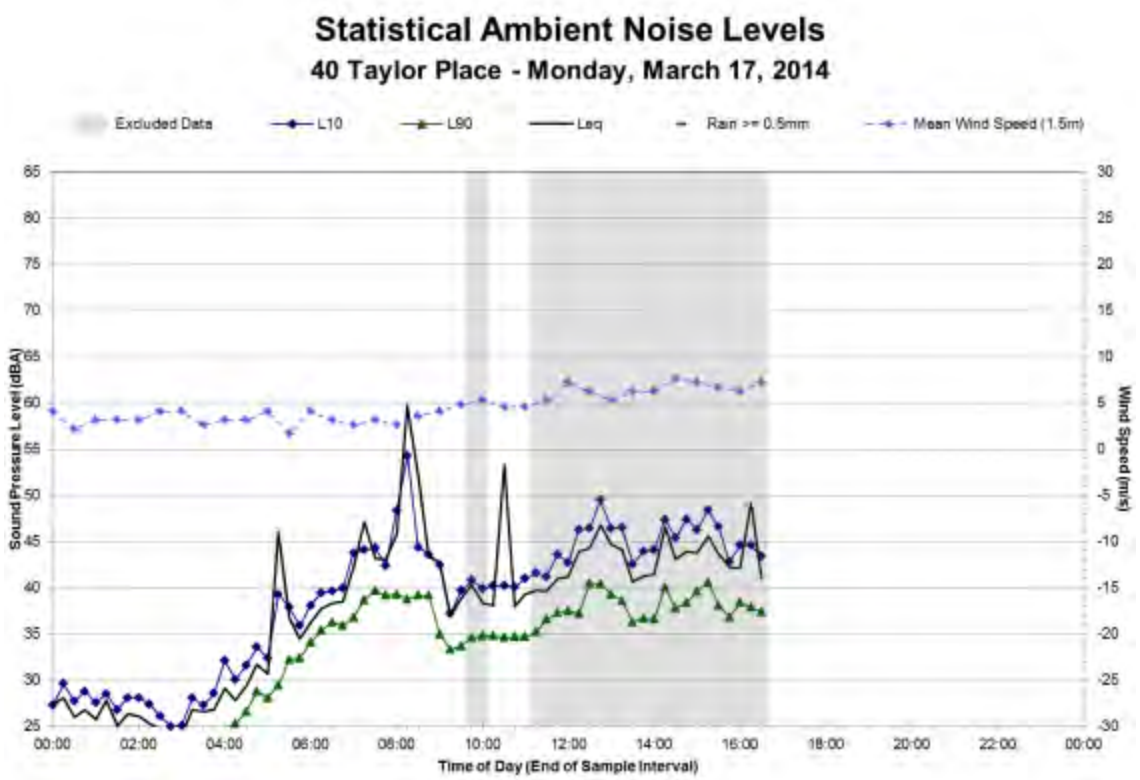
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
40 Taylor Place - Sunday, March 16, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
40 Taylor Place - Monday, March 17, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)
00:00
02:00
04:00
06:00
08:00
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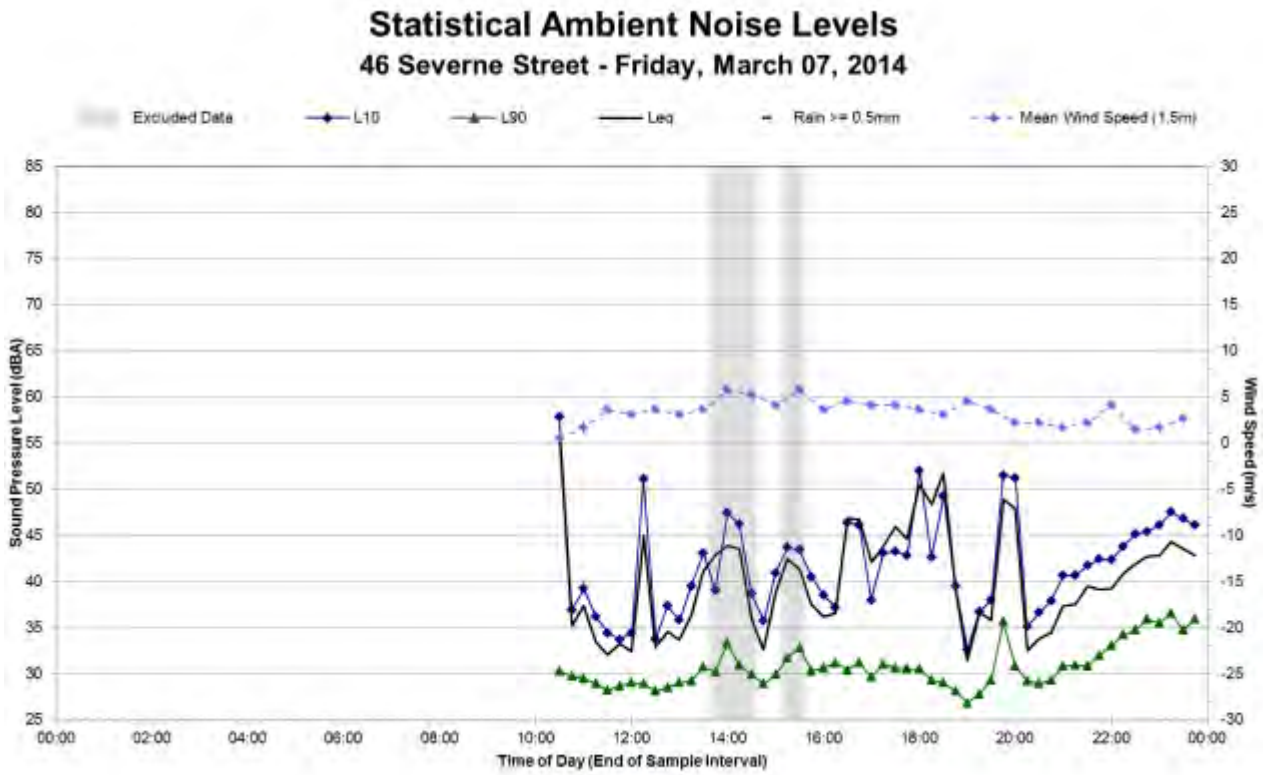
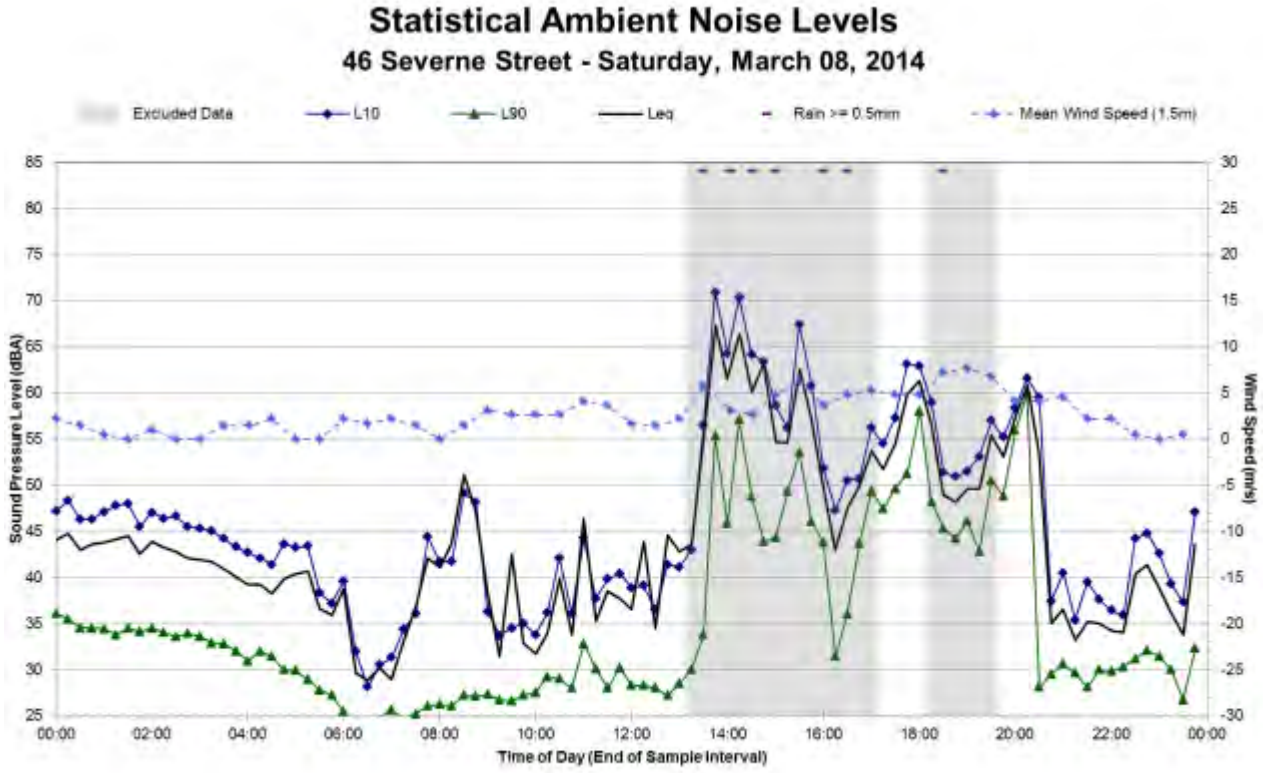
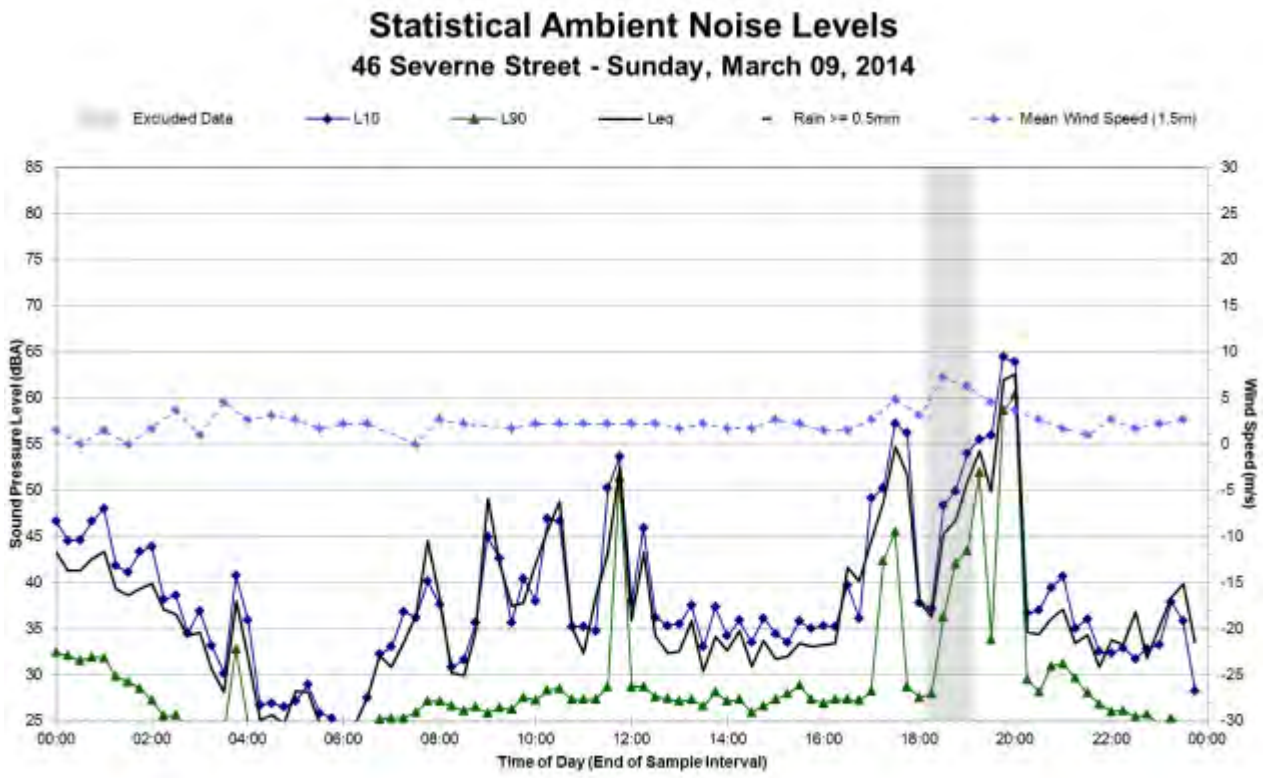
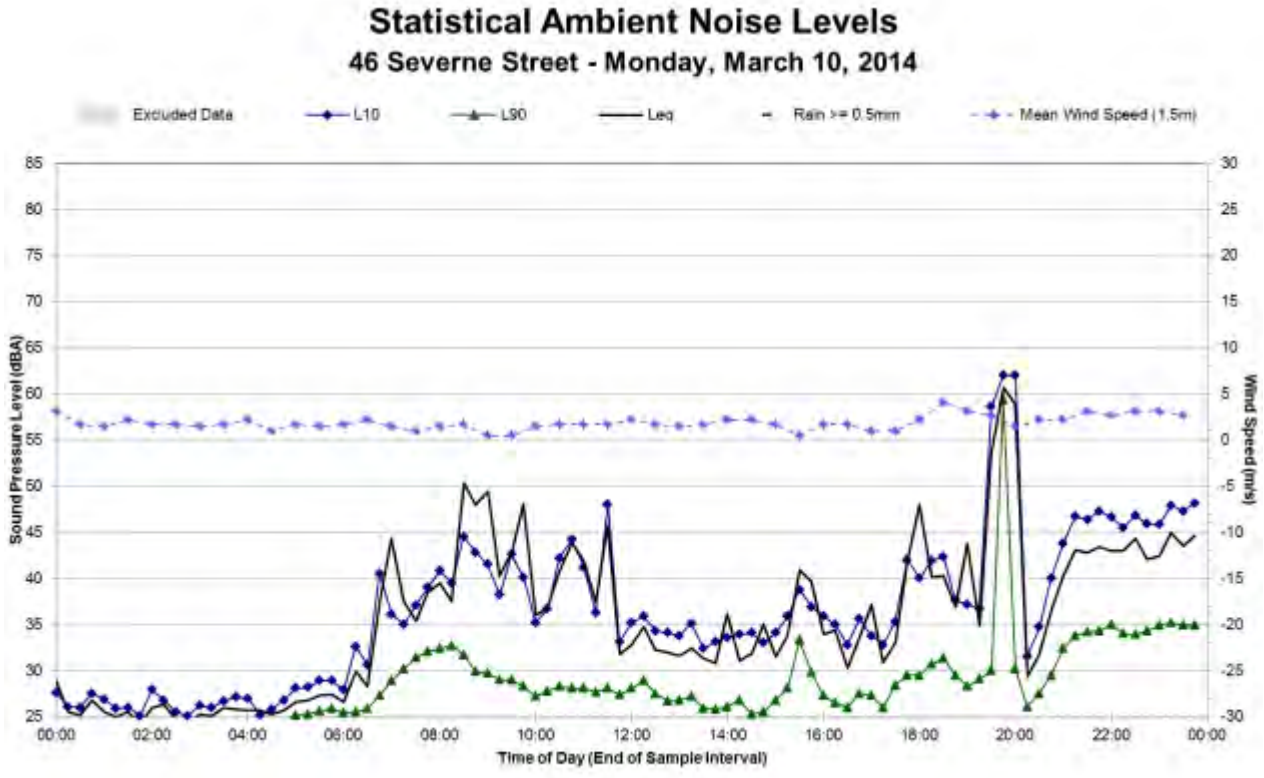
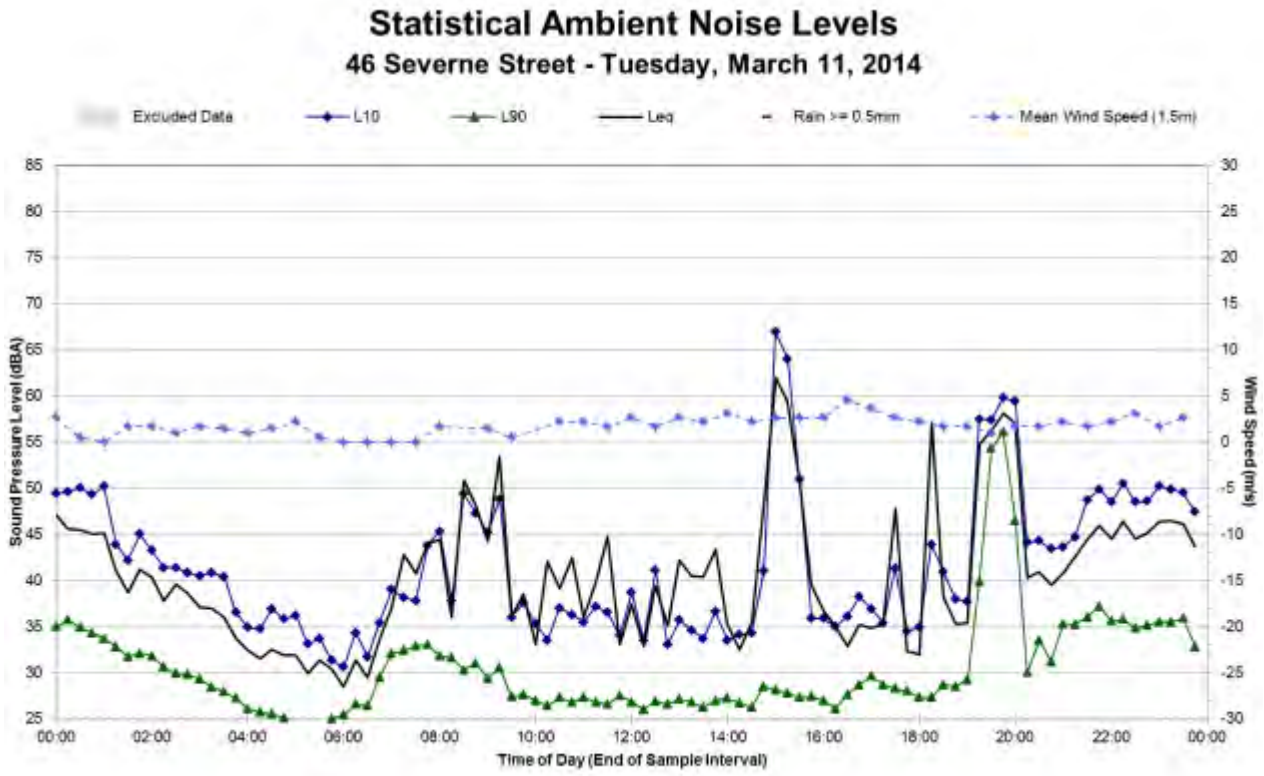
12:00
14:00
16:00
18:00
20:00
22:00
00:00

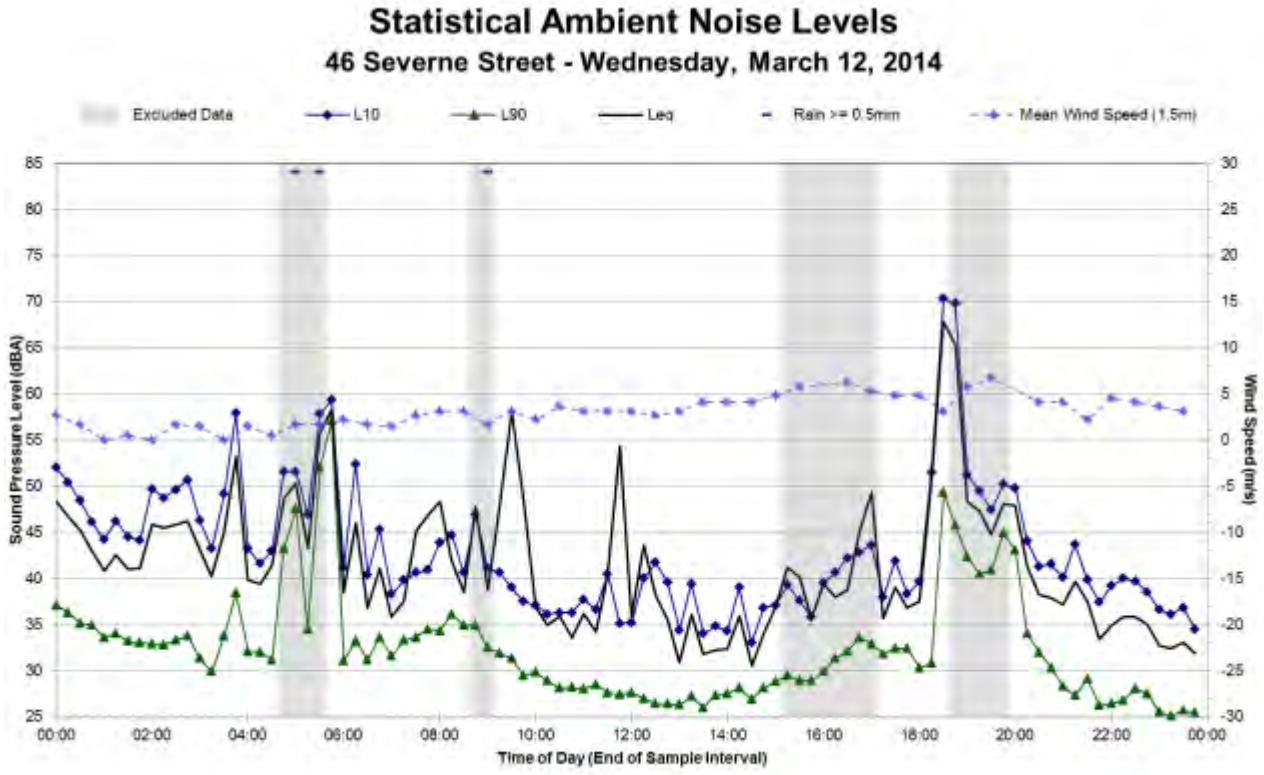

Statistical Ambient Noise Levels
46 Severne Street - Friday, March 07, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

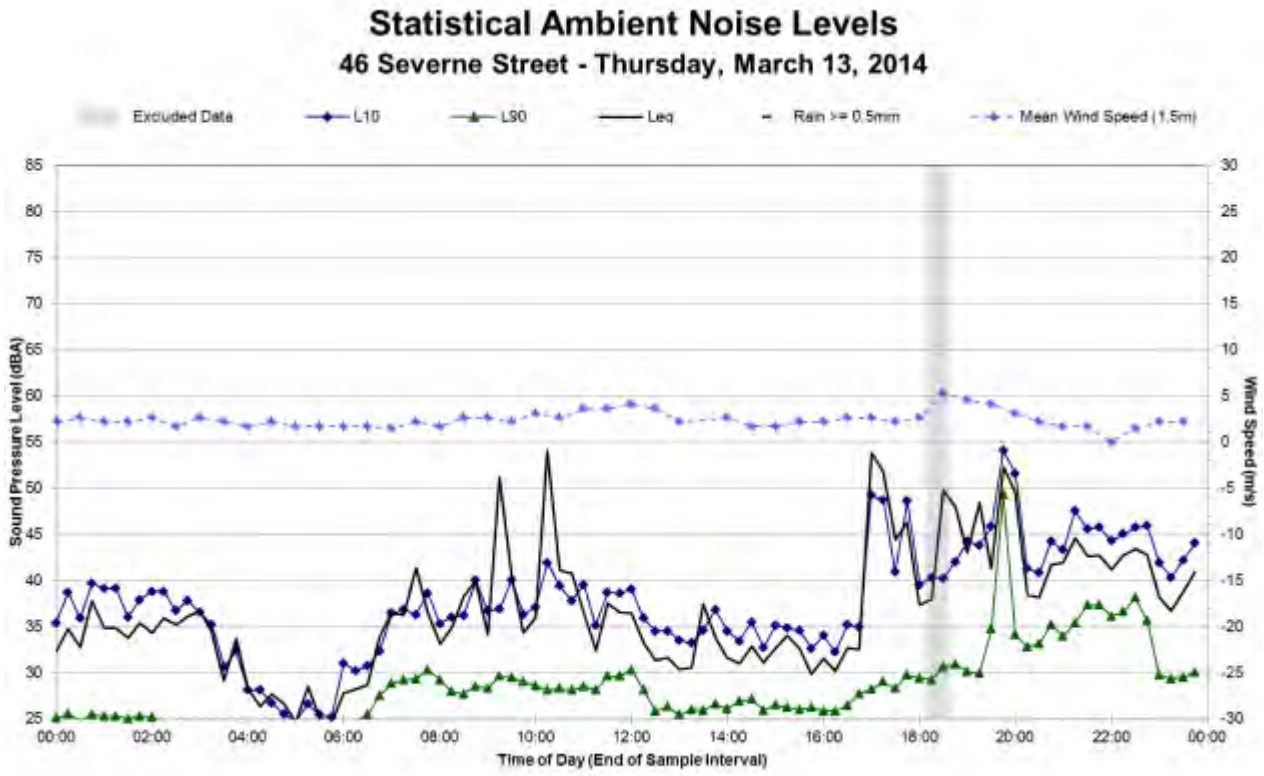

Statistical Ambient Noise Levels
46 Severne Street - Saturday, March 08, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

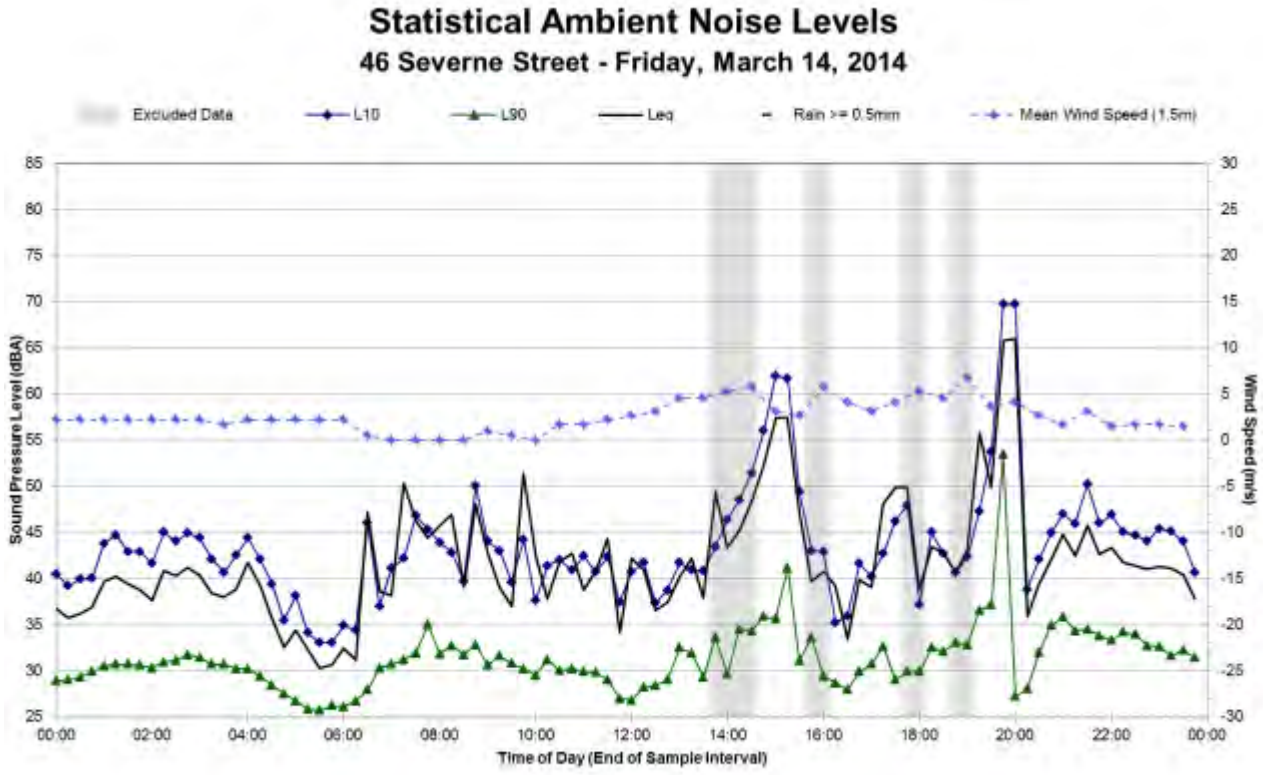

Statistical Ambient Noise Levels
46 Severne Street - Sunday, March 09, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

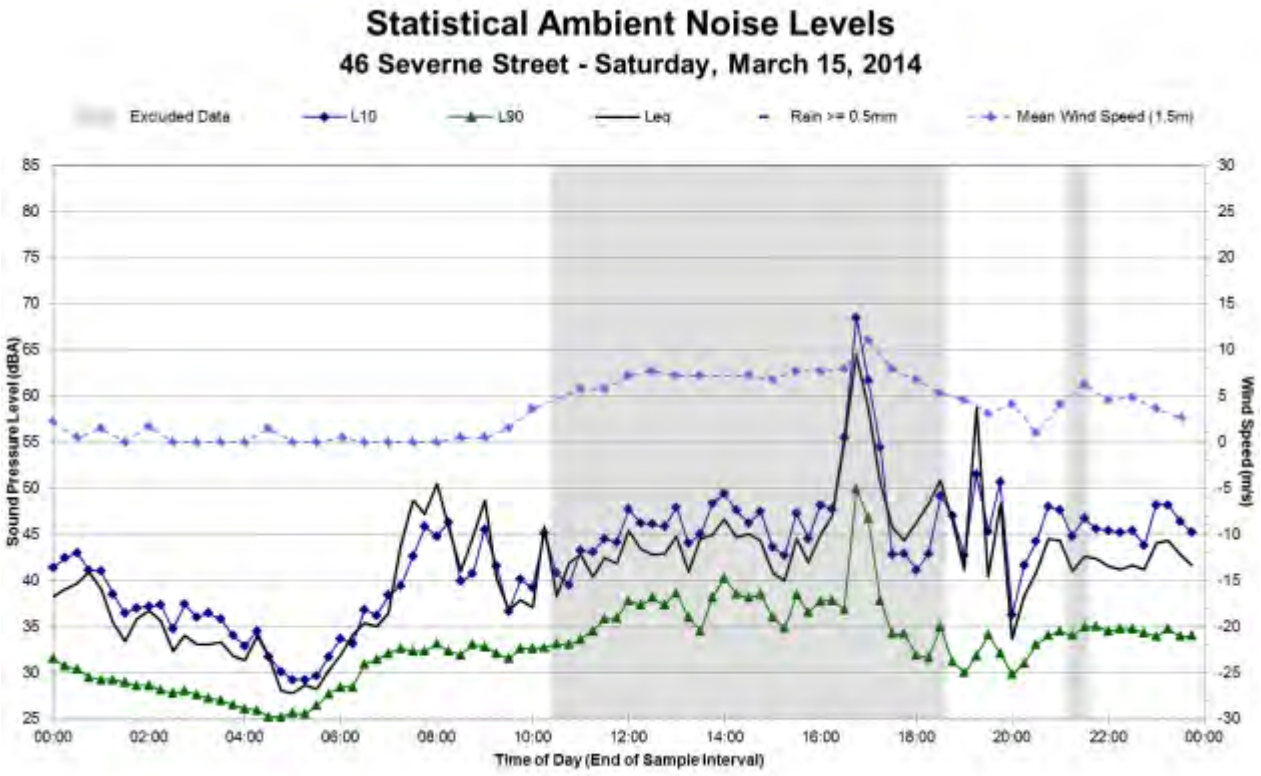

Statistical Ambient Noise Levels
46 Severne Street - Monday, March 10, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

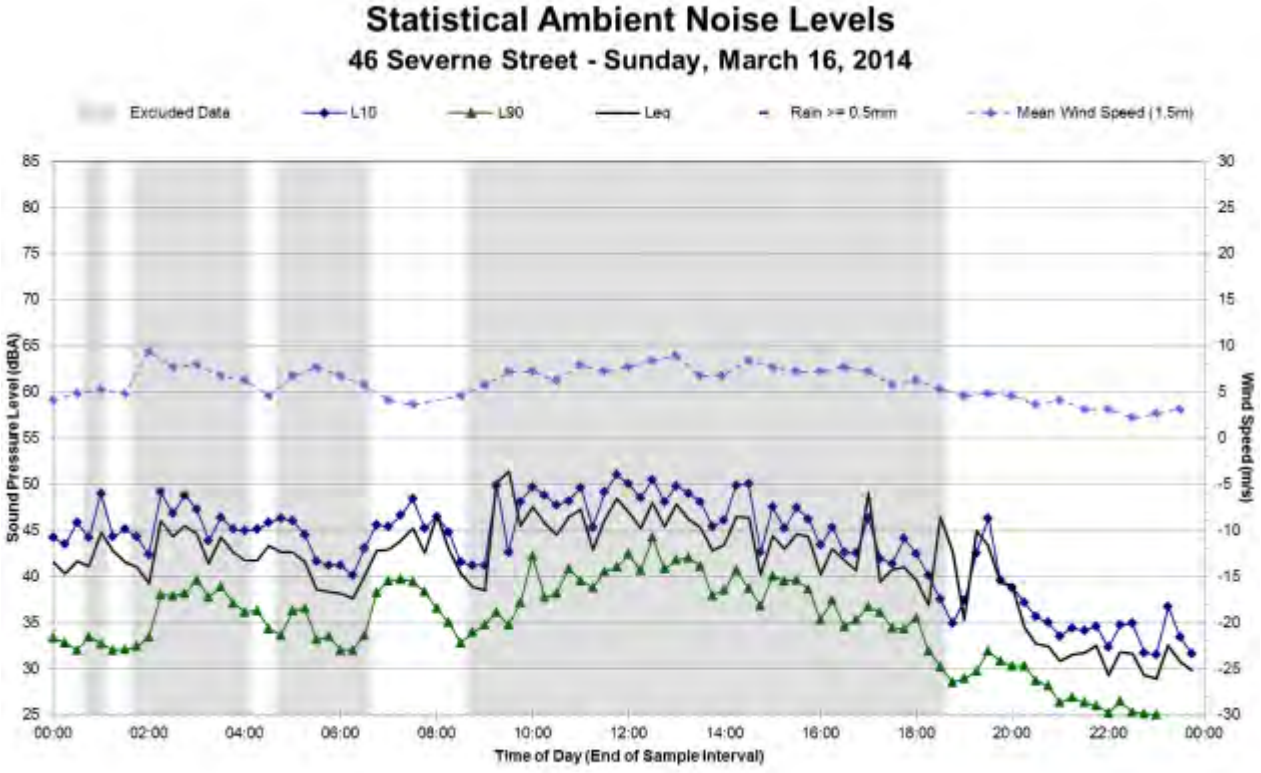

Statistical Ambient Noise Levels
46 Severne Street - Tuesday, March 11, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

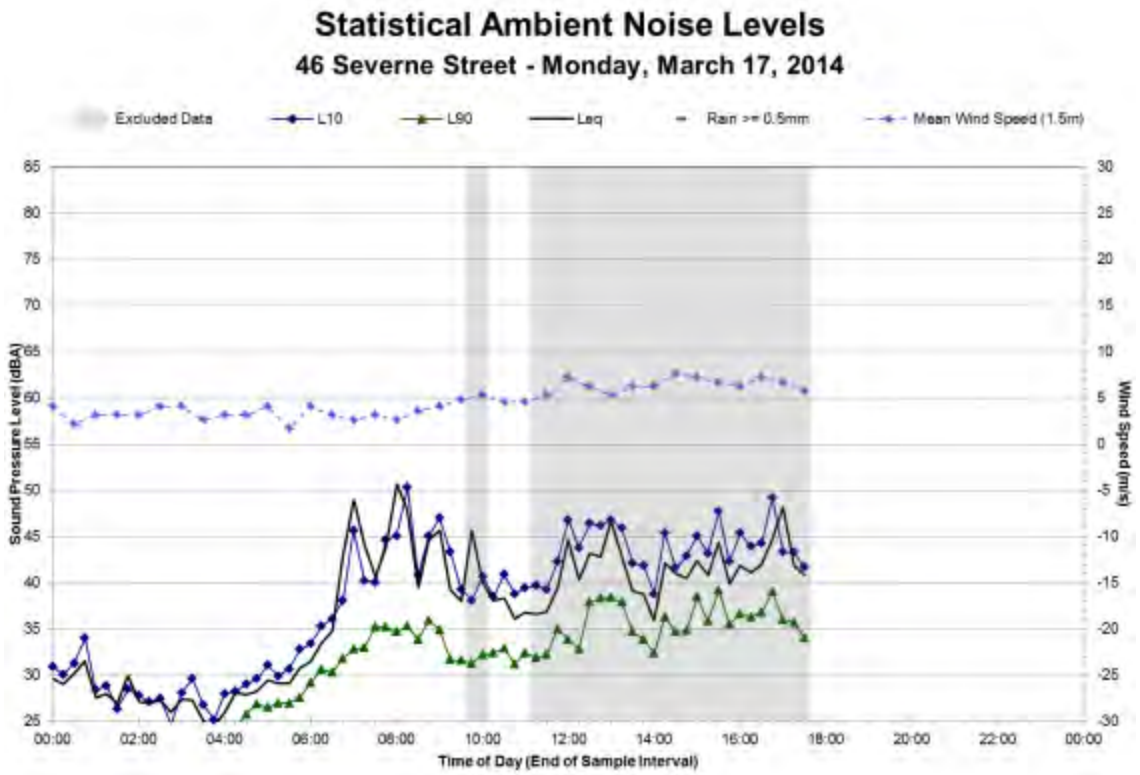

Statistical Ambient Noise Levels
46 Severne Street - Wednesday, March 12, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

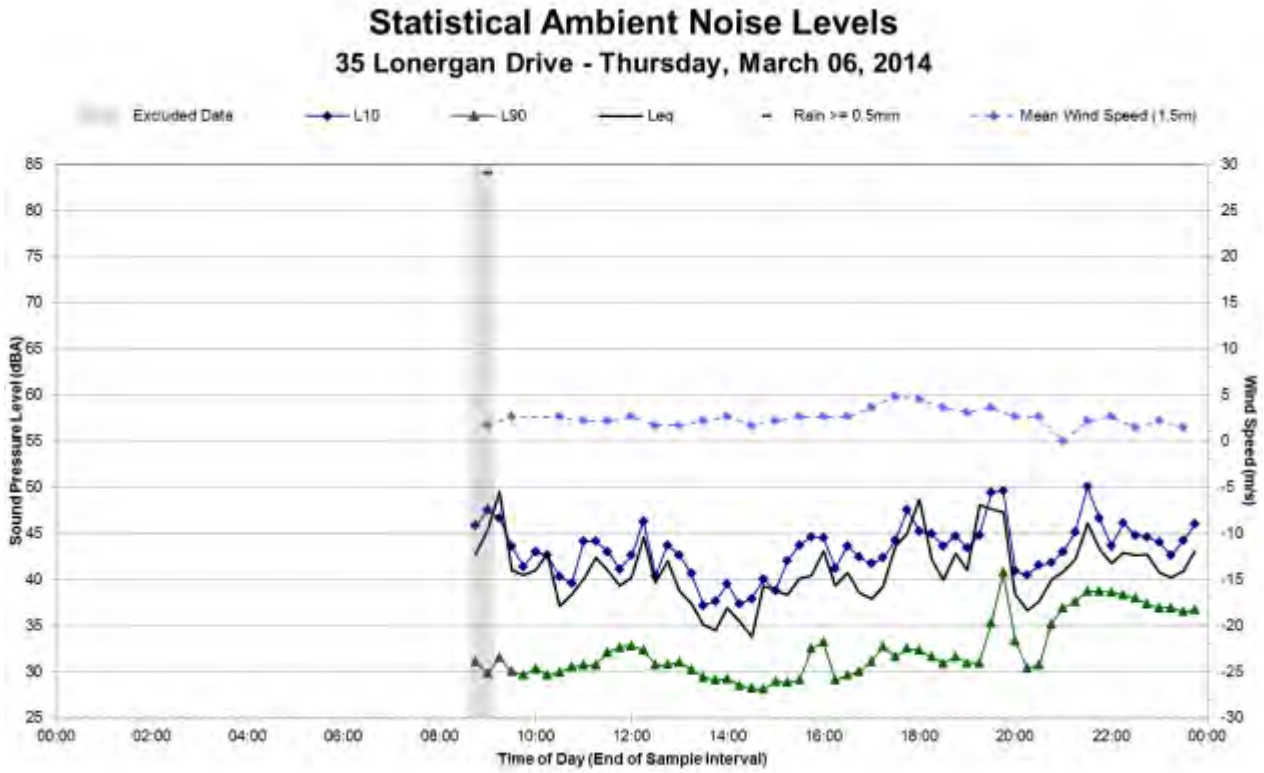

Statistical Ambient Noise Levels
46 Severne Street - Thursday, March 13, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

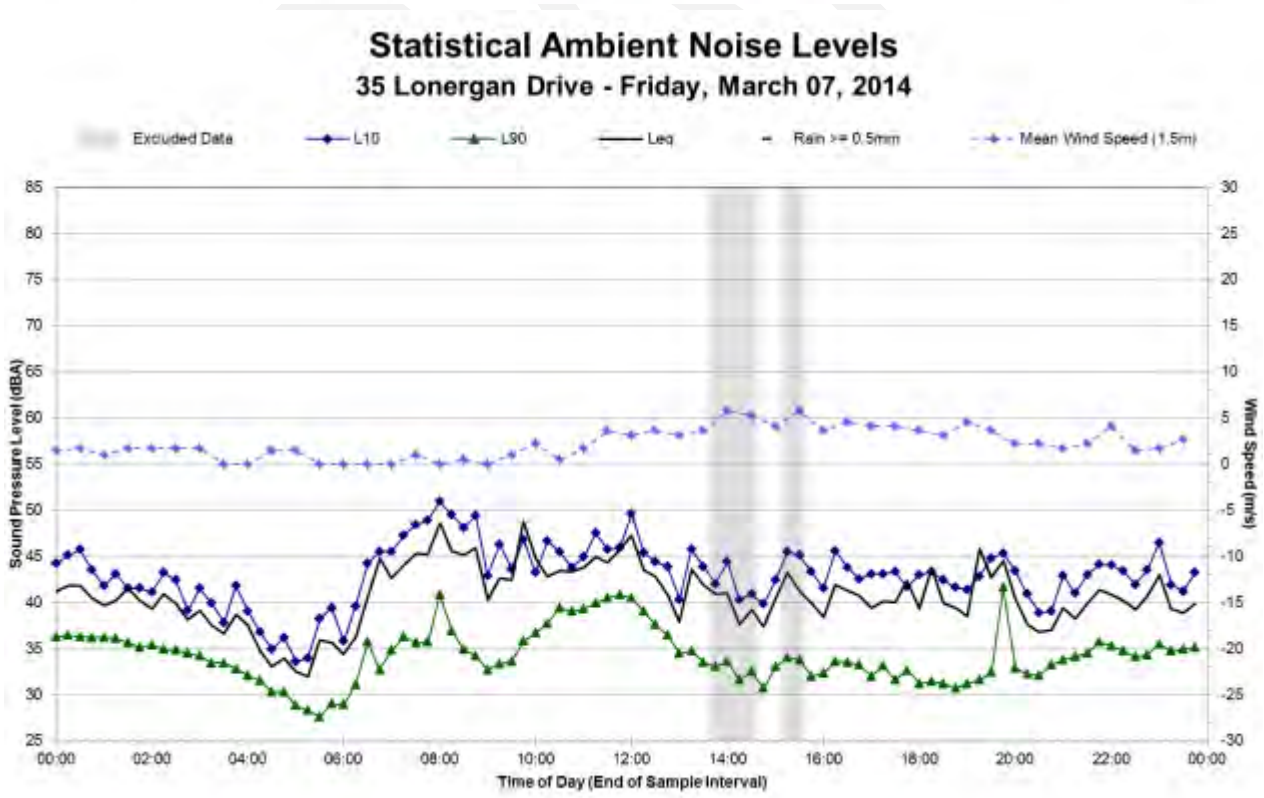

Statistical Ambient Noise Levels
46 Severne Street - Friday, March 14, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

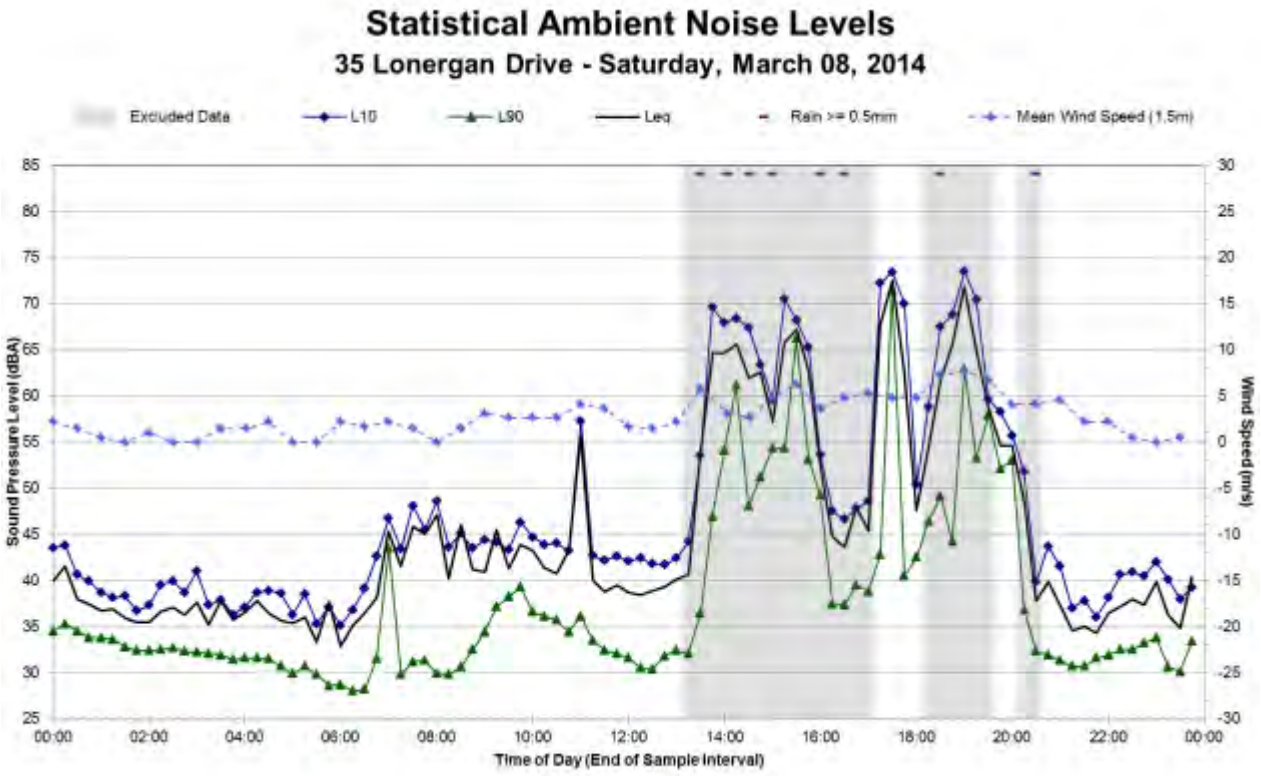

Statistical Ambient Noise Levels
46 Severne Street - Saturday, March 15, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

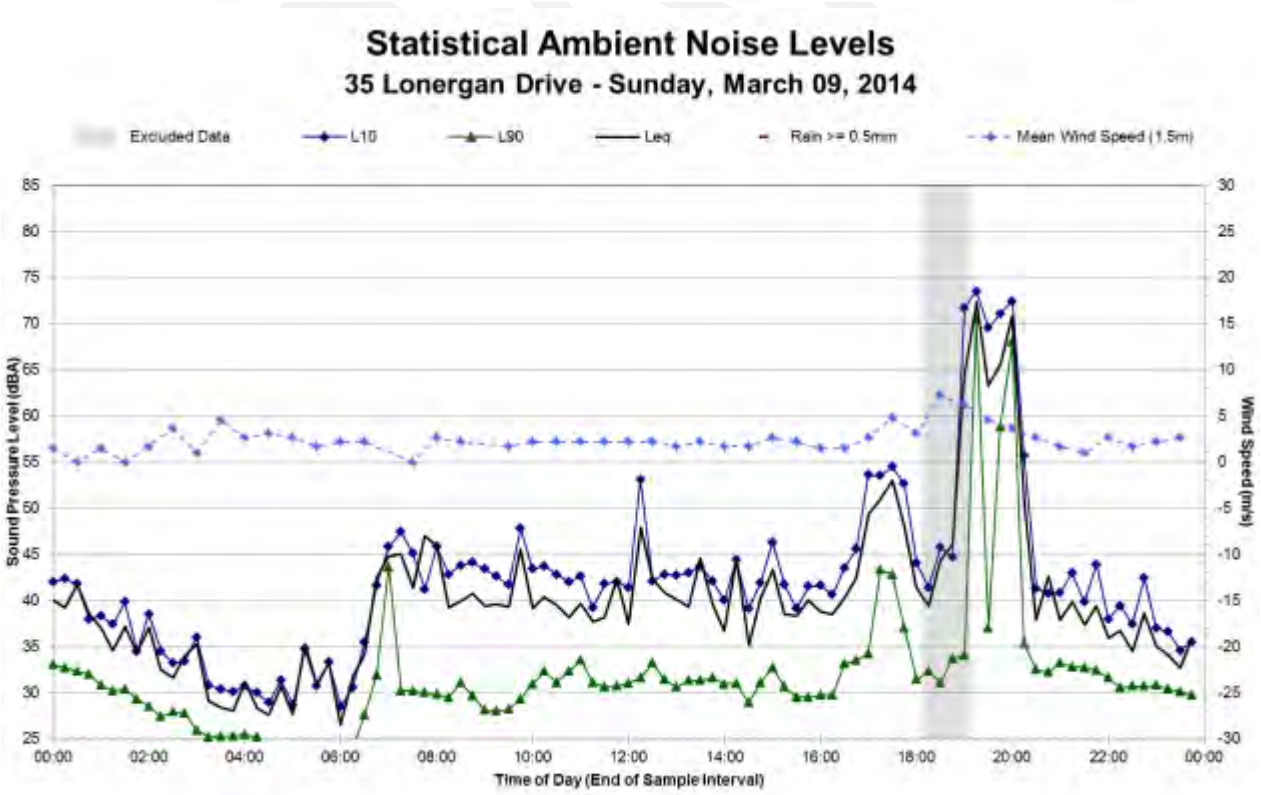

Statistical Ambient Noise Levels
46 Severne Street - Sunday, March 16, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

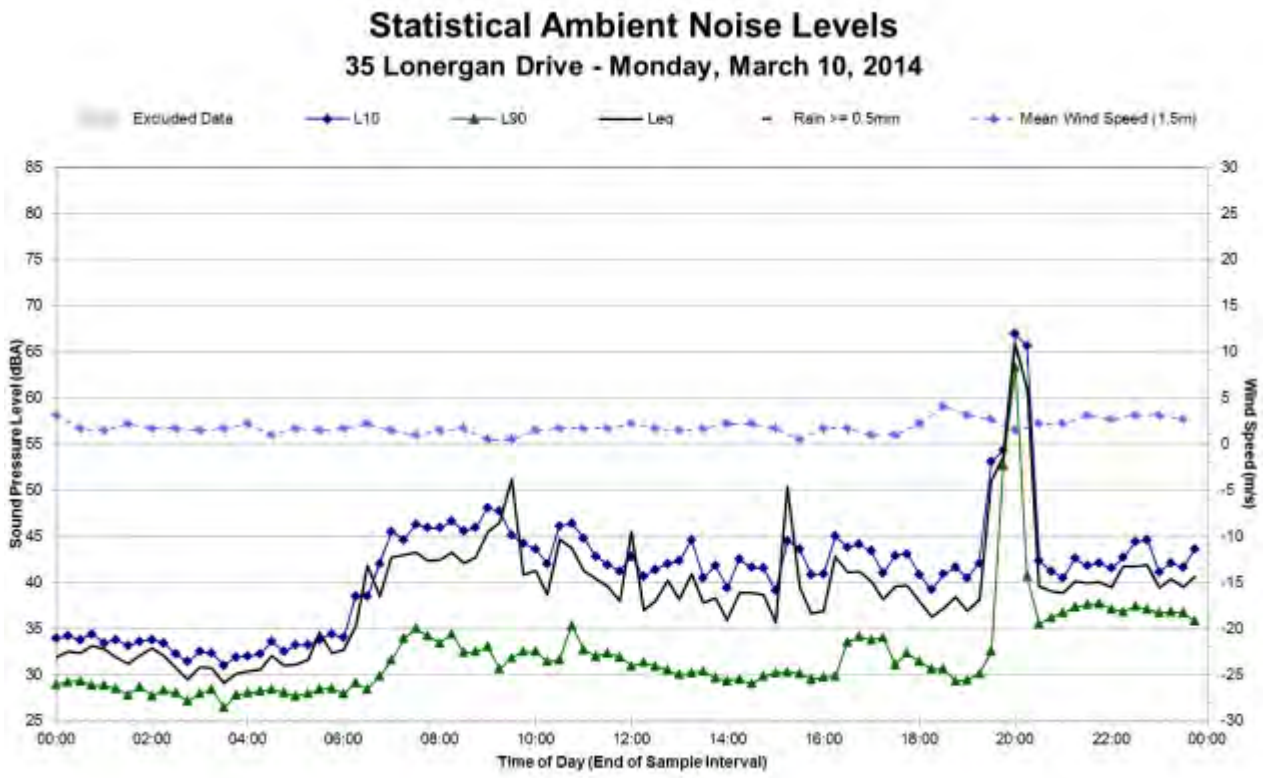

Statistical Ambient Noise Levels
46 Severne Street - Monday, March 17, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

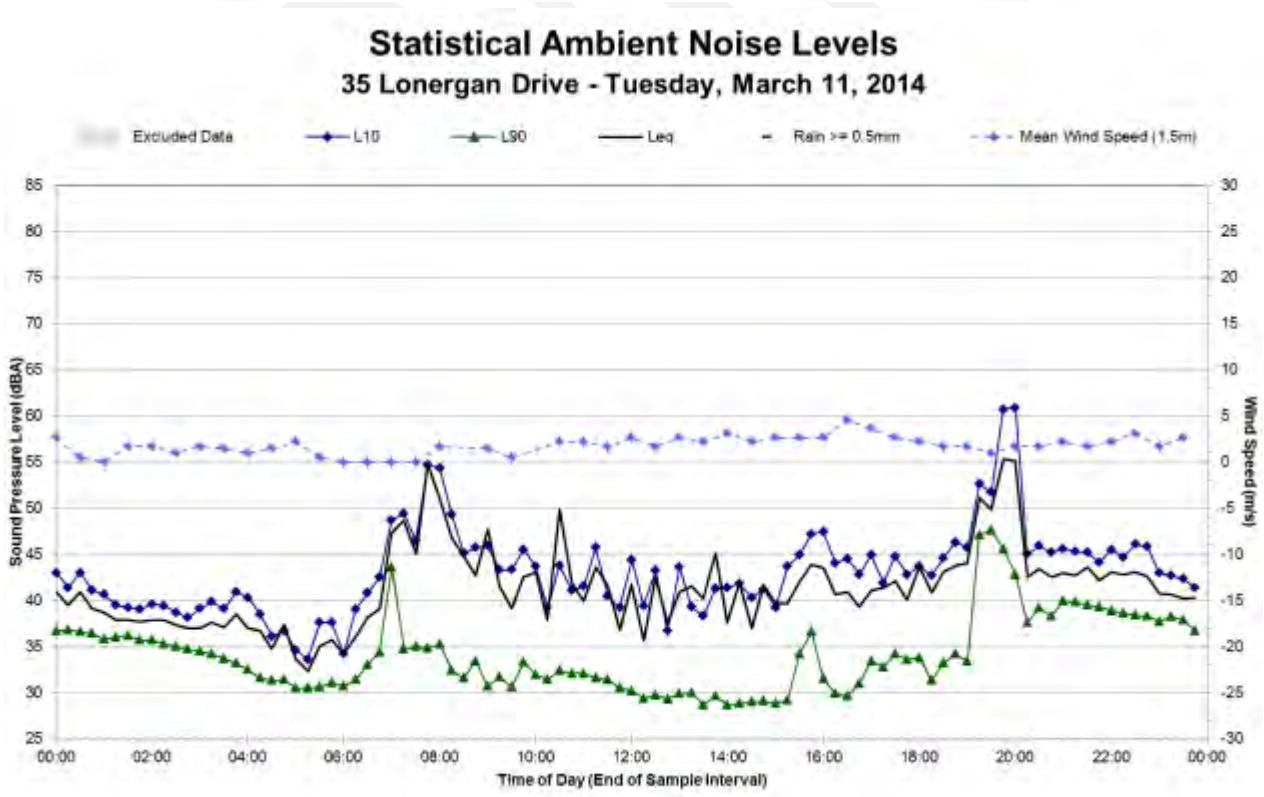

Statistical Ambient Noise Levels
35 Lonergan Drive - Thursday, March 06, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

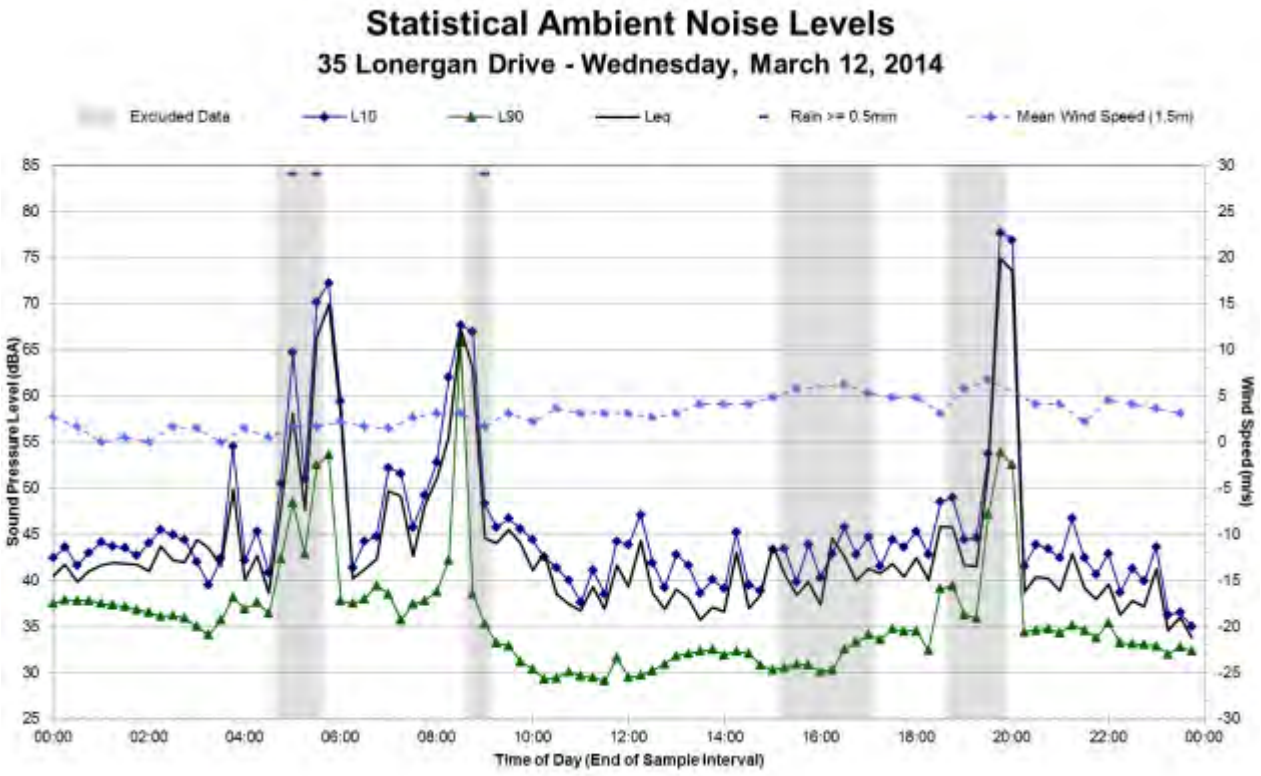

Statistical Ambient Noise Levels
35 Lonergan Drive - Friday, March 07, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

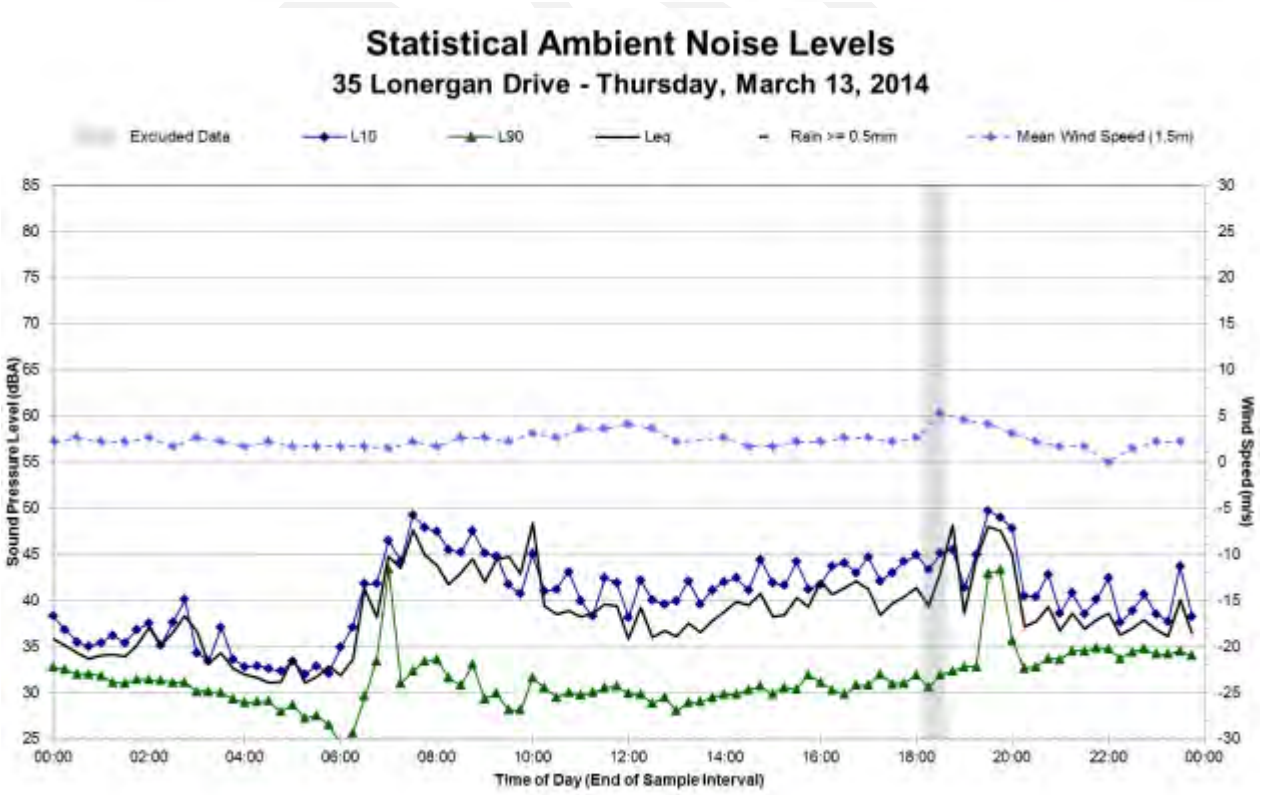

Statistical Ambient Noise Levels
35 Lonergan Drive - Saturday, March 08, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

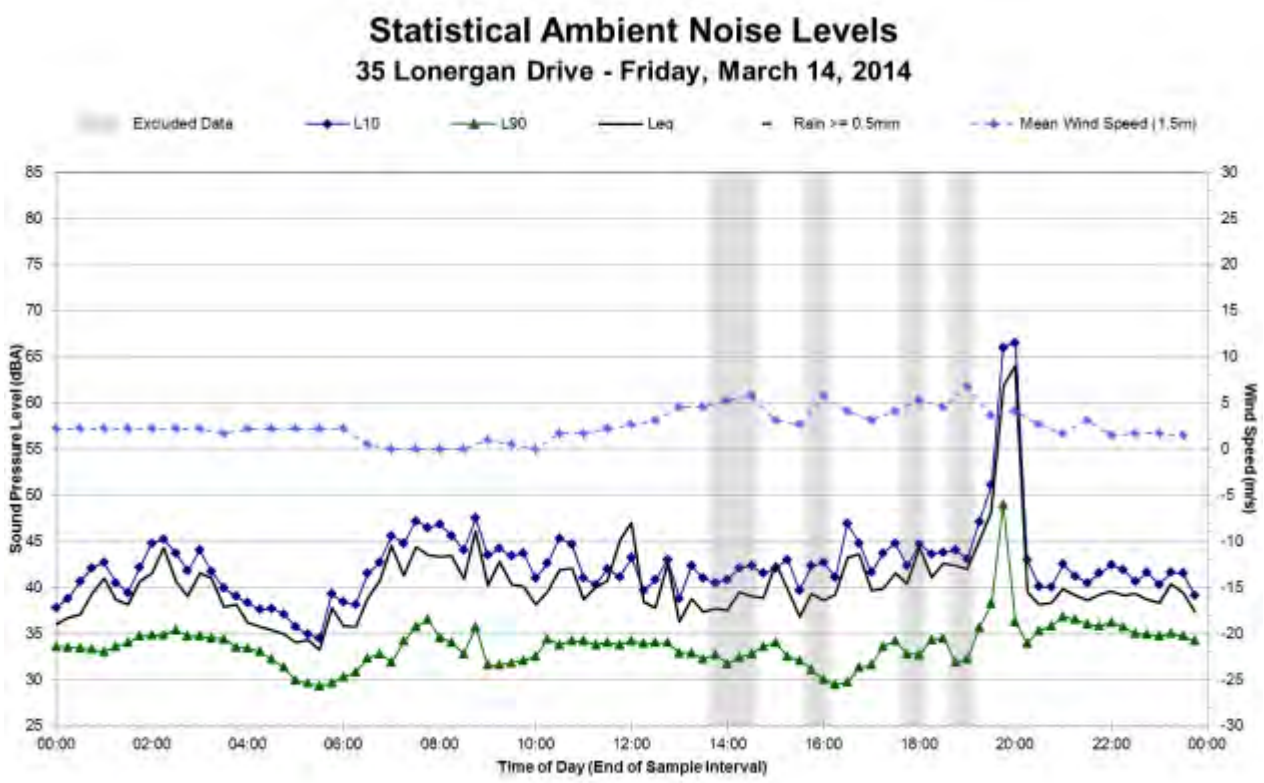

Statistical Ambient Noise Levels
35 Lonergan Drive - Sunday, March 09, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

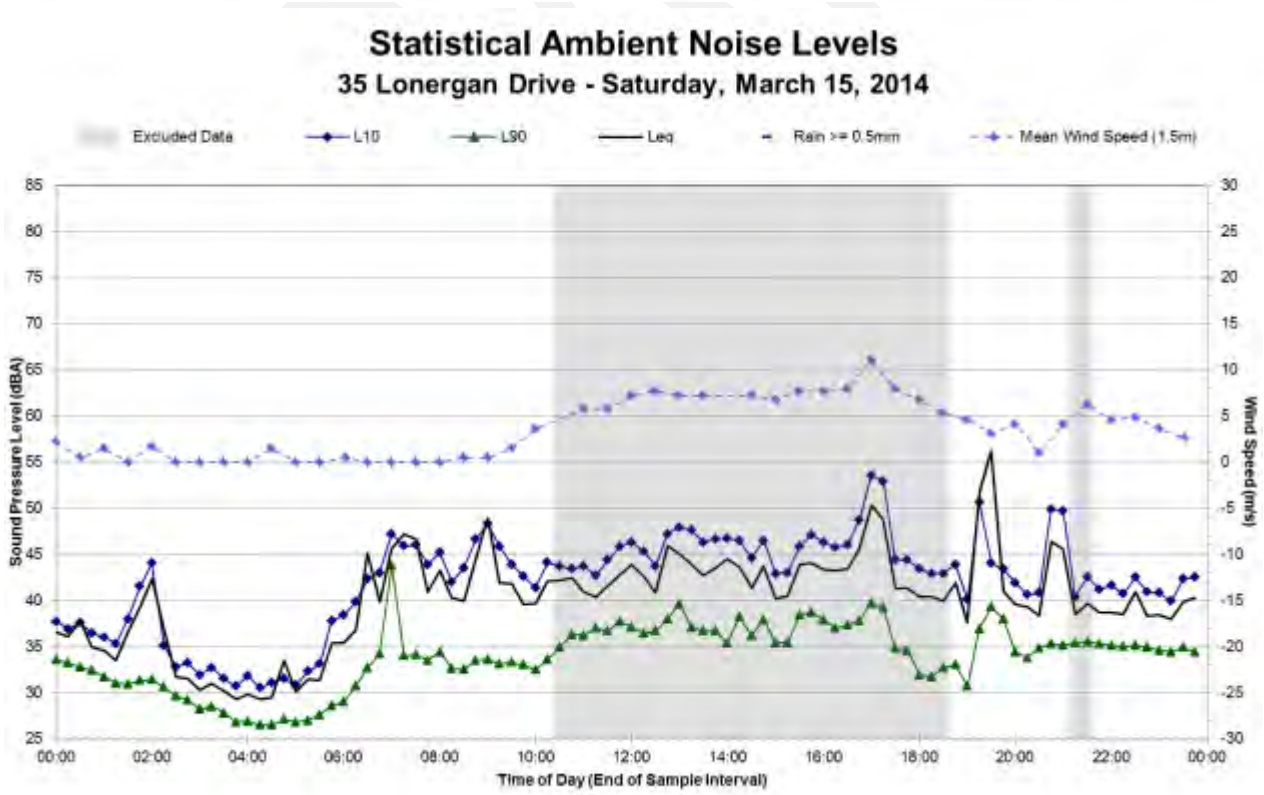

Statistical Ambient Noise Levels
35 Lonergan Drive - Monday, March 10, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

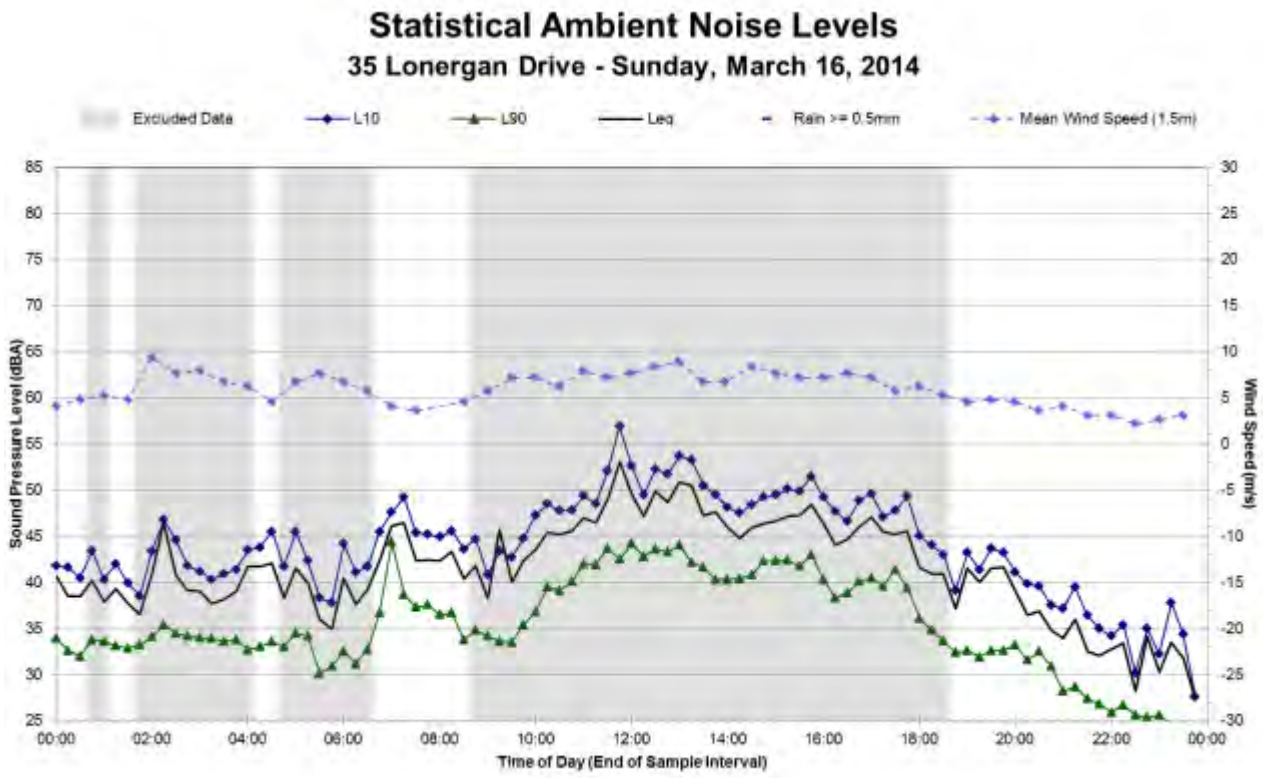

Statistical Ambient Noise Levels
35 Lonergan Drive - Tuesday, March 11, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

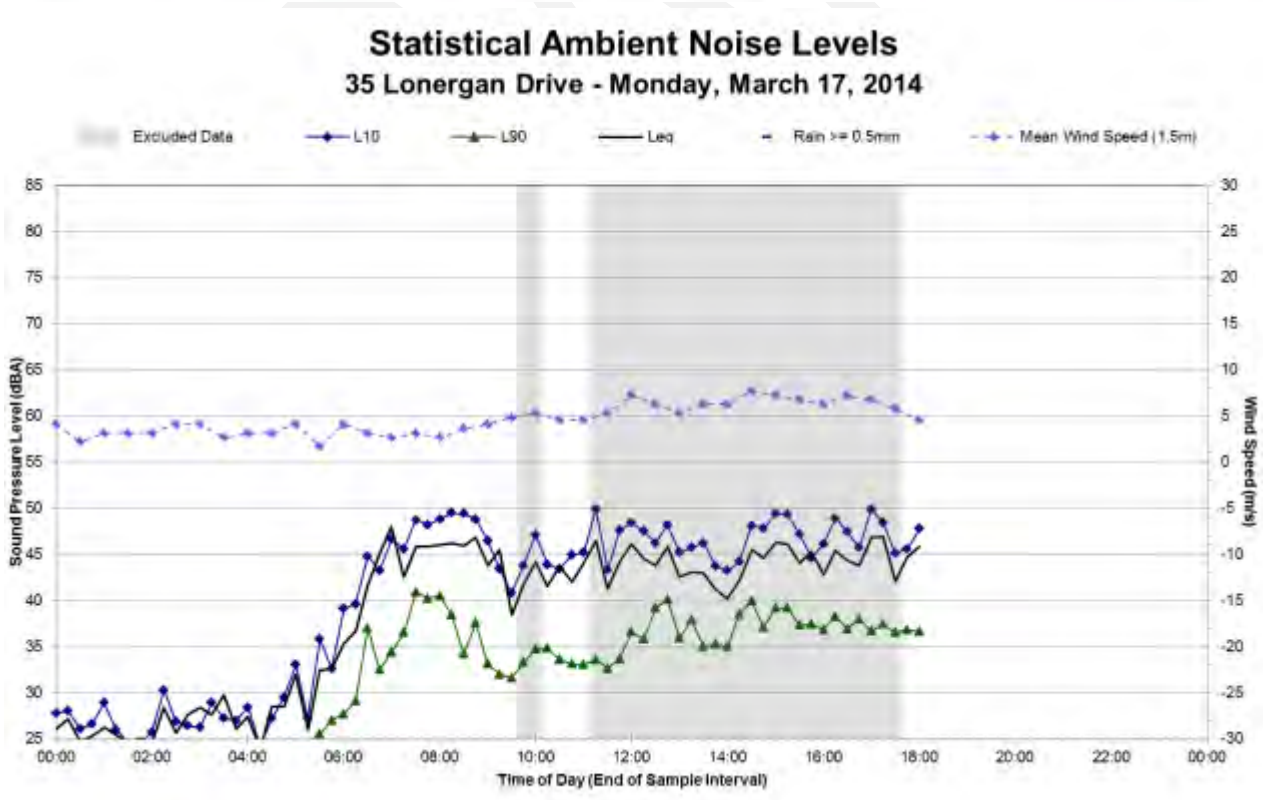

Statistical Ambient Noise Levels
35 Lonergan Drive - Wednesday, March 12, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

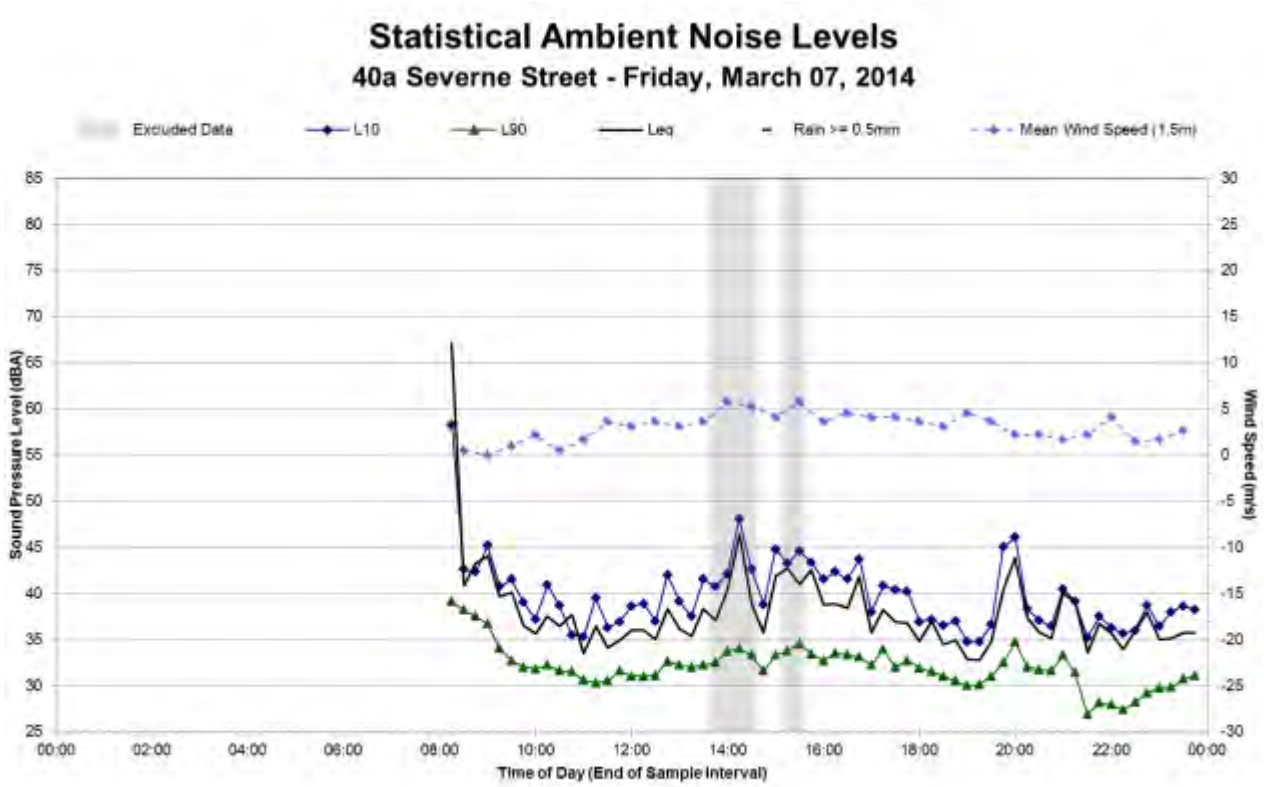

Statistical Ambient Noise Levels
35 Lonergan Drive - Thursday, March 13, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

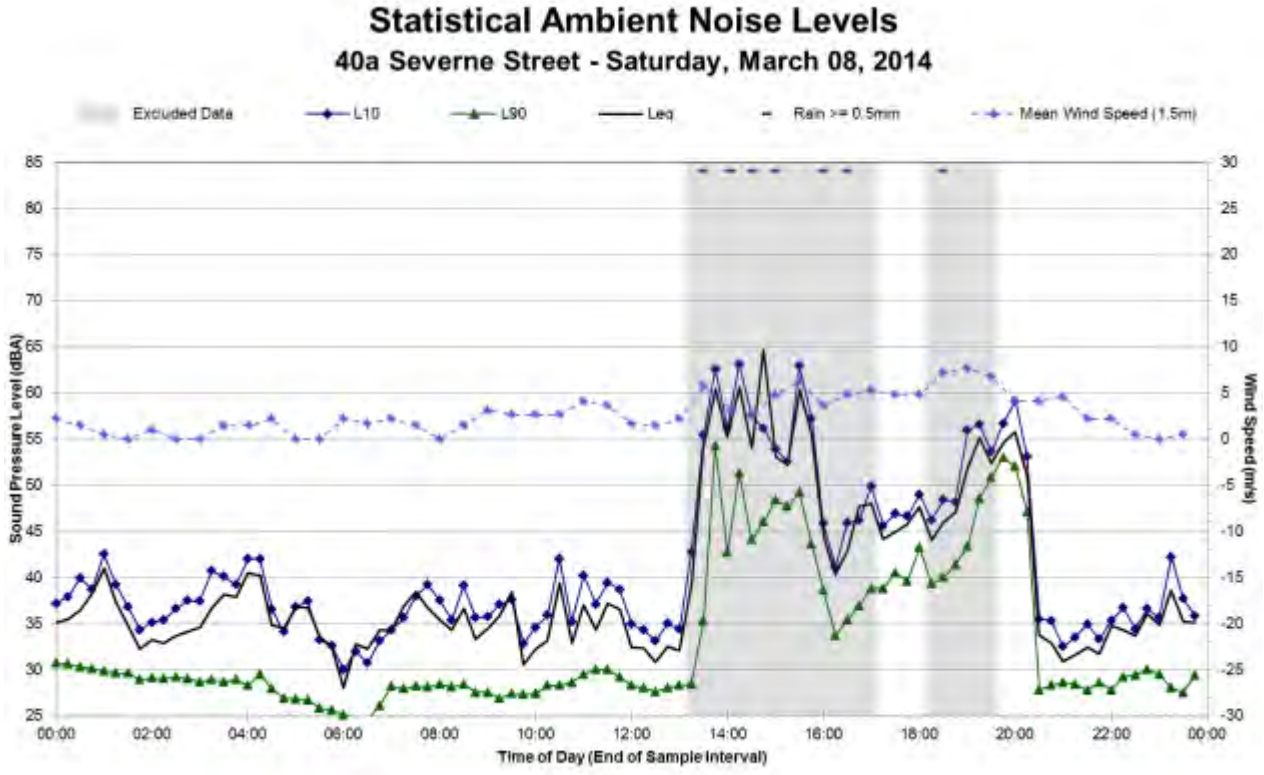

Statistical Ambient Noise Levels
35 Lonergan Drive - Friday, March 14, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

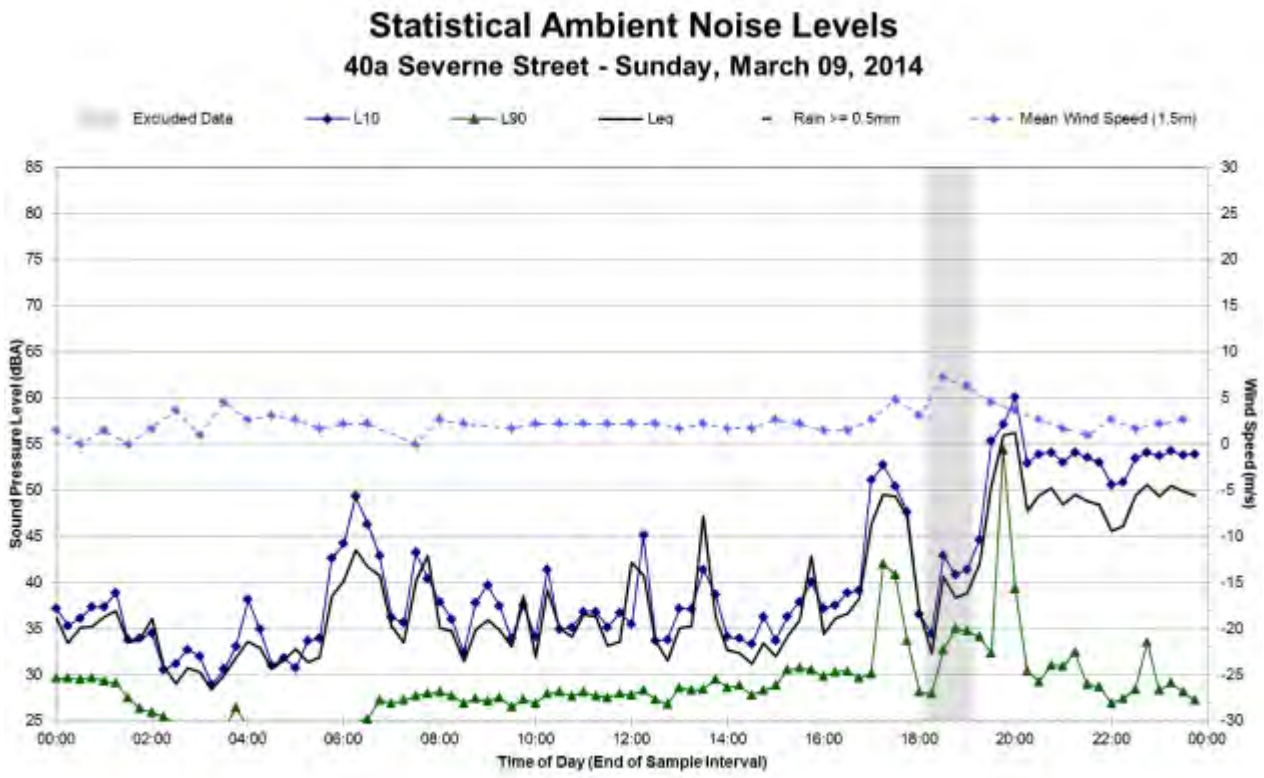

Statistical Ambient Noise Levels
35 Lonergan Drive - Saturday, March 15, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

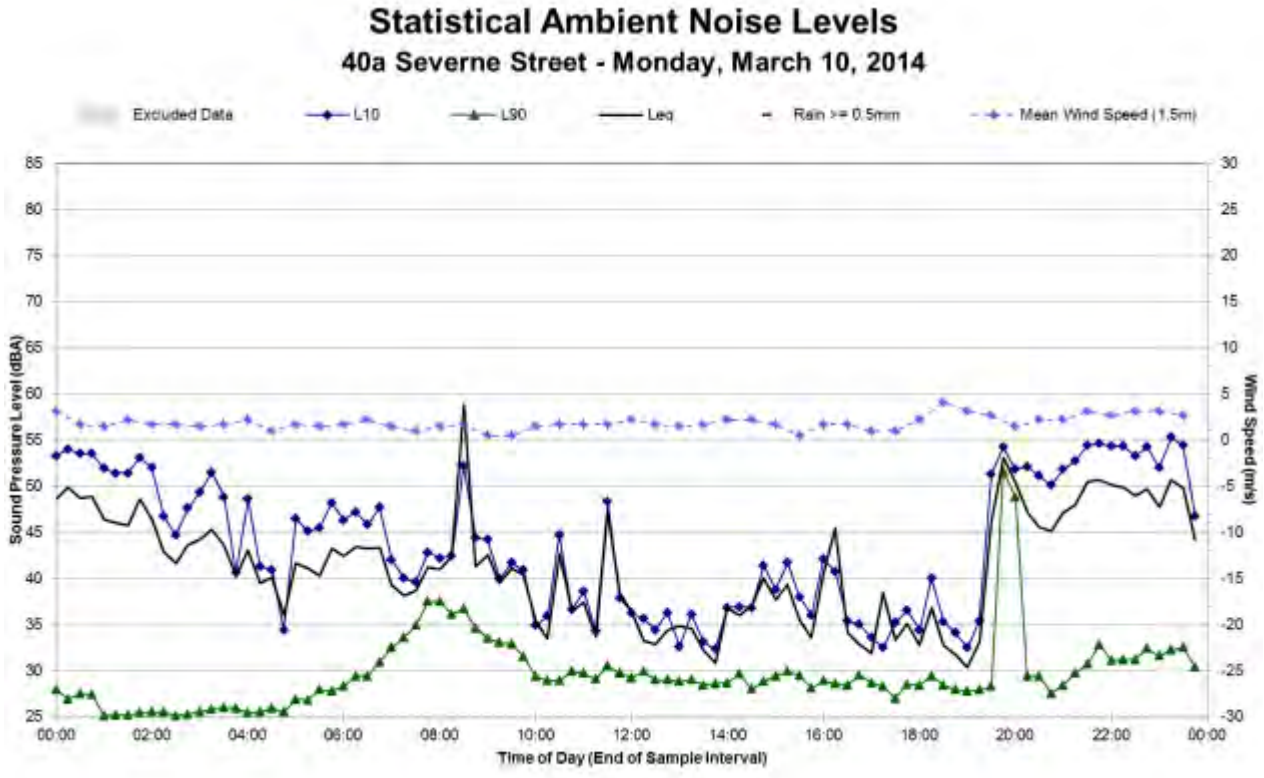

Statistical Ambient Noise Levels
35 Lonergan Drive - Sunday, March 16, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

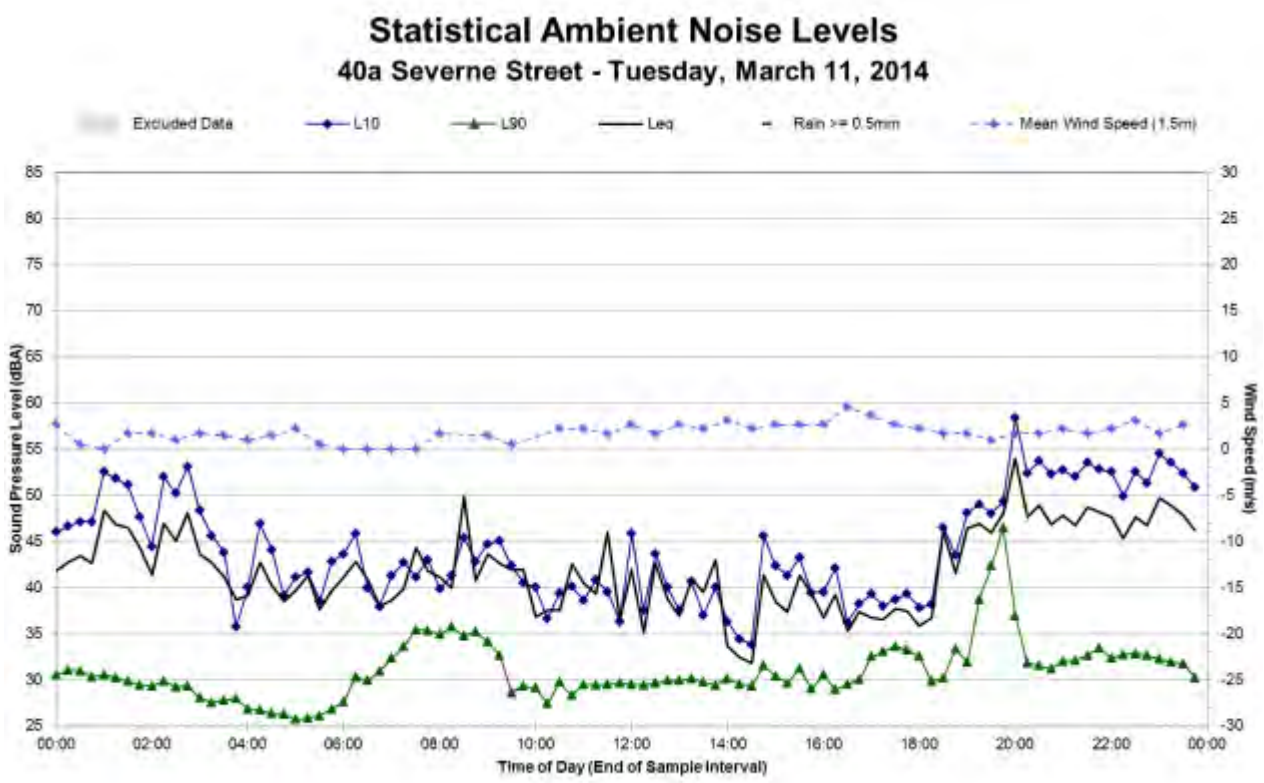

Statistical Ambient Noise Levels
35 Lonergan Drive - Monday, March 17, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

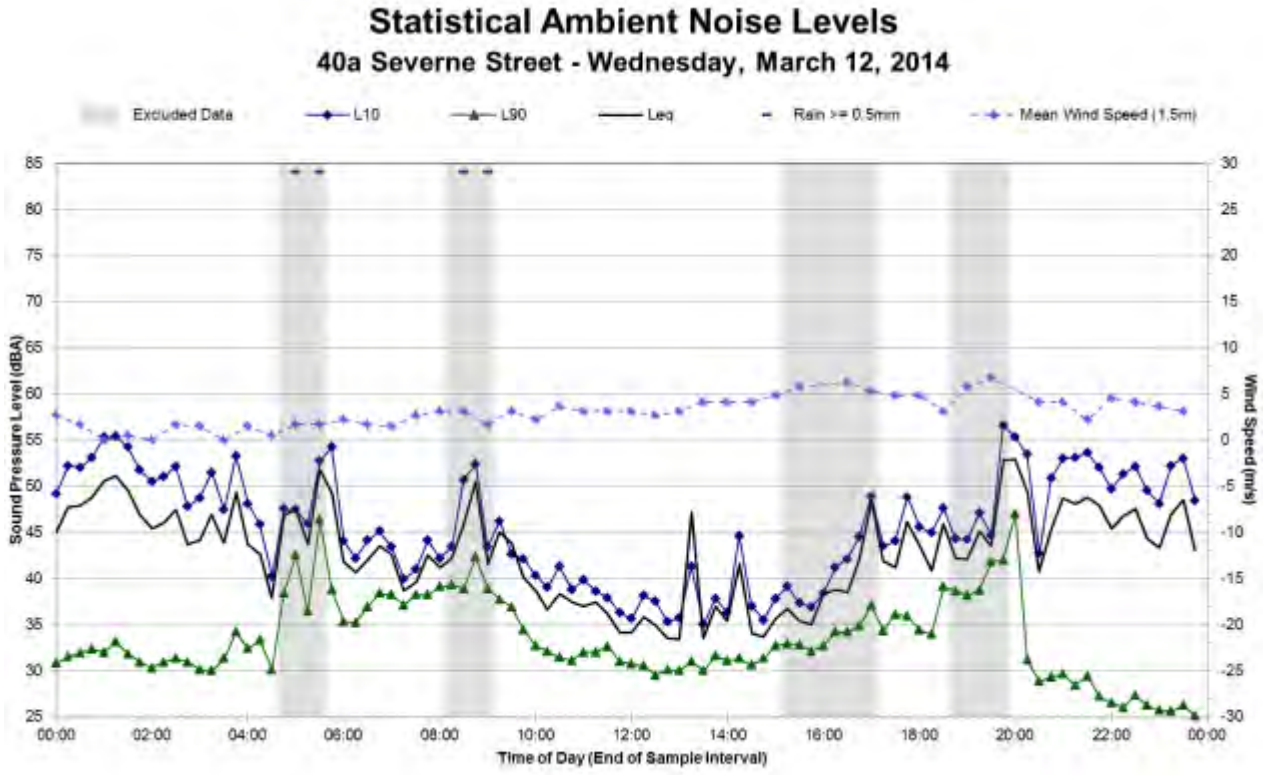

Statistical Ambient Noise Levels
40a Severne Street - Friday, March 07, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

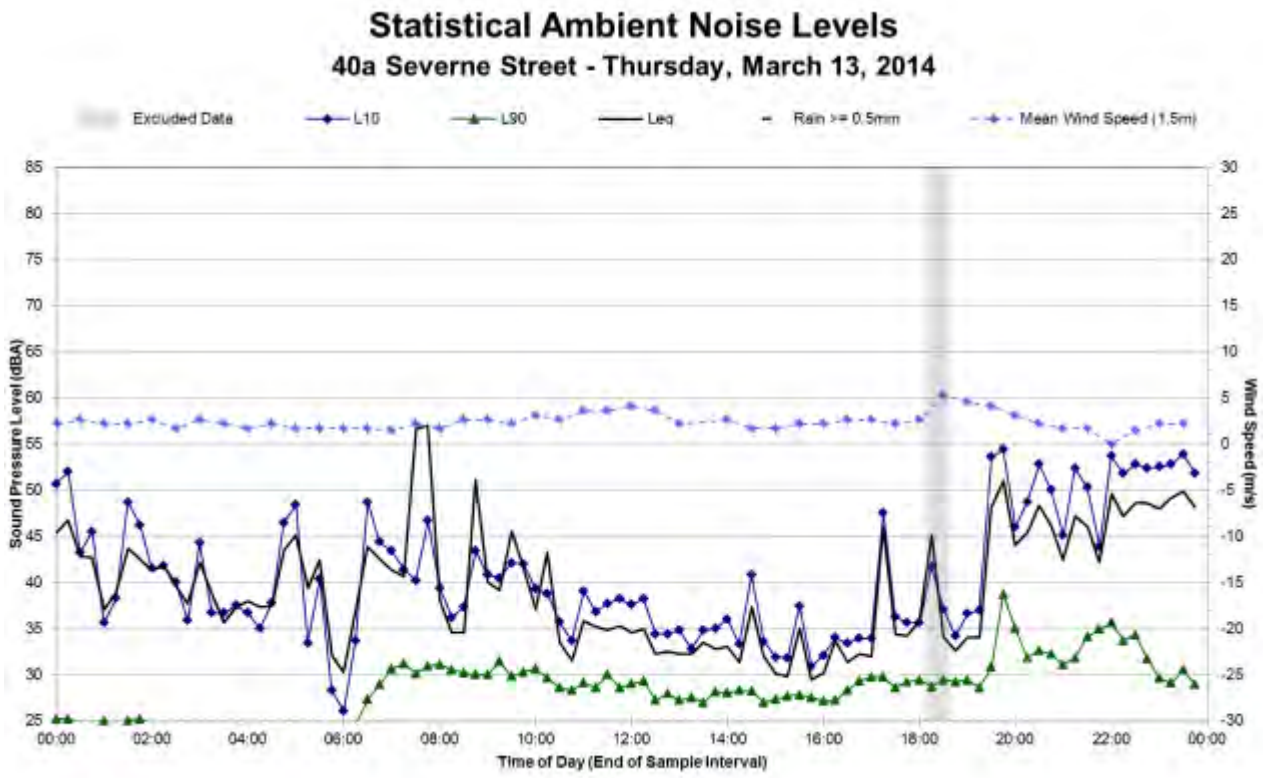

Statistical Ambient Noise Levels
40a Severne Street - Saturday, March 08, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

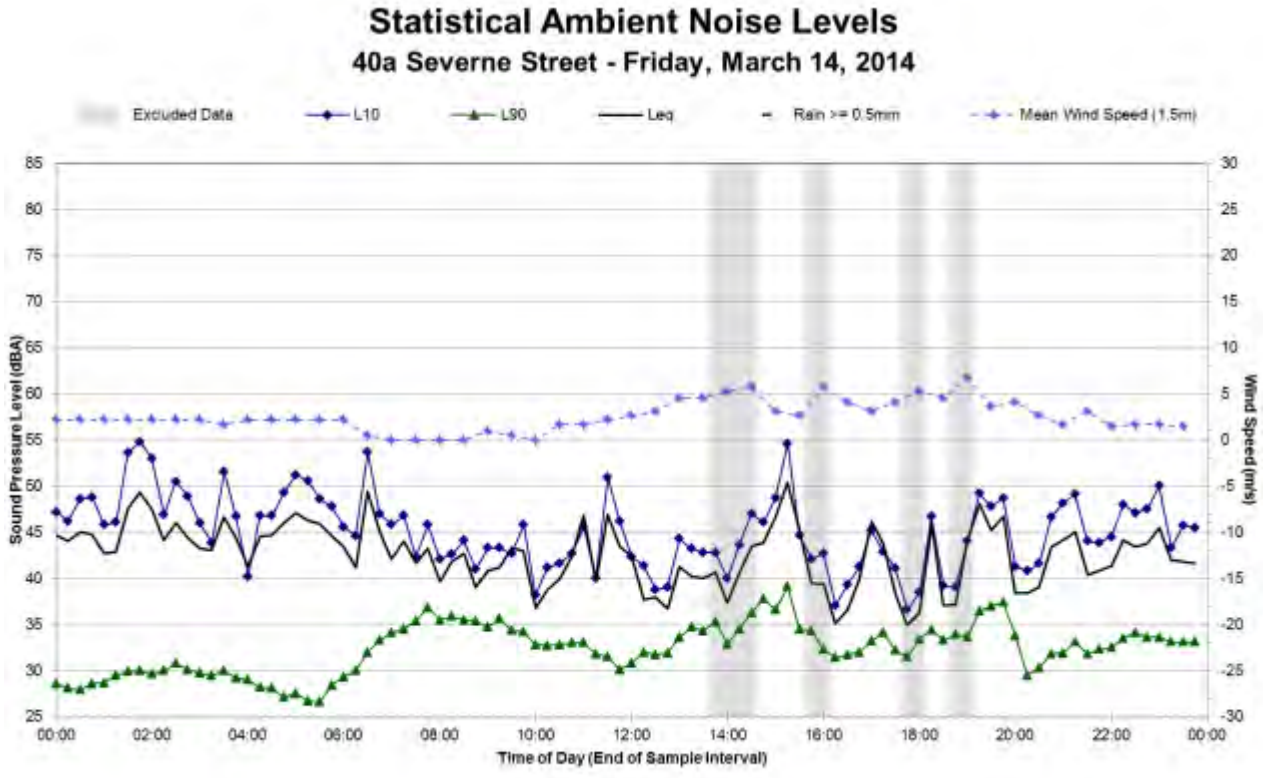

Statistical Ambient Noise Levels
40a Severne Street - Sunday, March 09, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

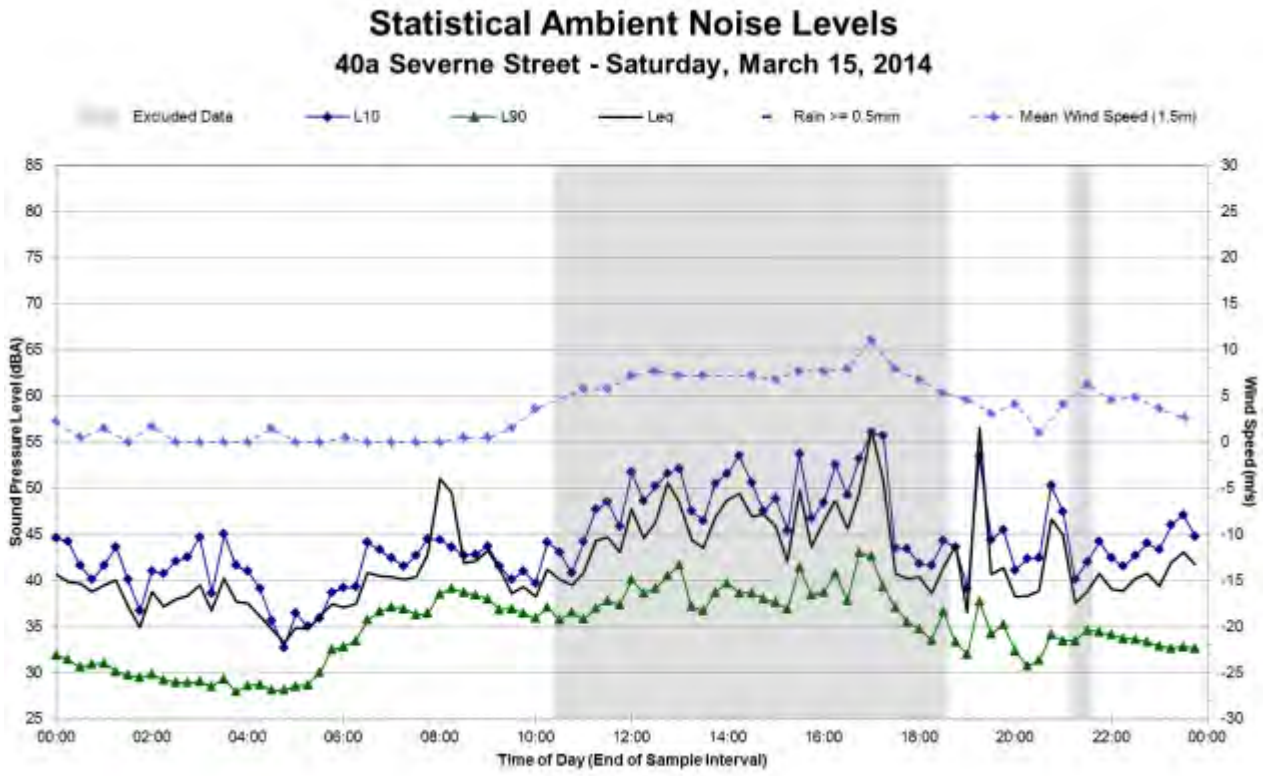

Statistical Ambient Noise Levels
40a Severne Street - Monday, March 10, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

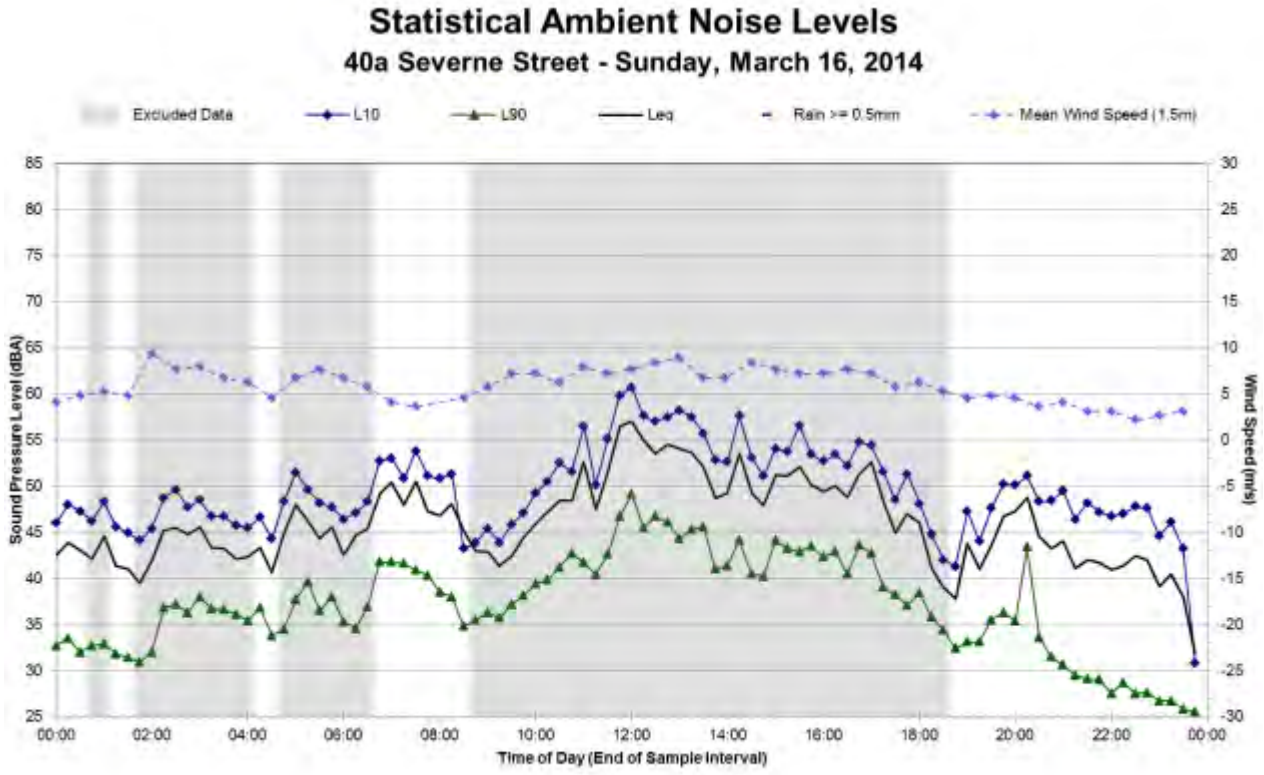

Statistical Ambient Noise Levels
40a Severne Street - Tuesday, March 11, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

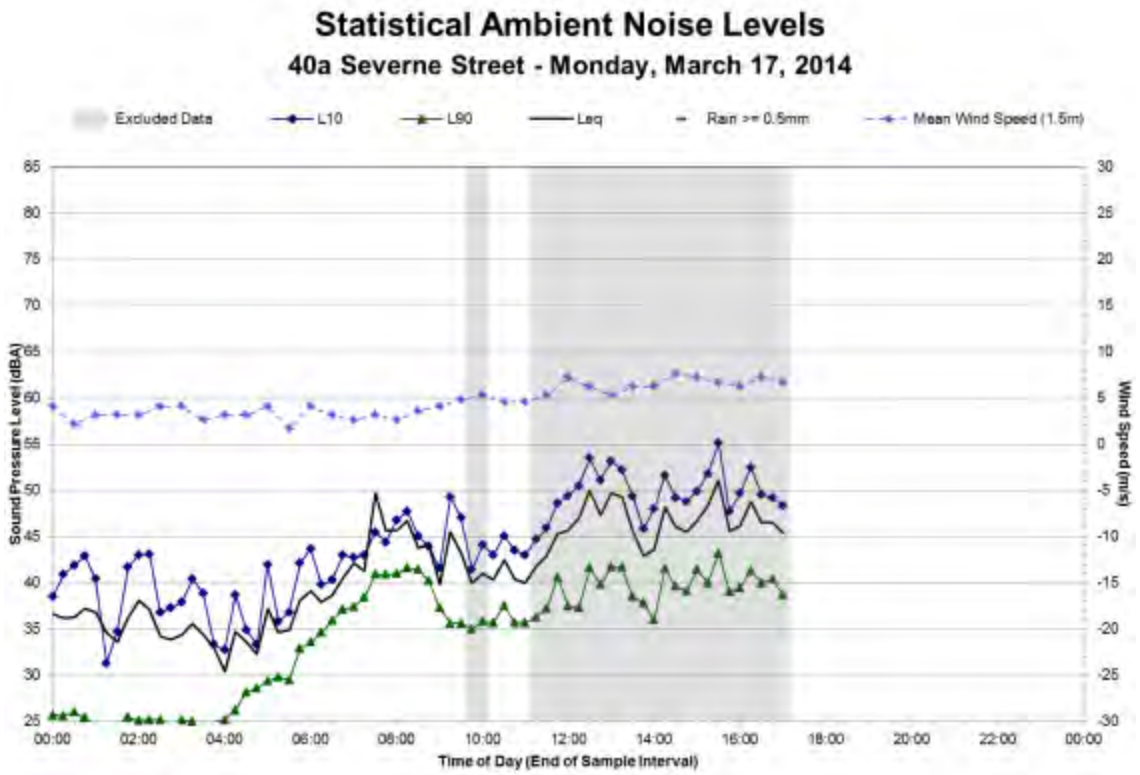

Statistical Ambient Noise Levels
40a Severne Street - Wednesday, March 12, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
40a Severne Street - Thursday, March 13, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
40a Severne Street - Friday, March 14, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
40a Severne Street - Saturday, March 15, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
40a Severne Street - Sunday, March 16, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
40a Severne Street - Monday, March 17, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)
00:00
02:00
04:00
06:00
08:00
10:00
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16:00
18:00
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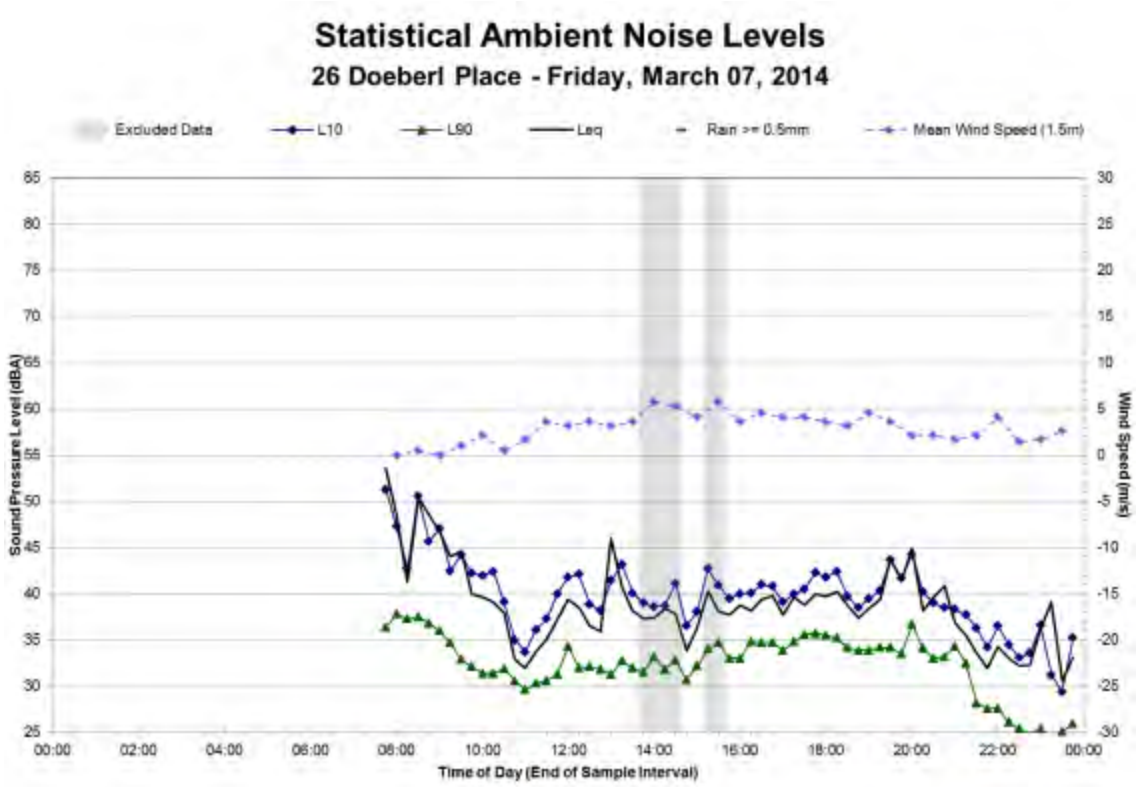
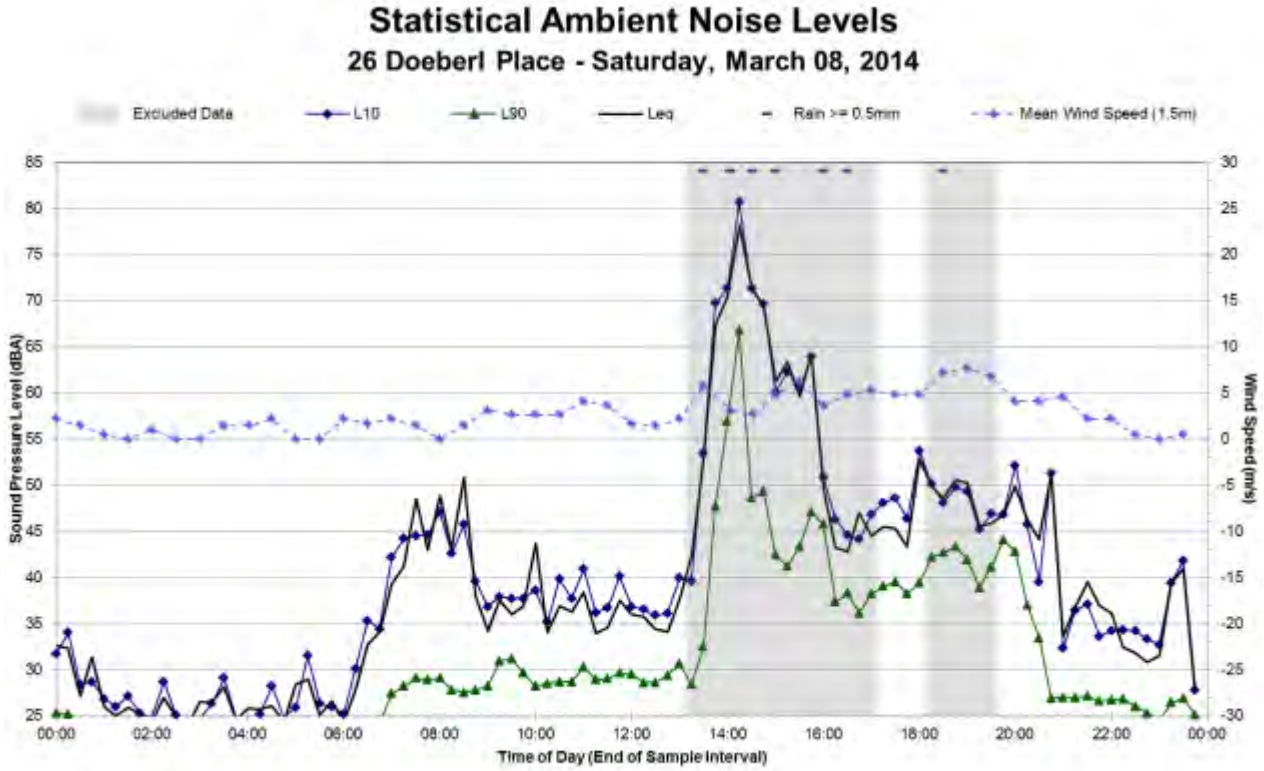
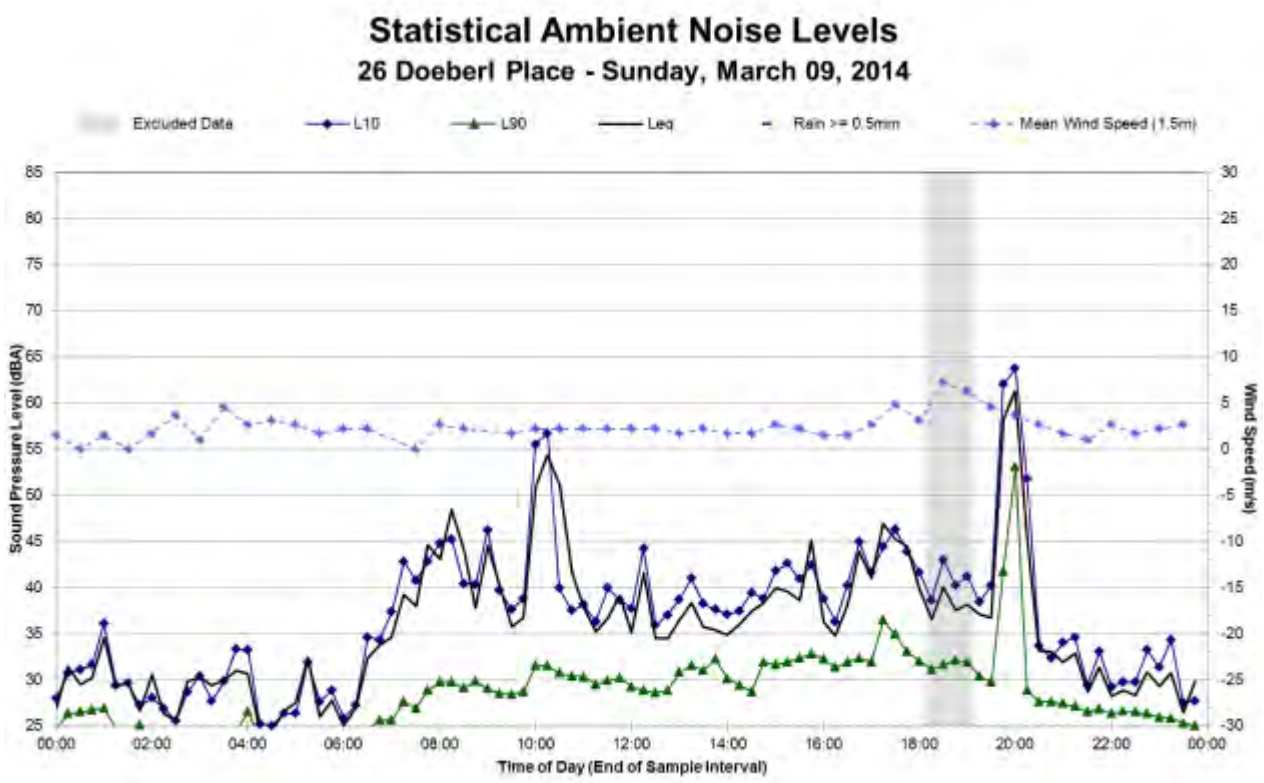
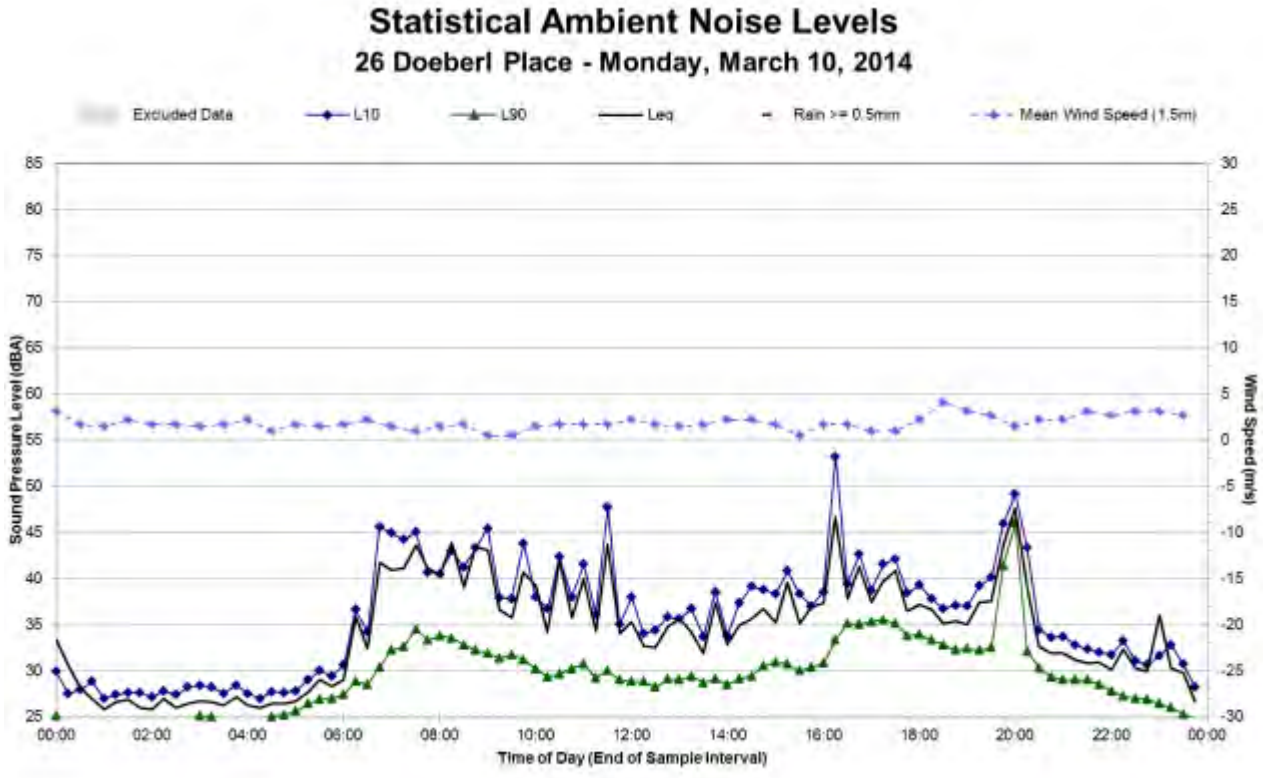
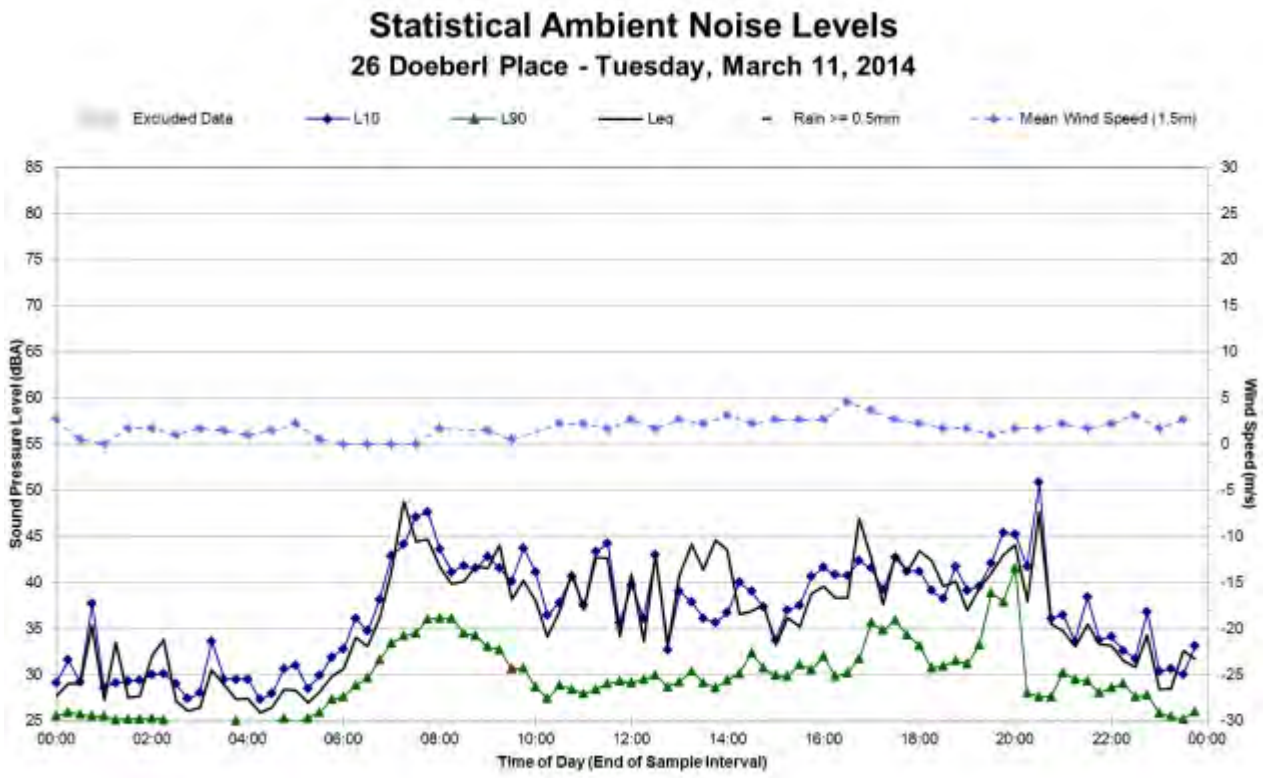
00:00

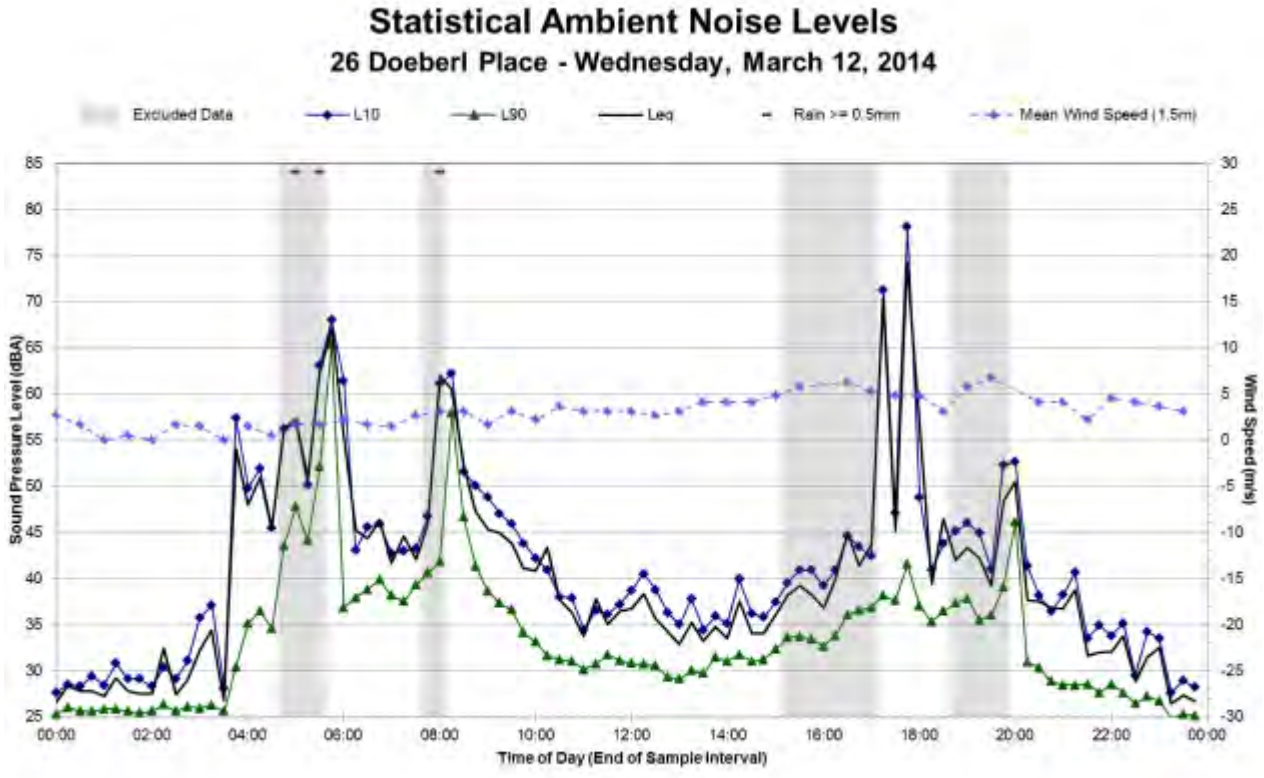

Statistical Ambient Noise Levels
26 Doeberl Place - Friday, March 07, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

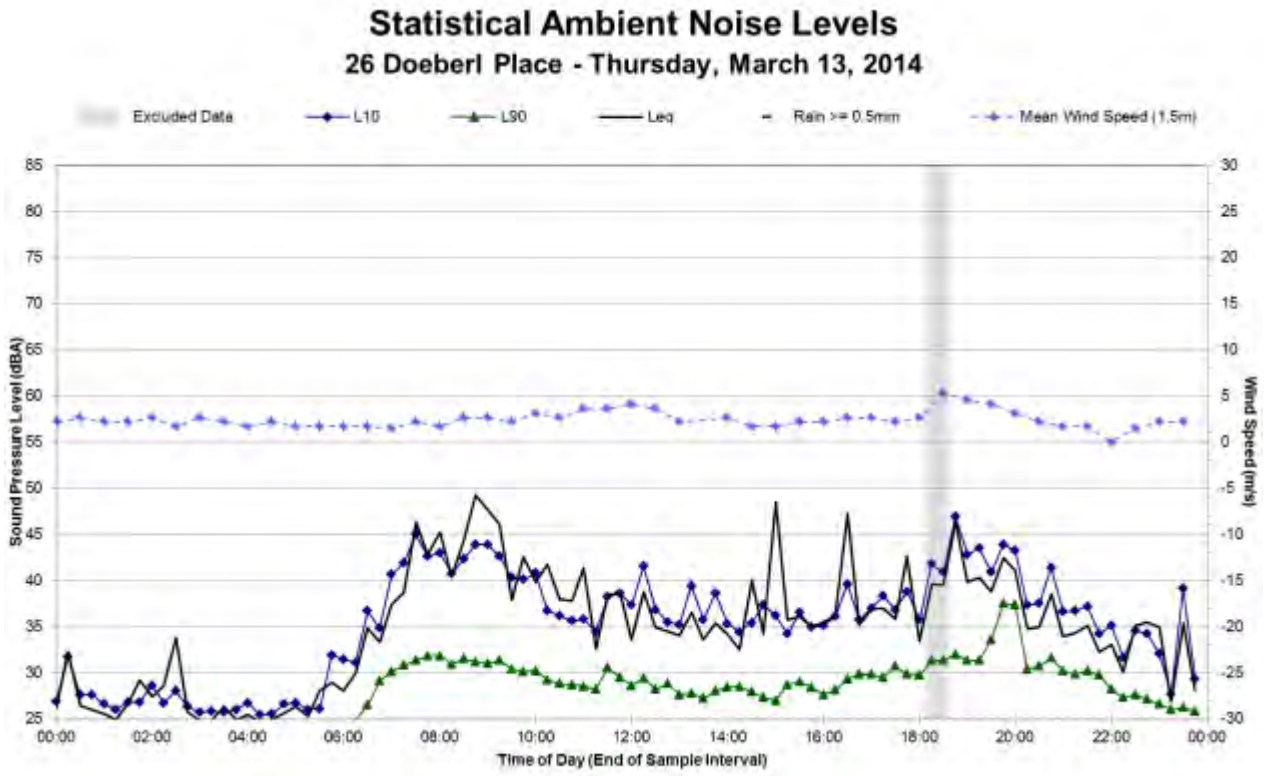

Statistical Ambient Noise Levels
26 Doeberl Place - Saturday, March 08, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
26 Doeberl Place - Sunday, March 09, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
26 Doeberl Place - Monday, March 10, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
26 Doeberl Place - Tuesday, March 11, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
26 Doeberl Place - Wednesday, March 12, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
26 Doeberl Place - Thursday, March 13, 2014
Excluded Data
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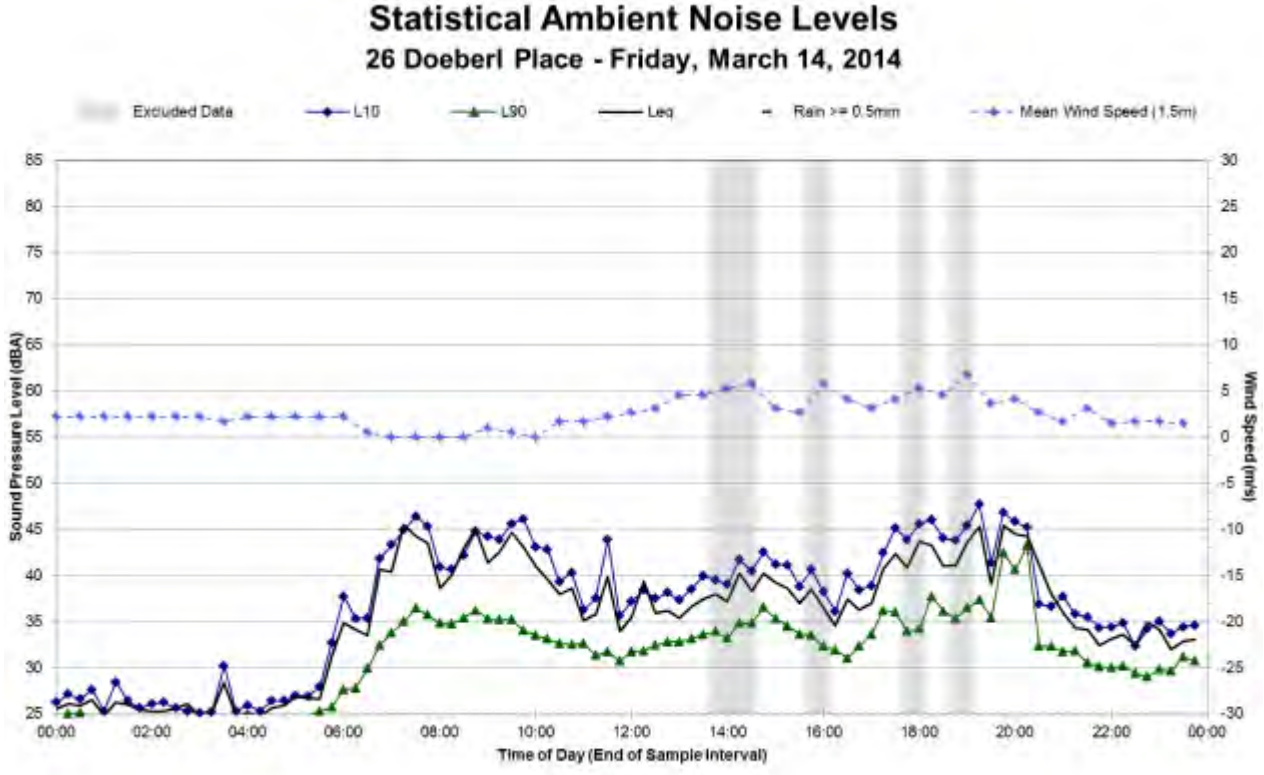
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
26 Doeberl Place - Friday, March 14, 2014
Excluded Data
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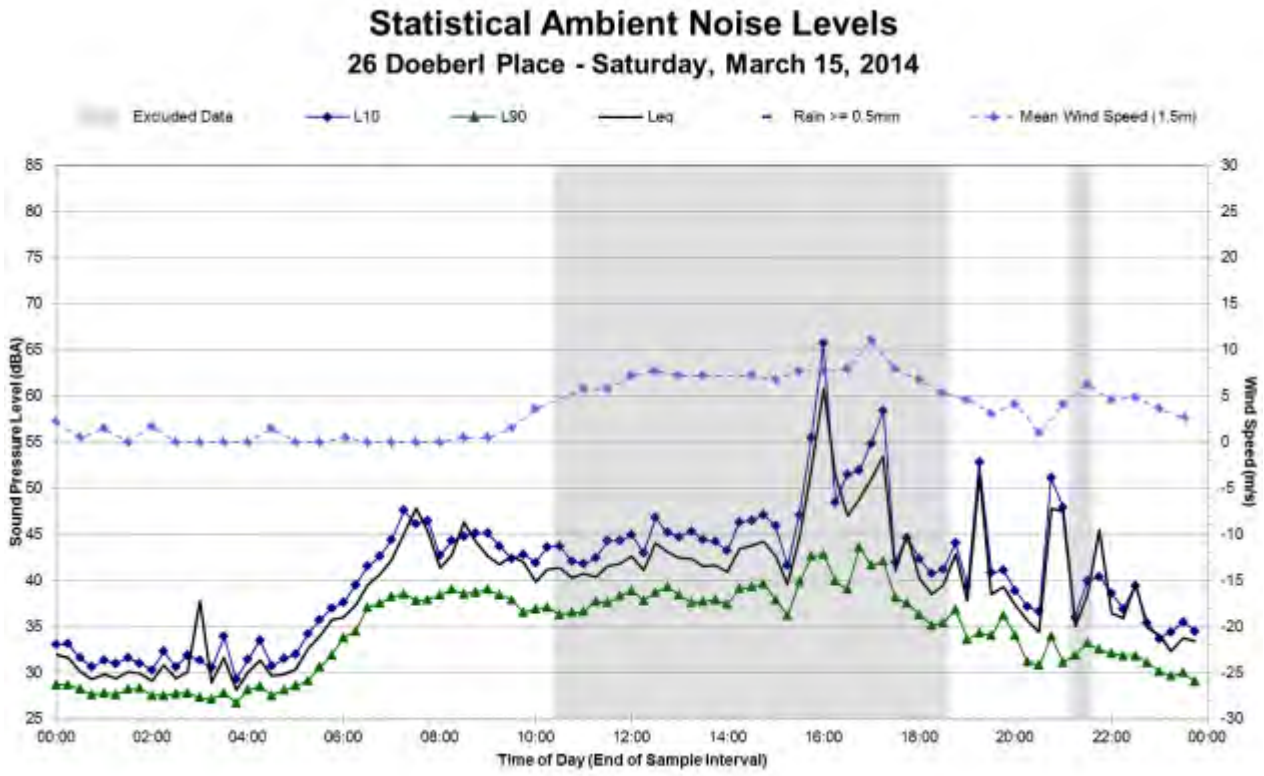
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
26 Doeberl Place - Saturday, March 15, 2014
Excluded Data
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L90
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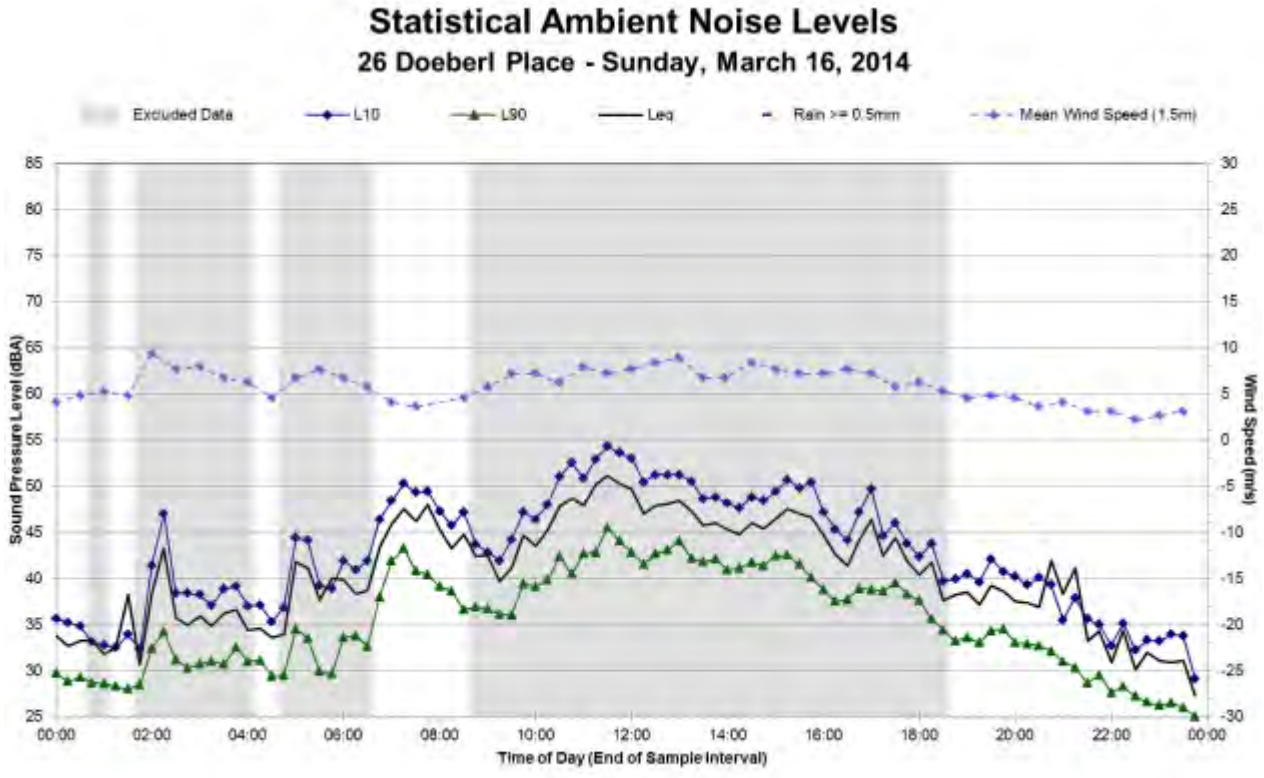
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
26 Doeberl Place - Sunday, March 16, 2014
Excluded Data
L10
L90
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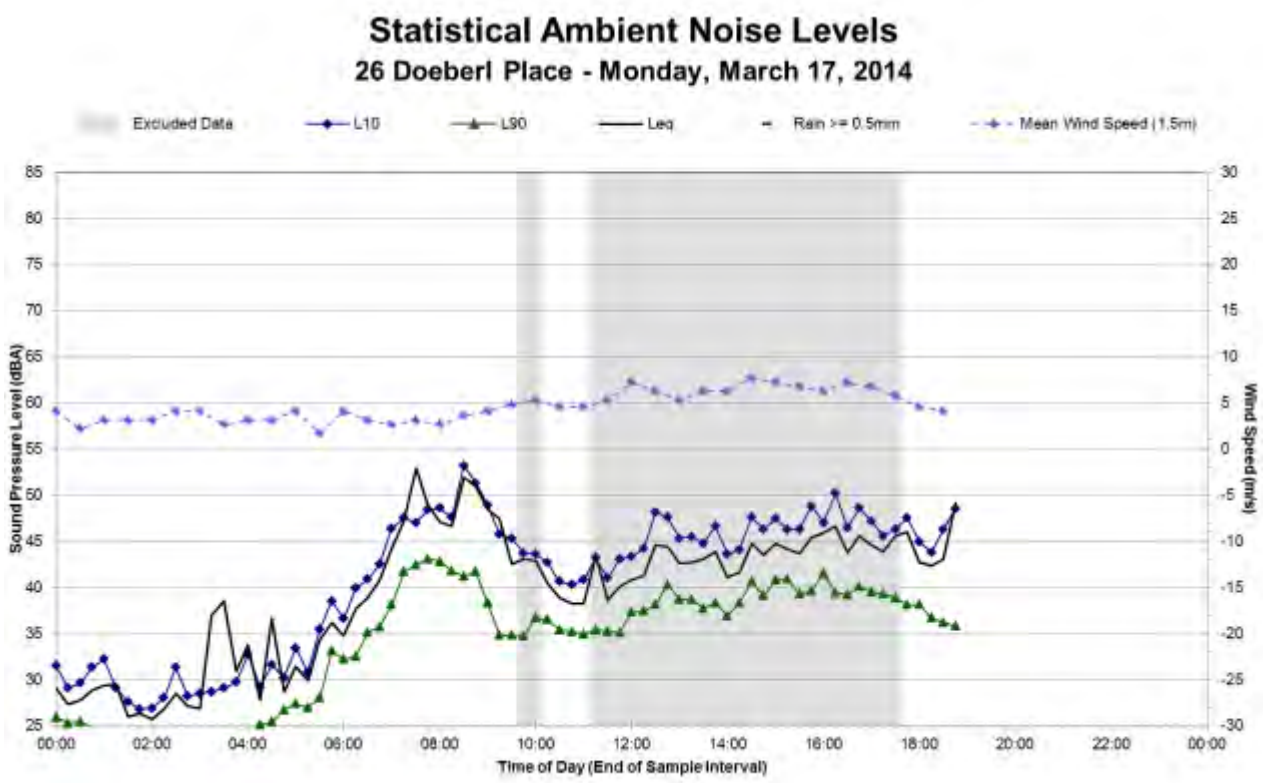
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
26 Doeberl Place - Monday, March 17, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)
85
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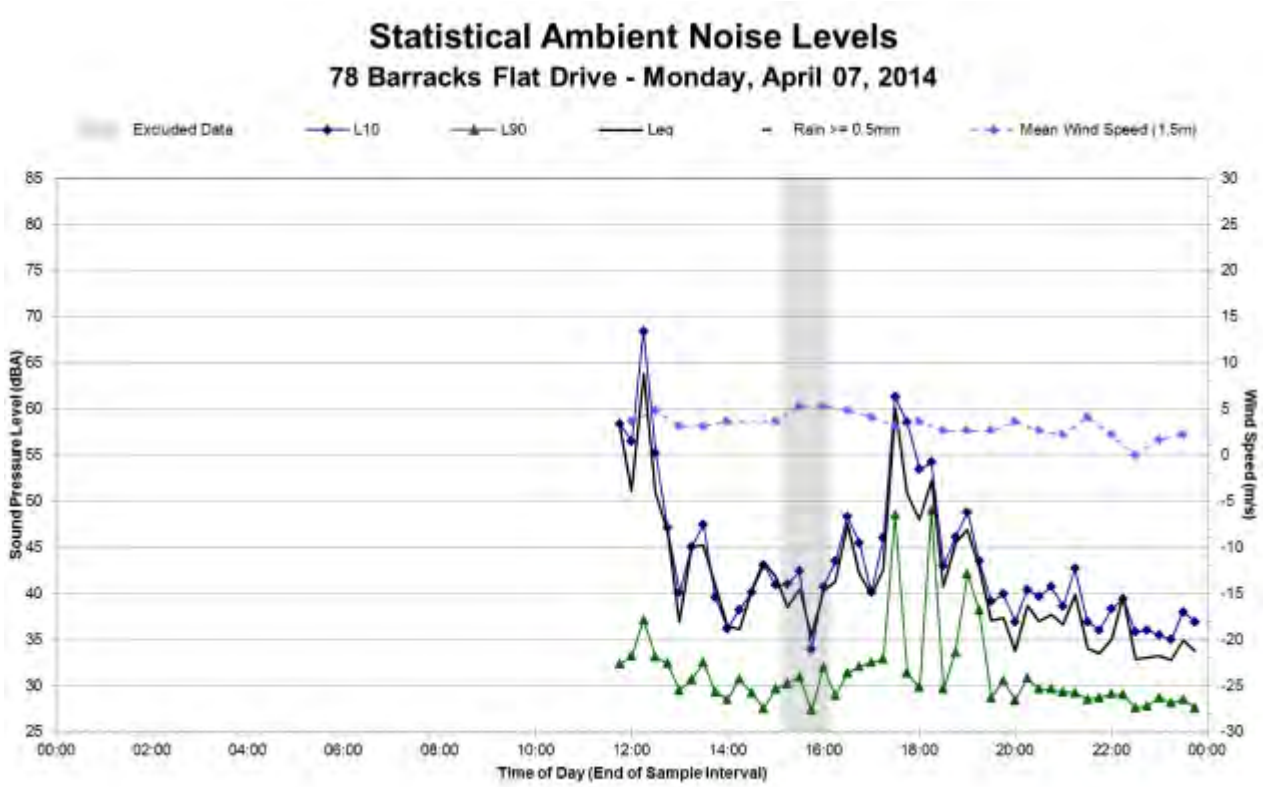
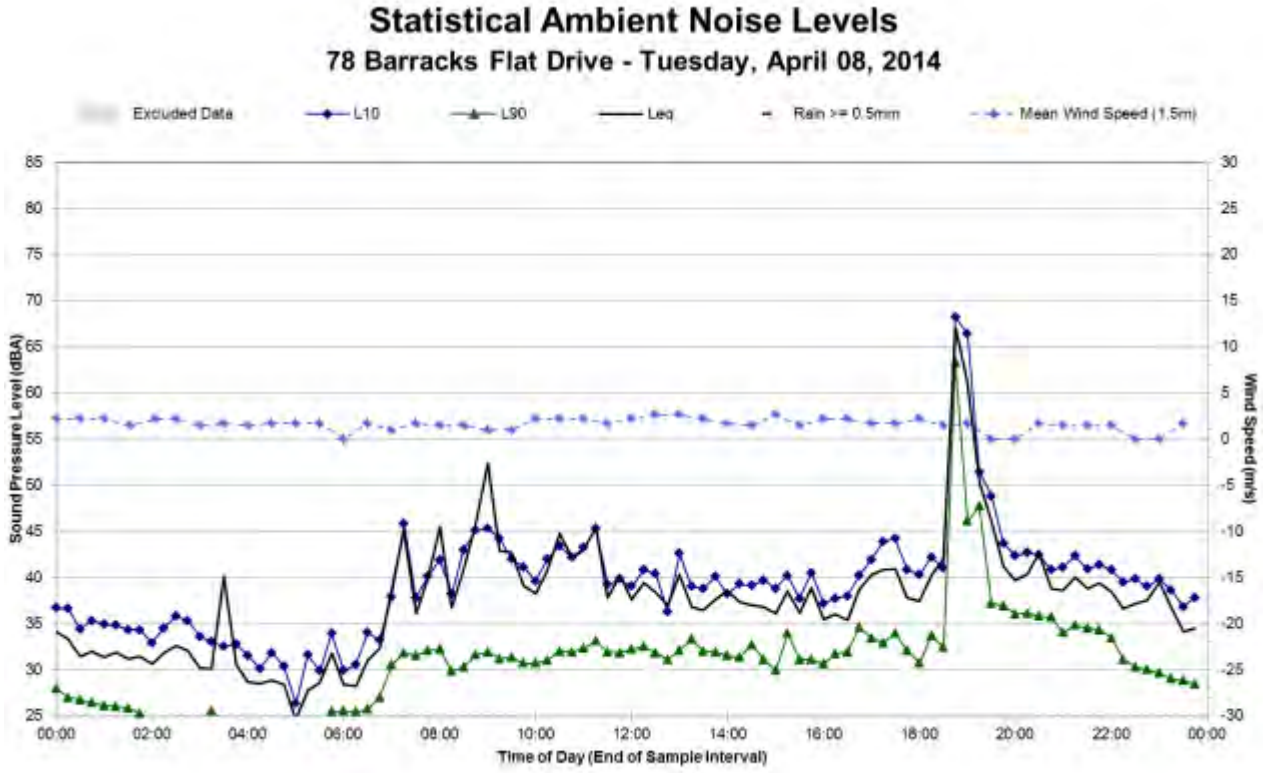
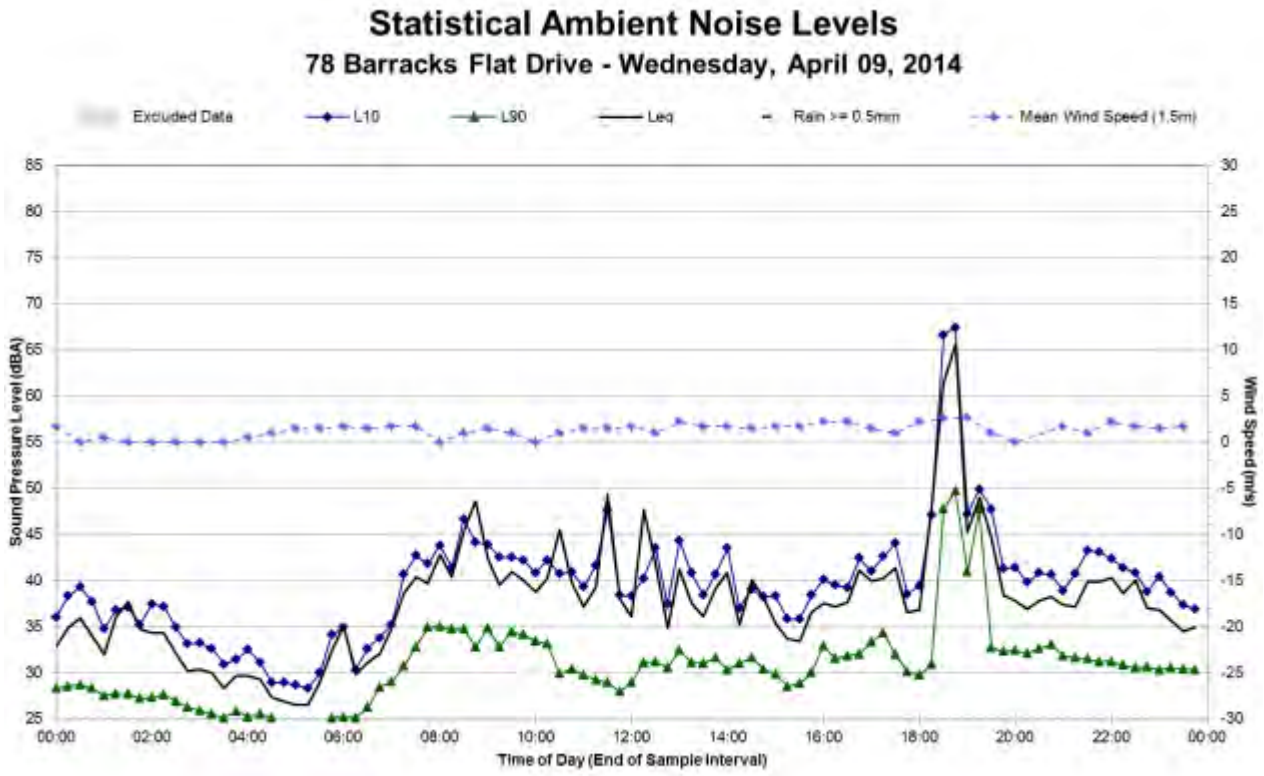

Statistical Ambient Noise Levels
78 Barracks Flat Drive - Monday, April 07, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
78 Barracks Flat Drive - Tuesday, April 08, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
78 Barracks Flat Drive - Wednesday, April 09, 2014
Excluded Data
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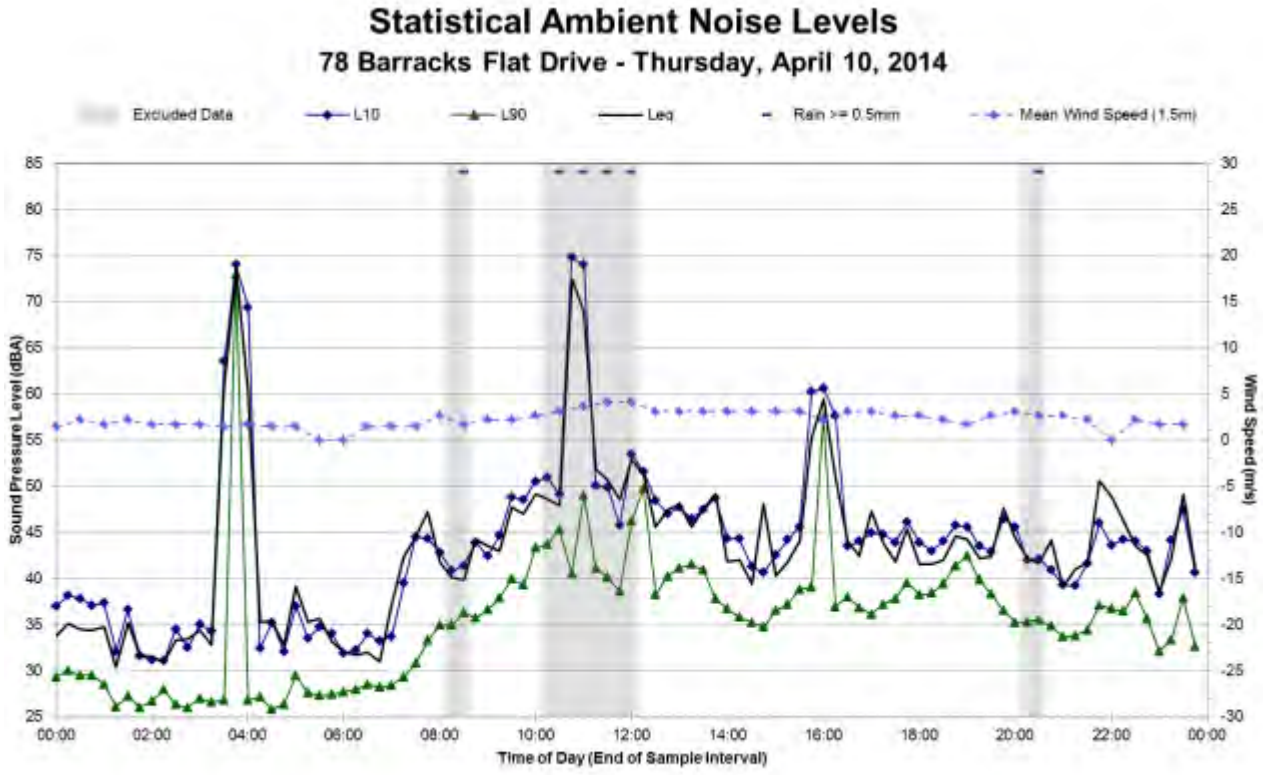
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
78 Barracks Flat Drive - Thursday, April 10, 2014
Excluded Data
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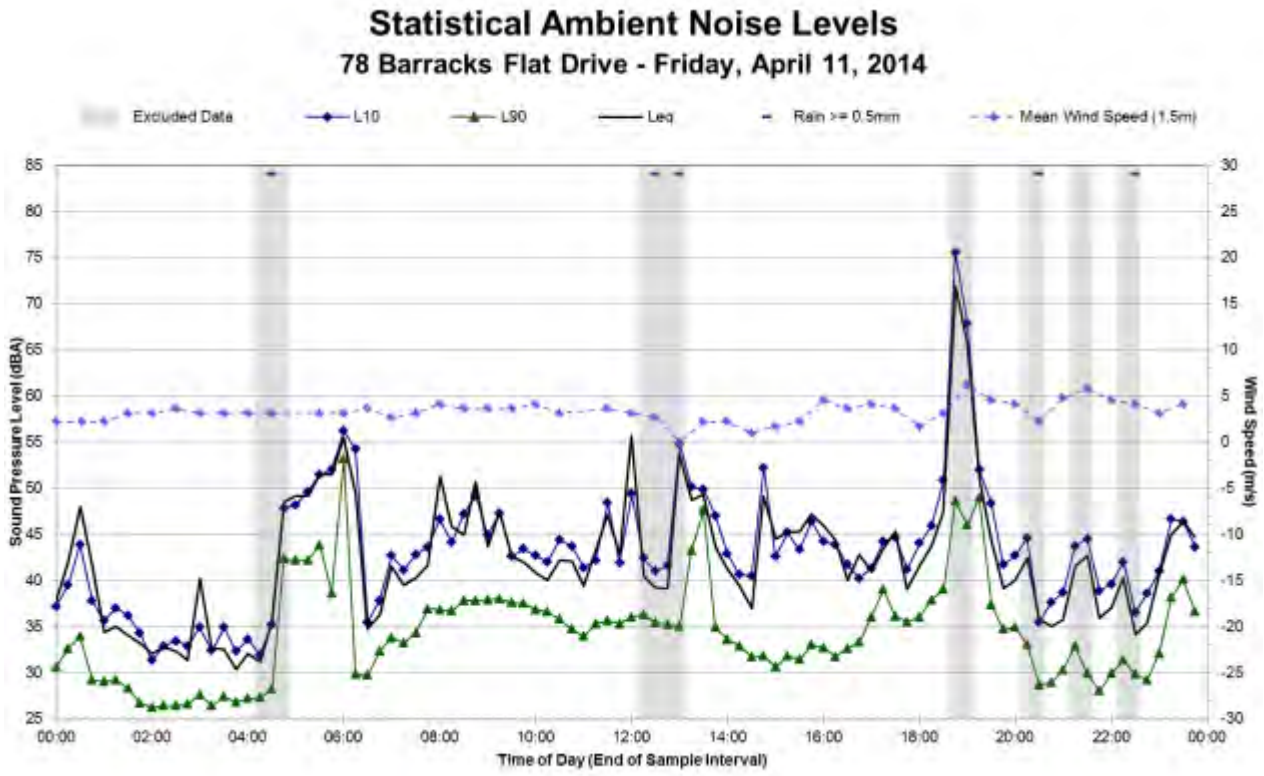
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
78 Barracks Flat Drive - Friday, April 11, 2014
Excluded Data
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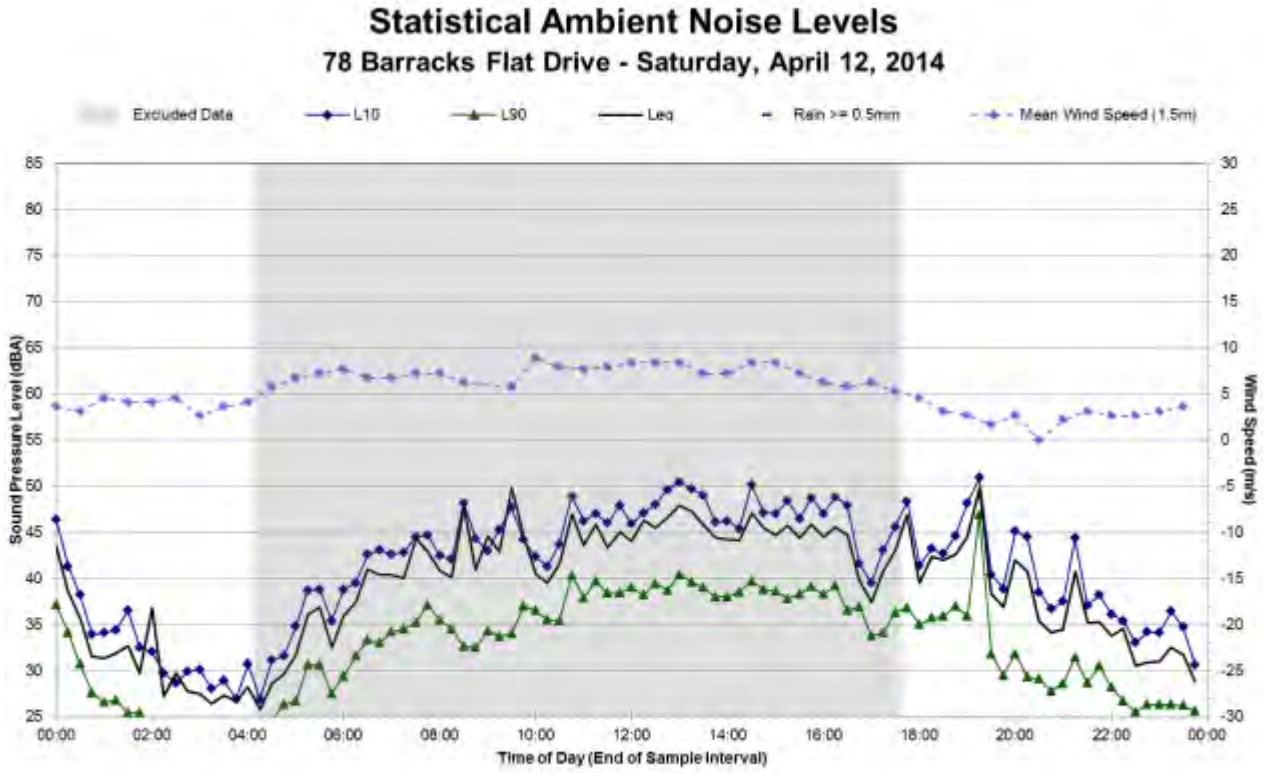
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
78 Barracks Flat Drive - Saturday, April 12, 2014
Excluded Data
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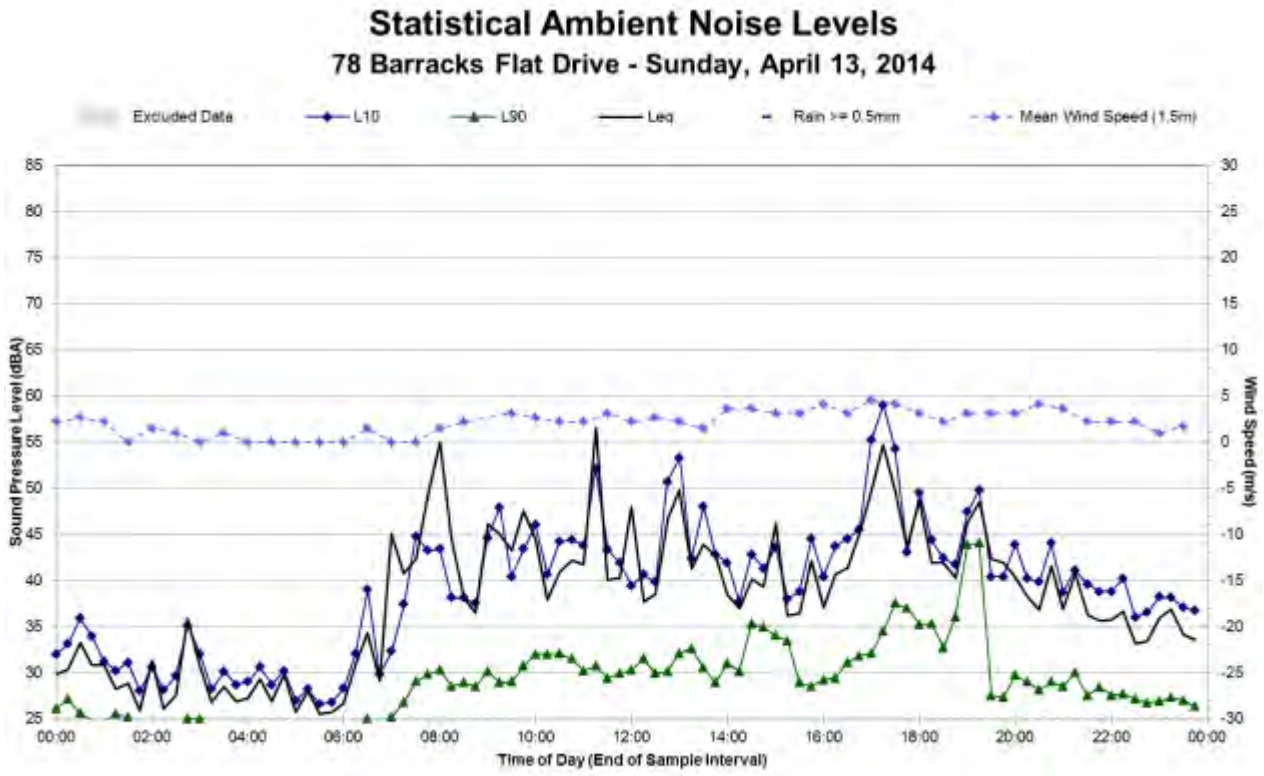
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
78 Barracks Flat Drive - Sunday, April 13, 2014
Excluded Data
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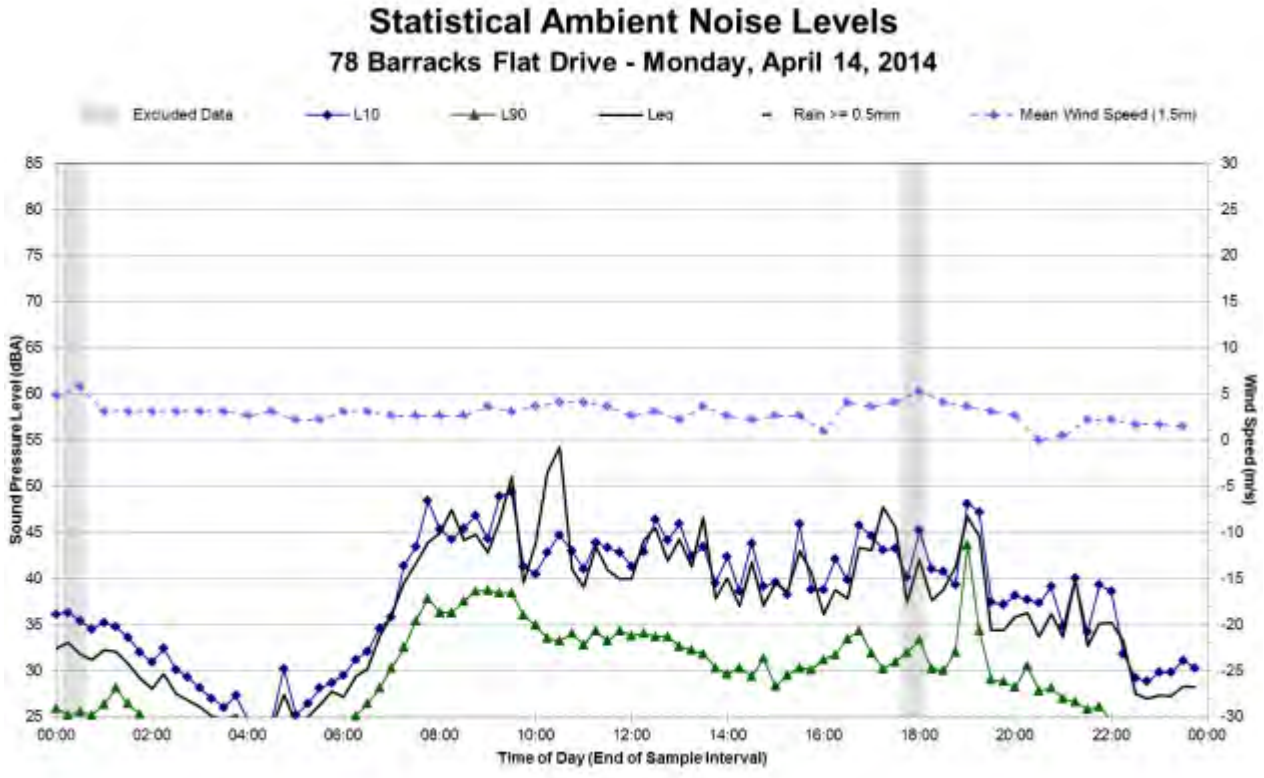
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
78 Barracks Flat Drive - Monday, April 14, 2014
Excluded Data
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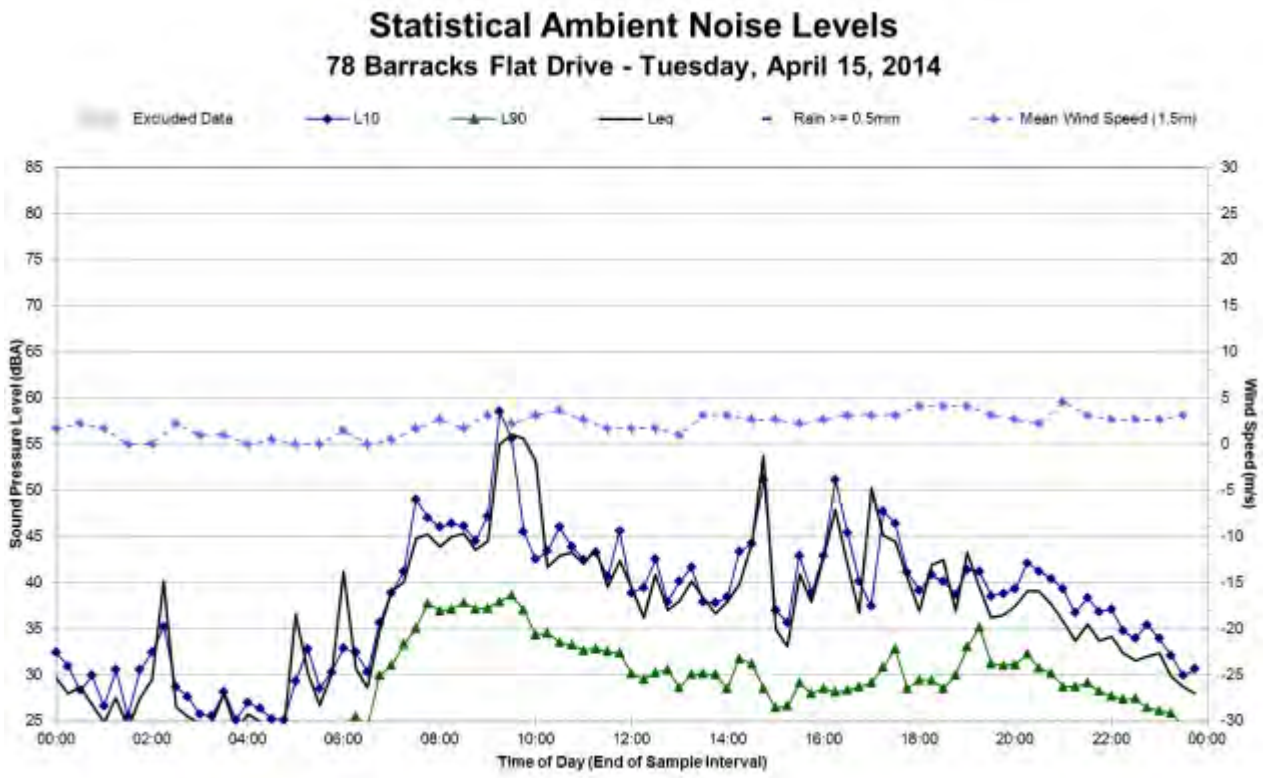
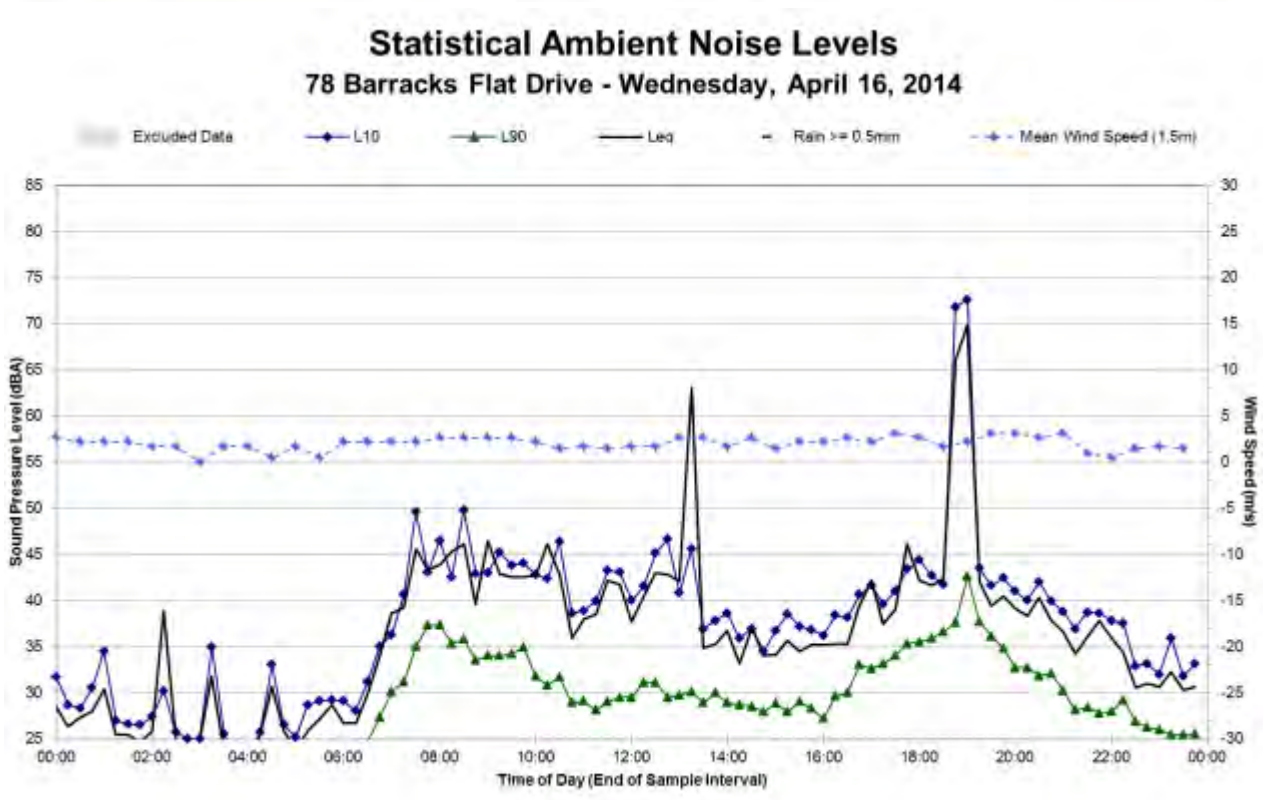
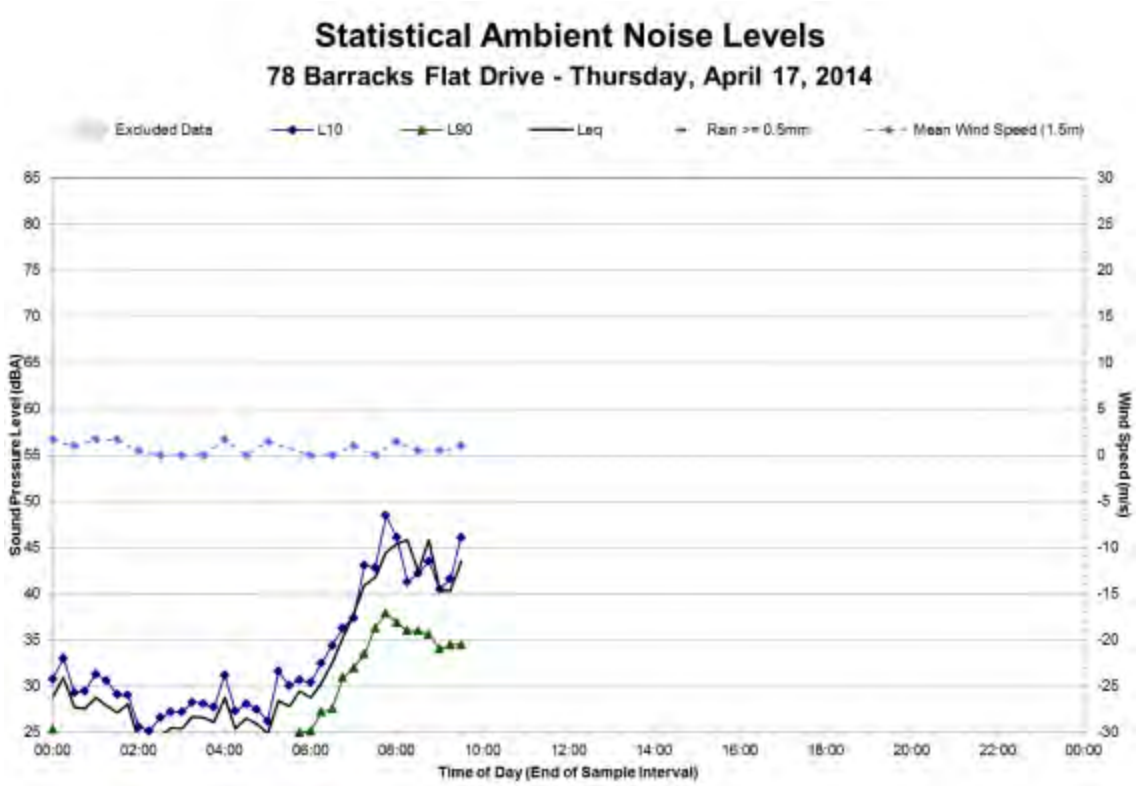
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
78 Barracks Flat Drive - Tuesday, April 15, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
78 Barracks Flat Drive - Wednesday, April 16, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
78 Barracks Flat Drive - Thursday, April 17, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)
00:00
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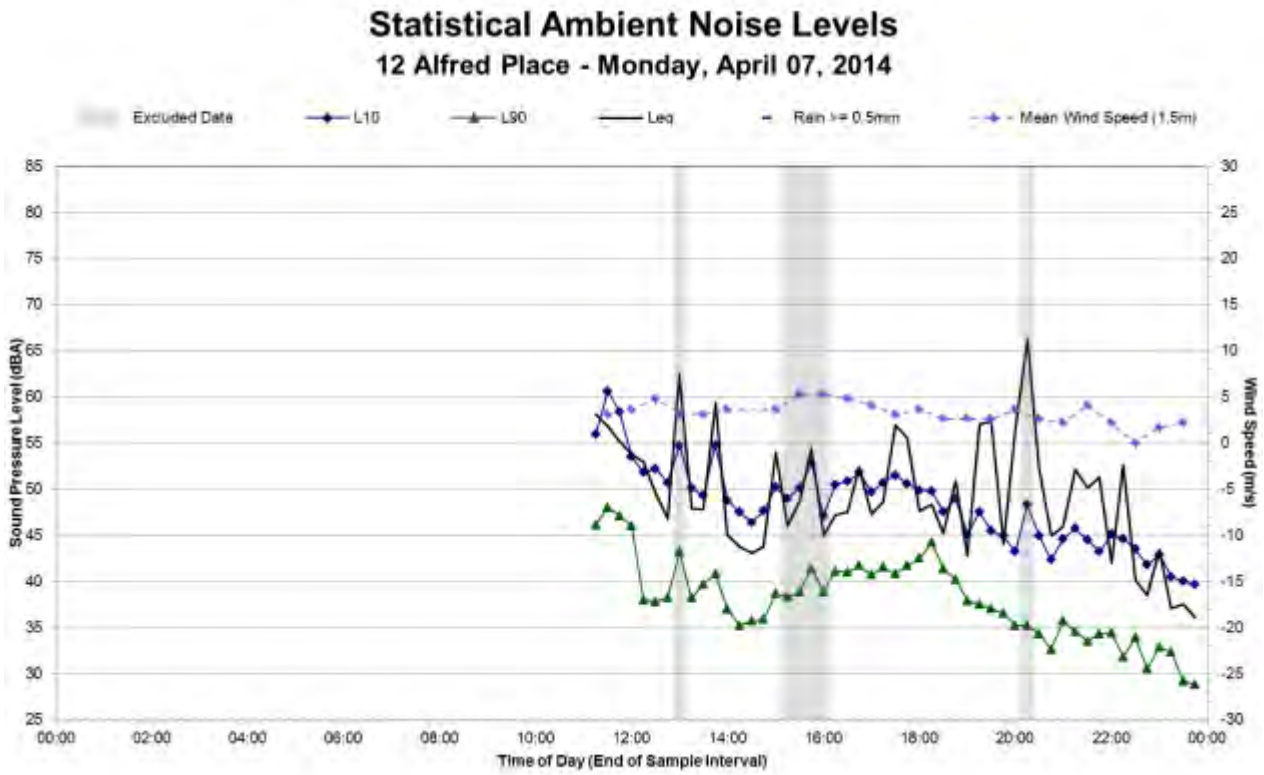
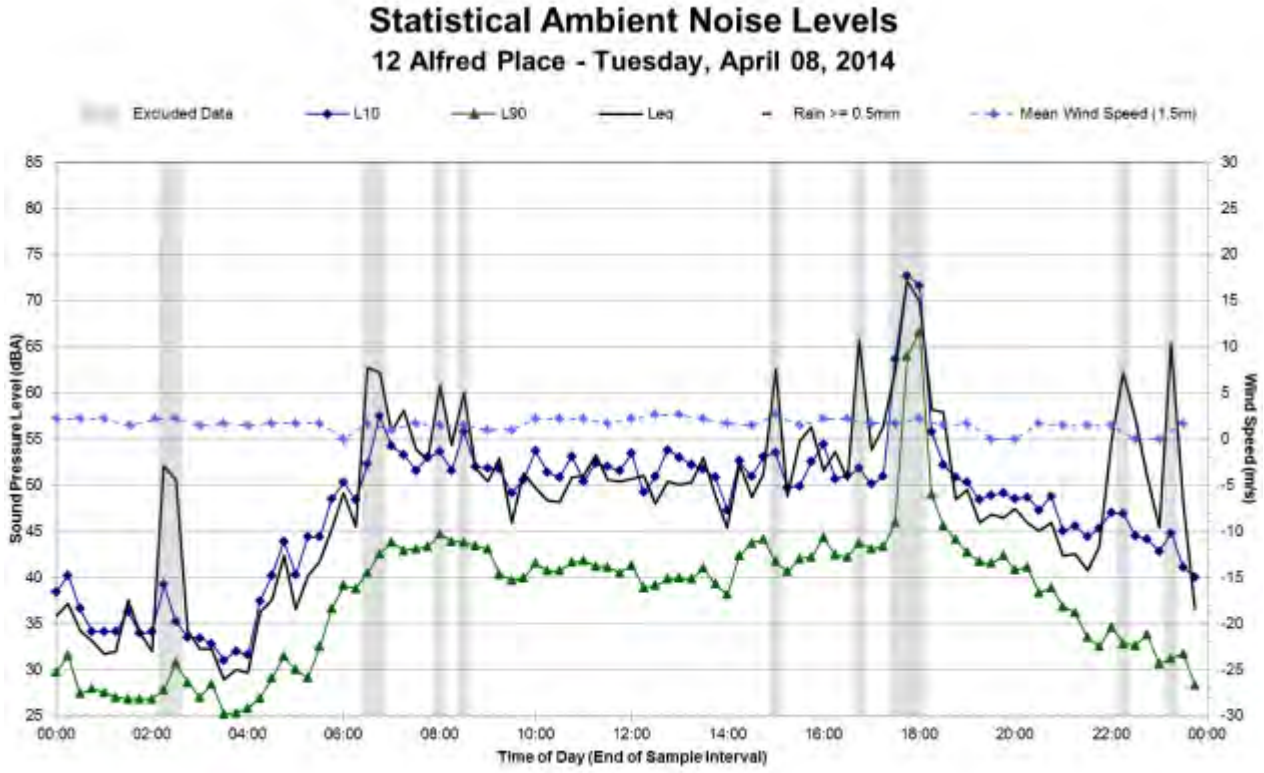
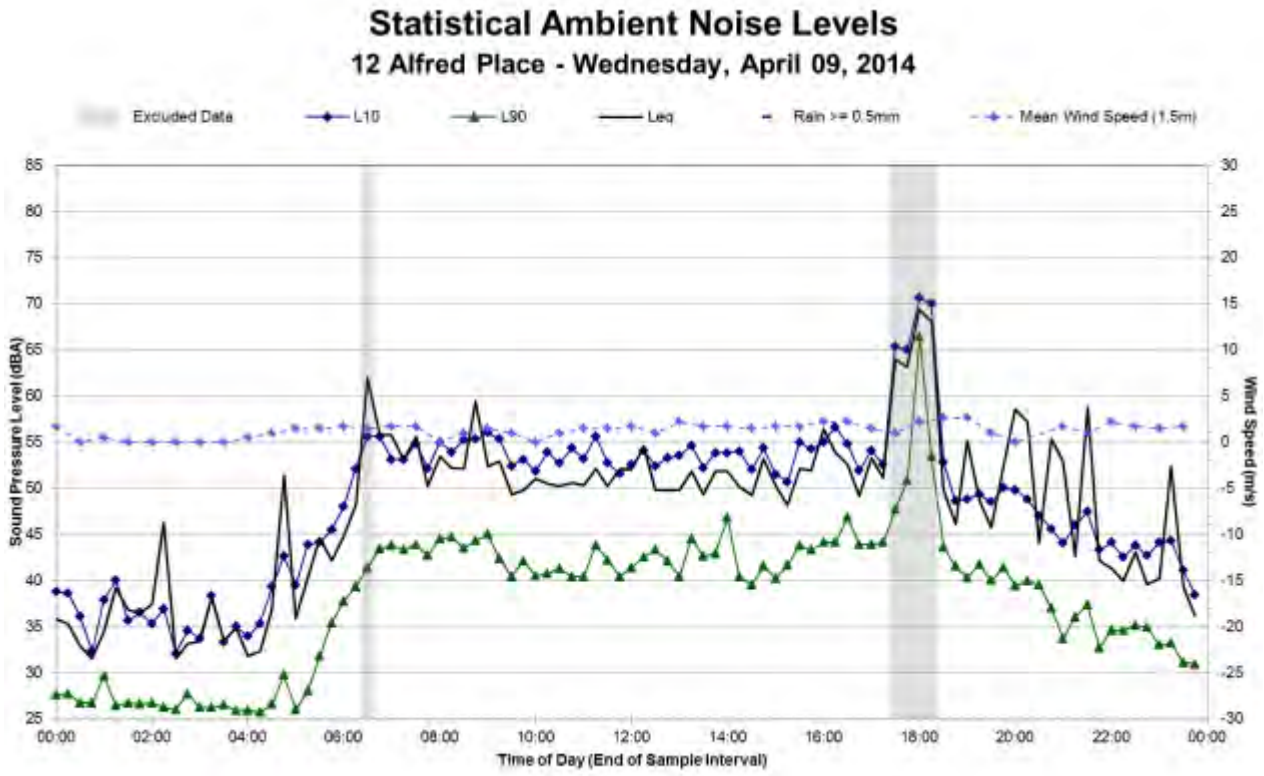

Statistical Ambient Noise Levels
12 Alfred Place - Monday, April 07, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
12 Alfred Place - Tuesday, April 08, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
12 Alfred Place - Wednesday, April 09, 2014
Excluded Data
L10
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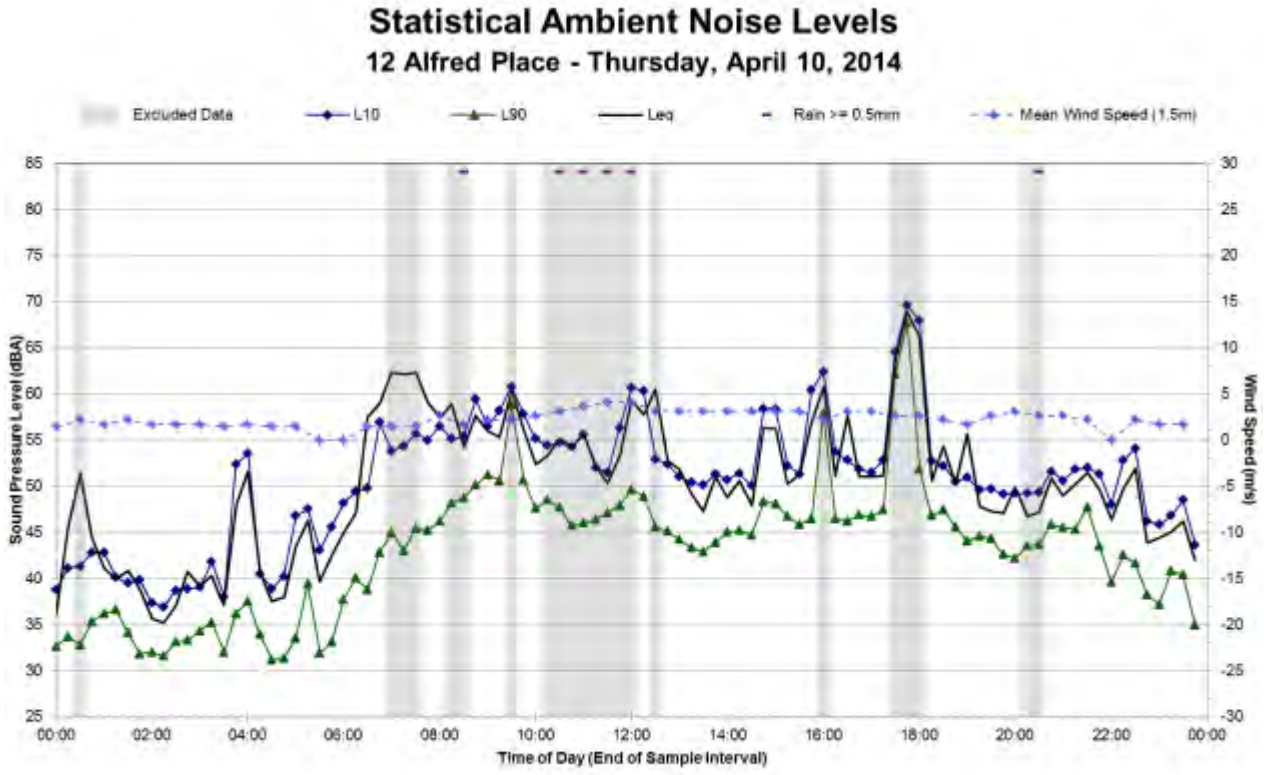
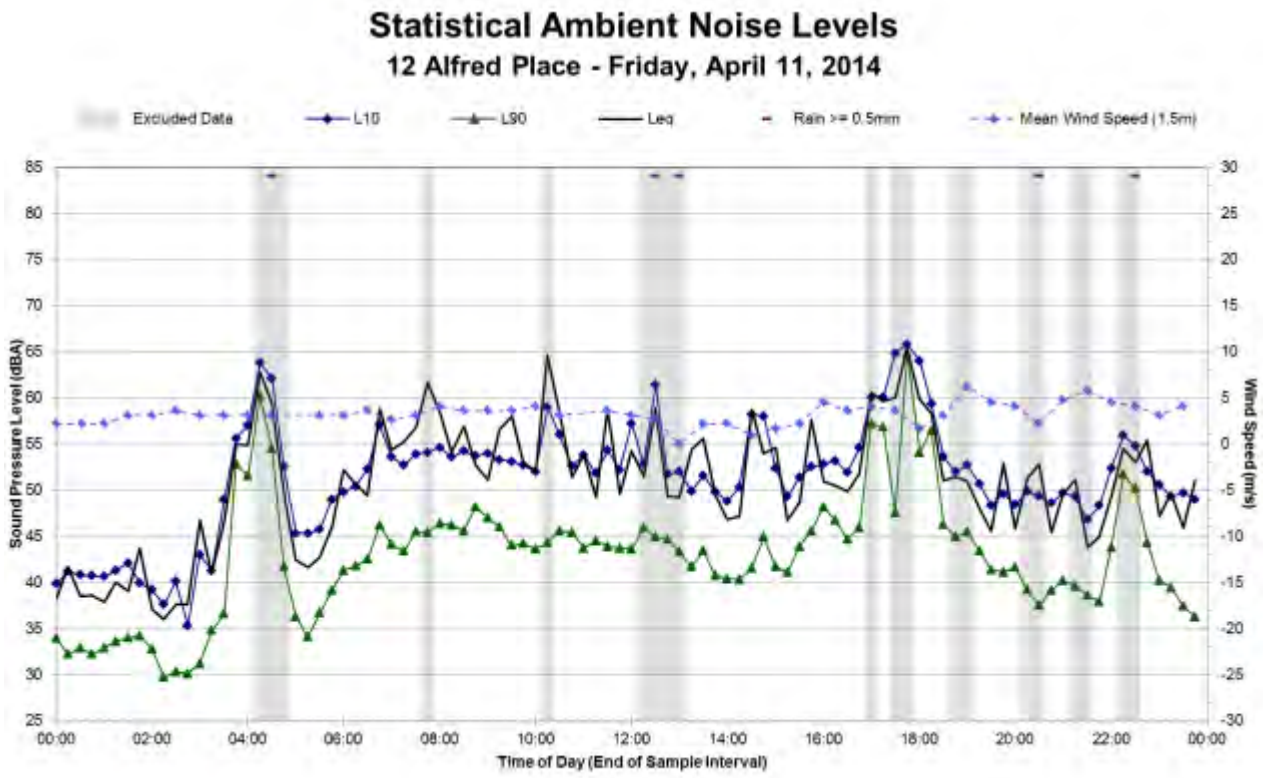
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
12 Alfred Place - Thursday, April 10, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
12 Alfred Place - Friday, April 11, 2014
Excluded Data
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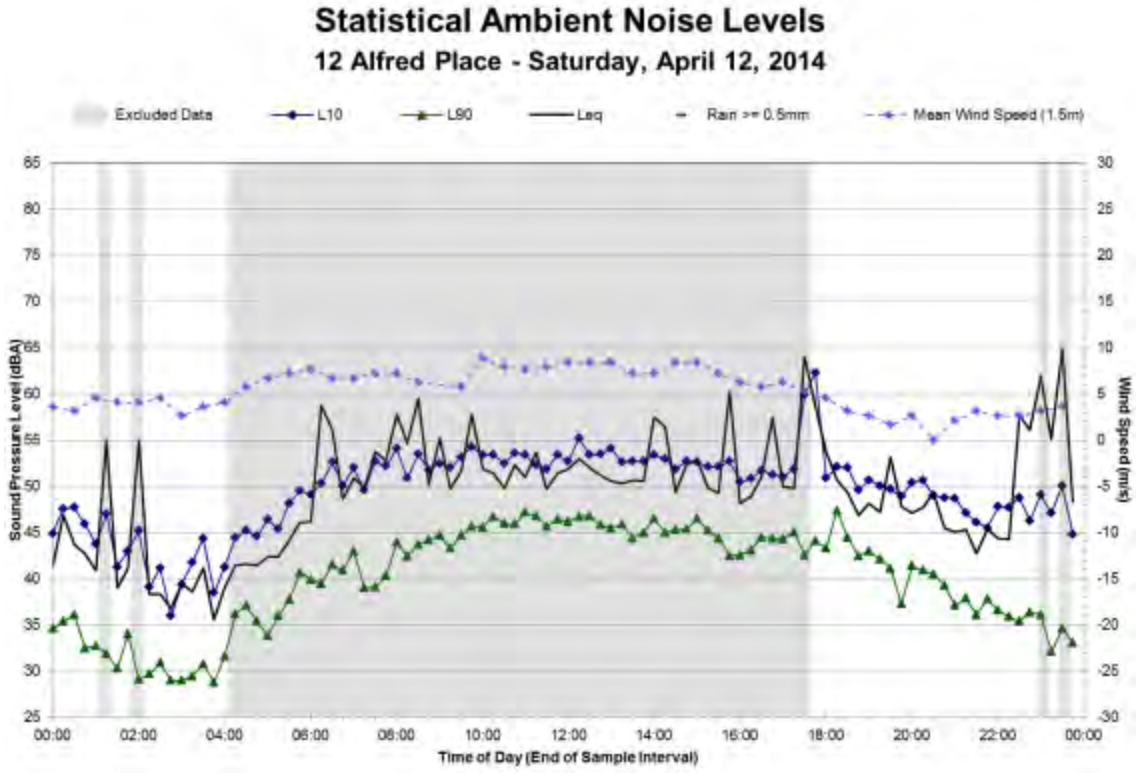
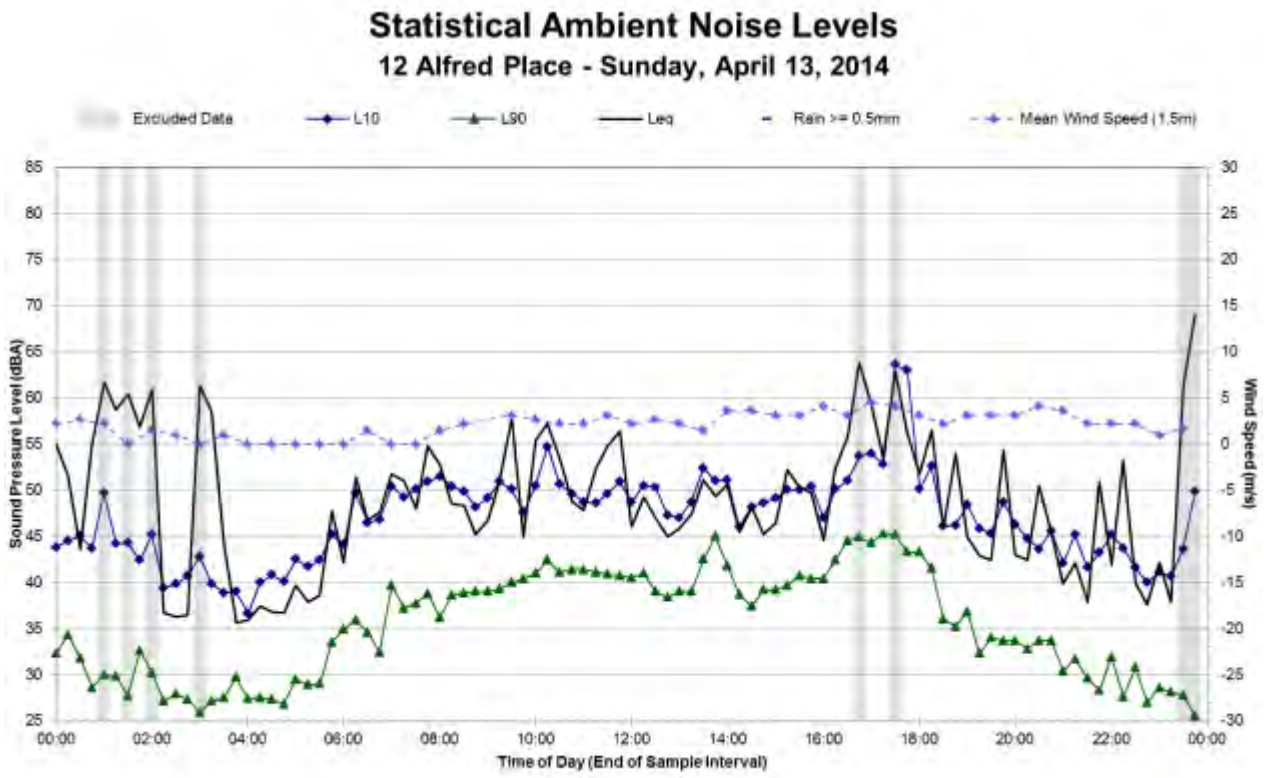
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
12 Alfred Place - Saturday, April 12, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
12 Alfred Place - Sunday, April 13, 2014
Excluded Data
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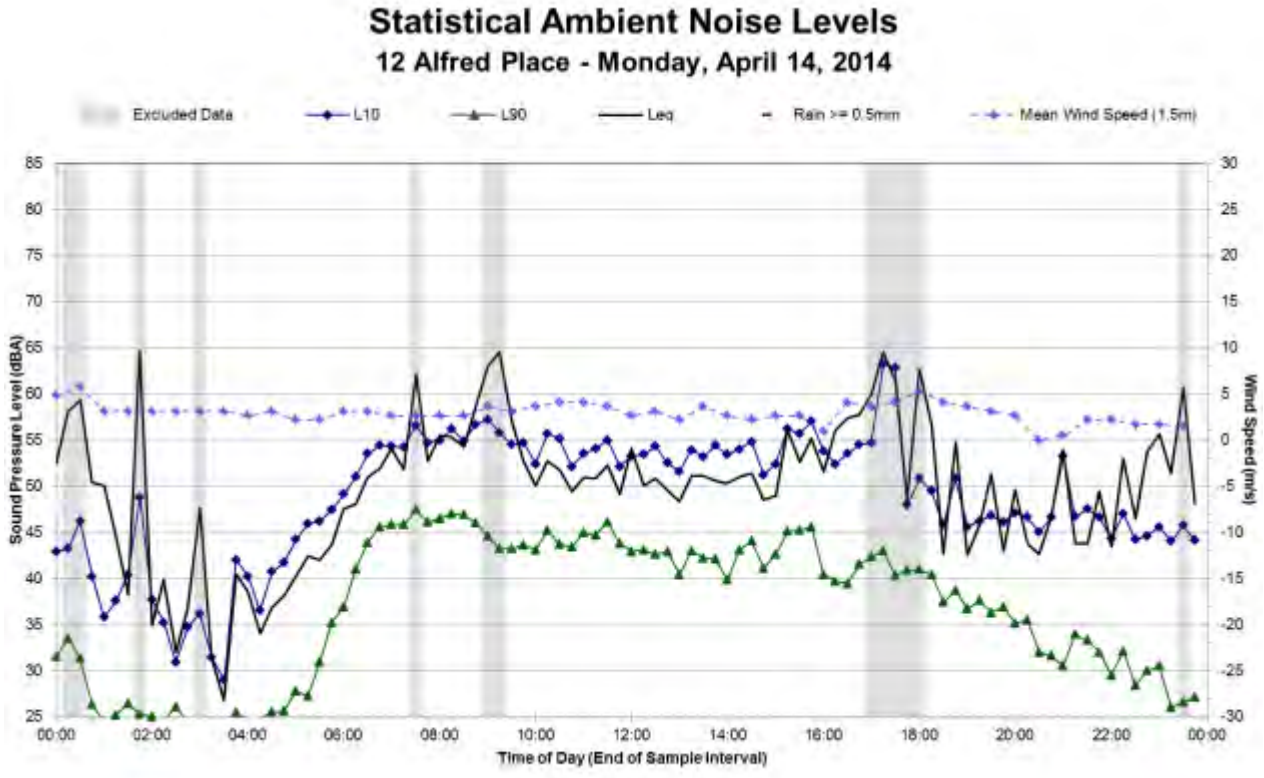
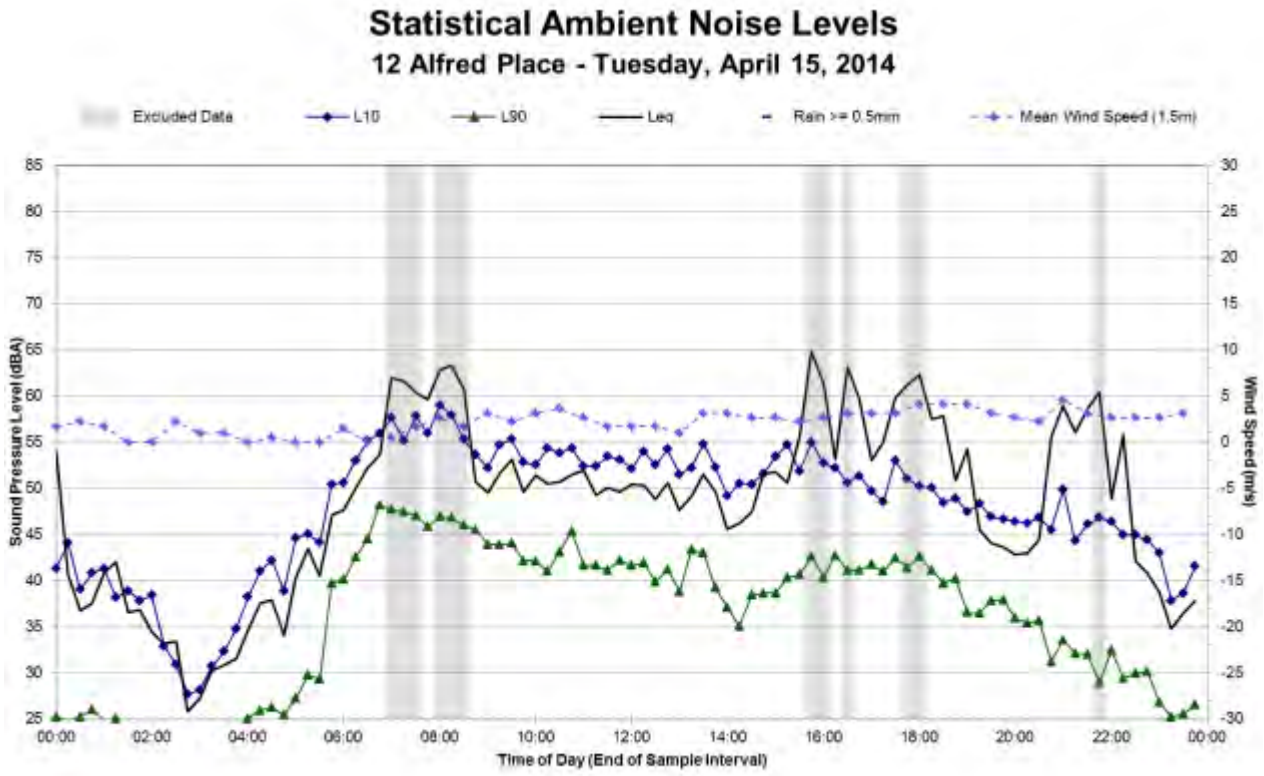
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
12 Alfred Place - Monday, April 14, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
12 Alfred Place - Tuesday, April 15, 2014
Excluded Data
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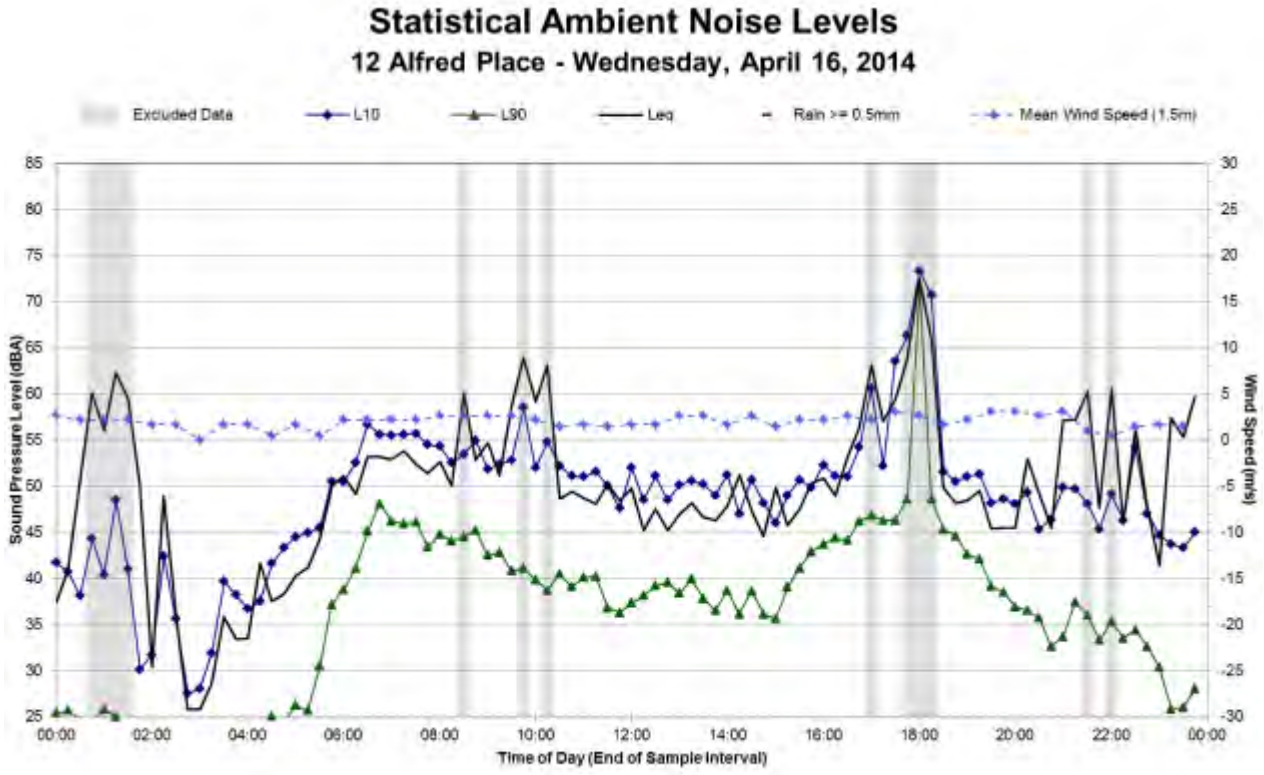
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
12 Alfred Place - Wednesday, April 16, 2014
Excluded Data
L10
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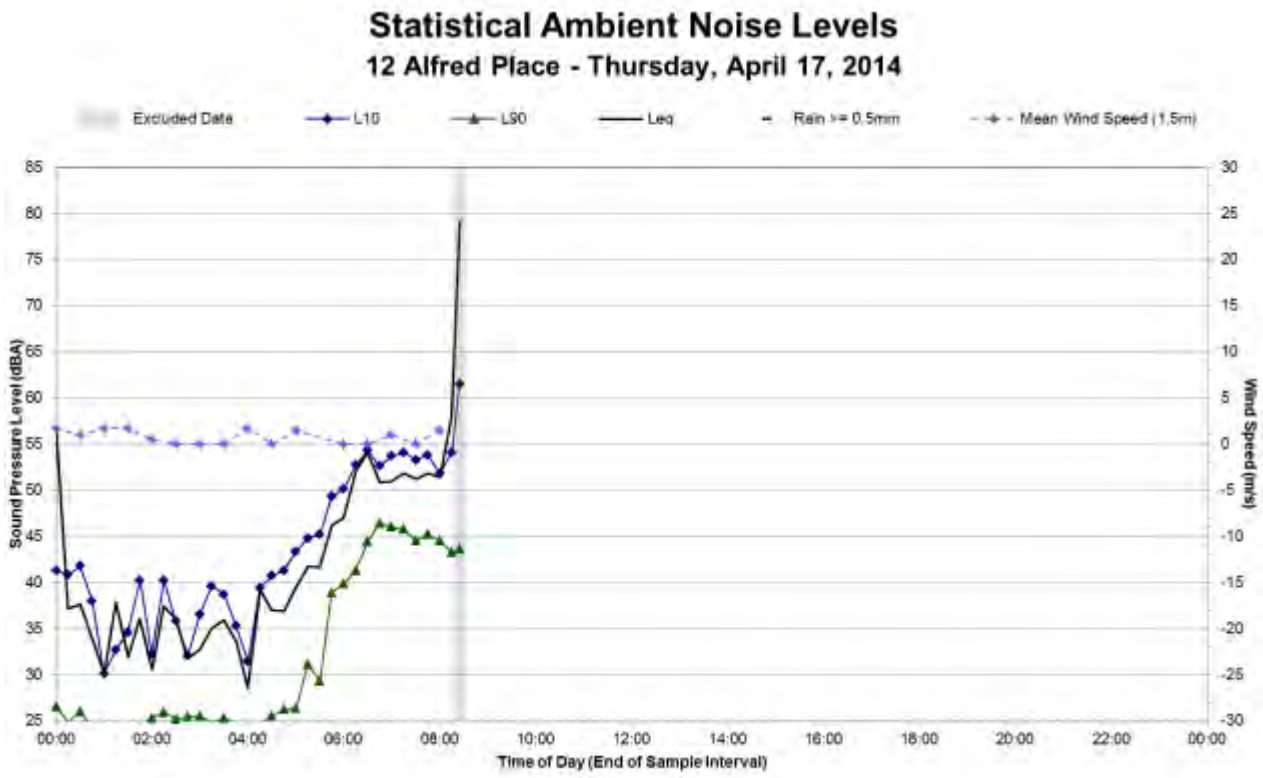
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
12 Alfred Place - Thursday, April 17, 2014
Excluded Date
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)
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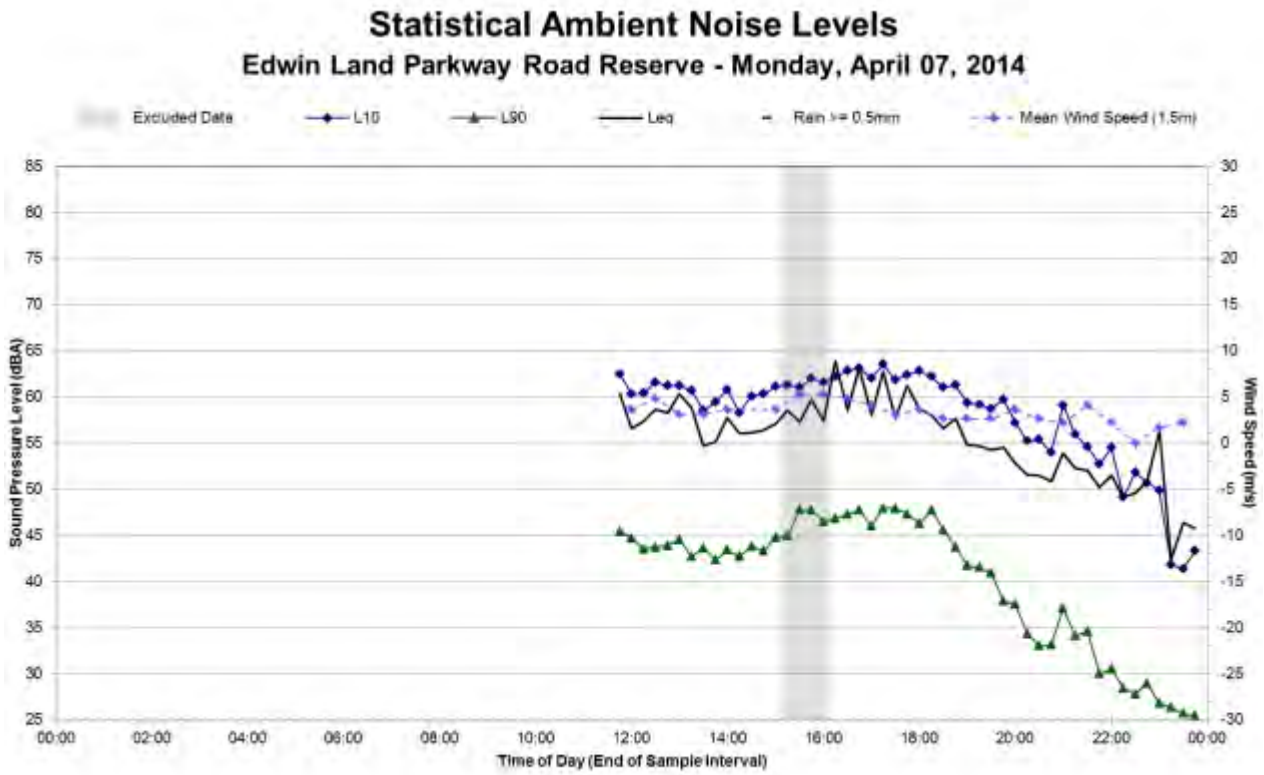
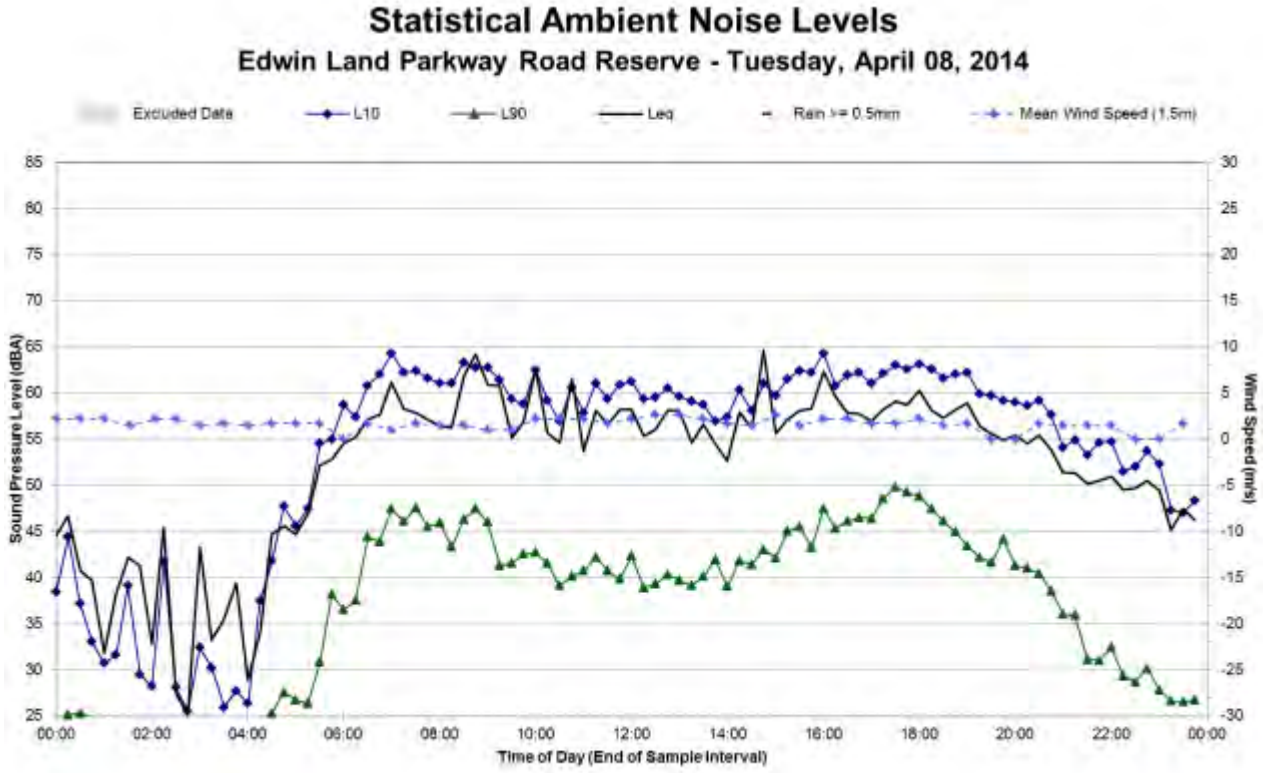
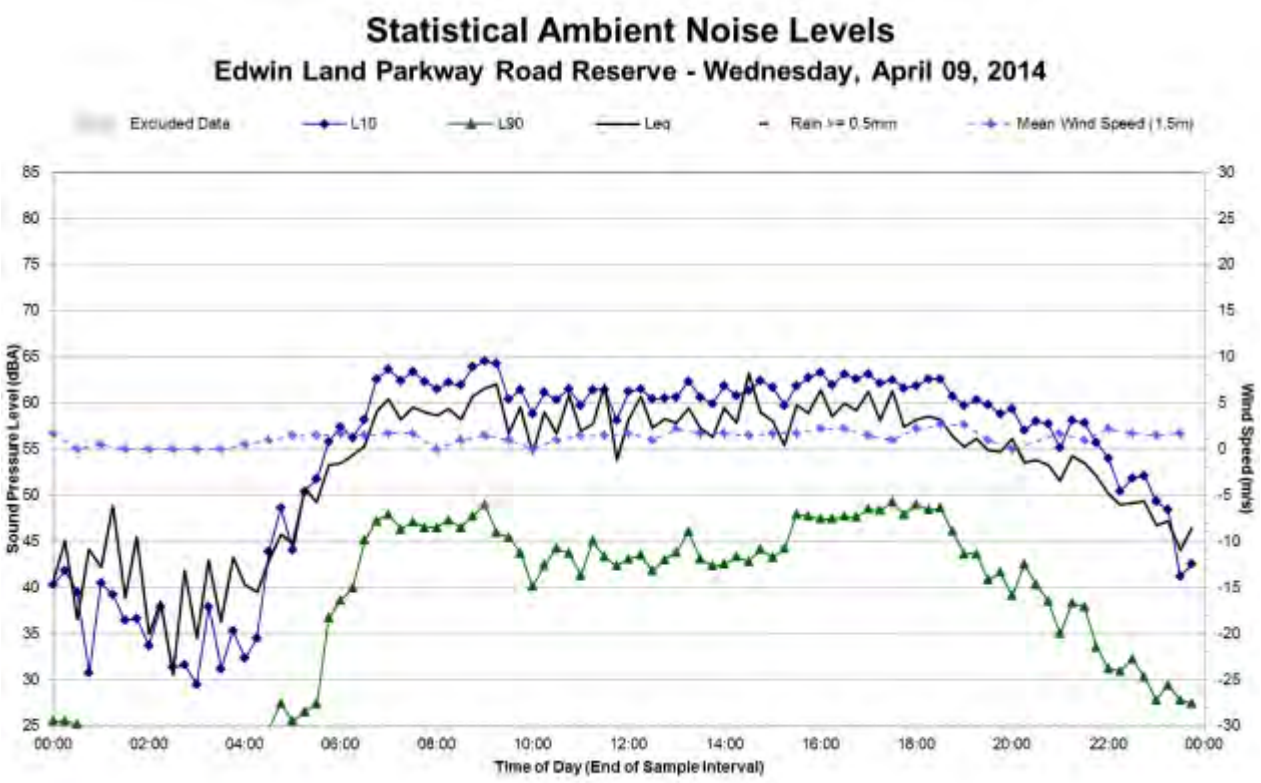
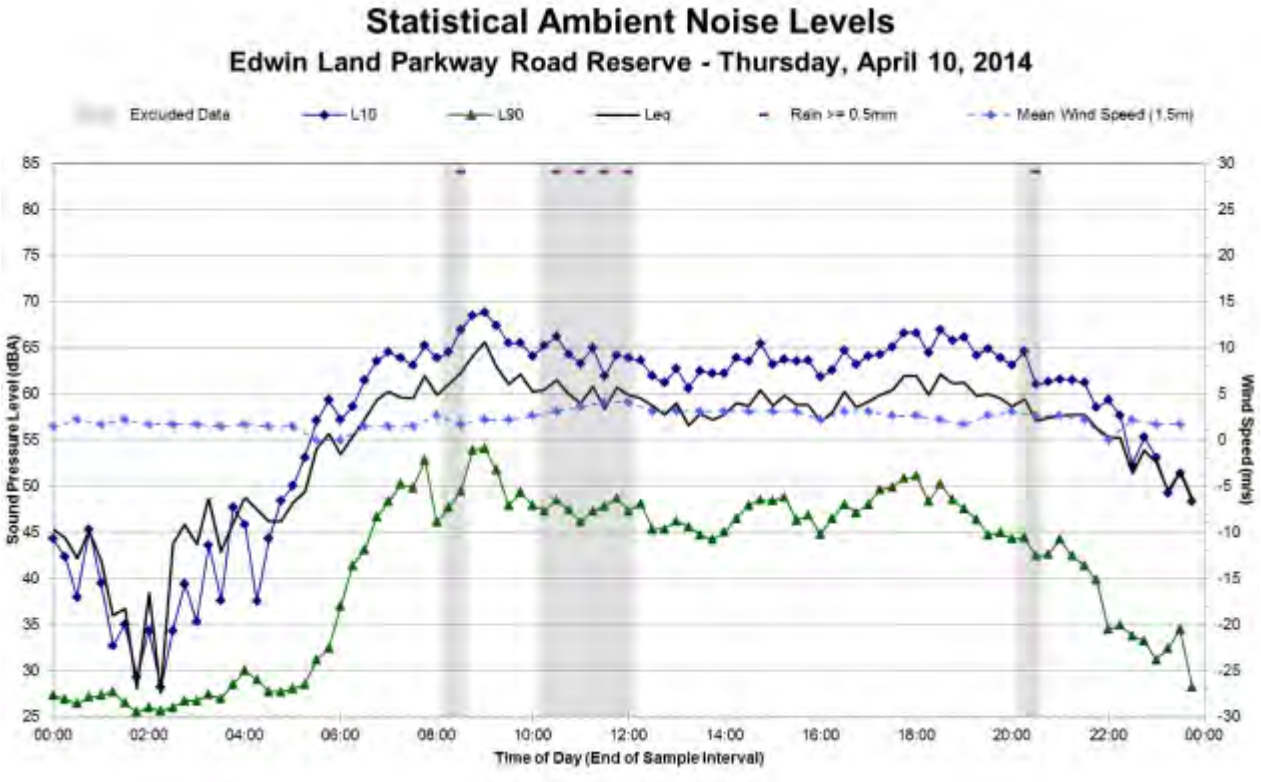
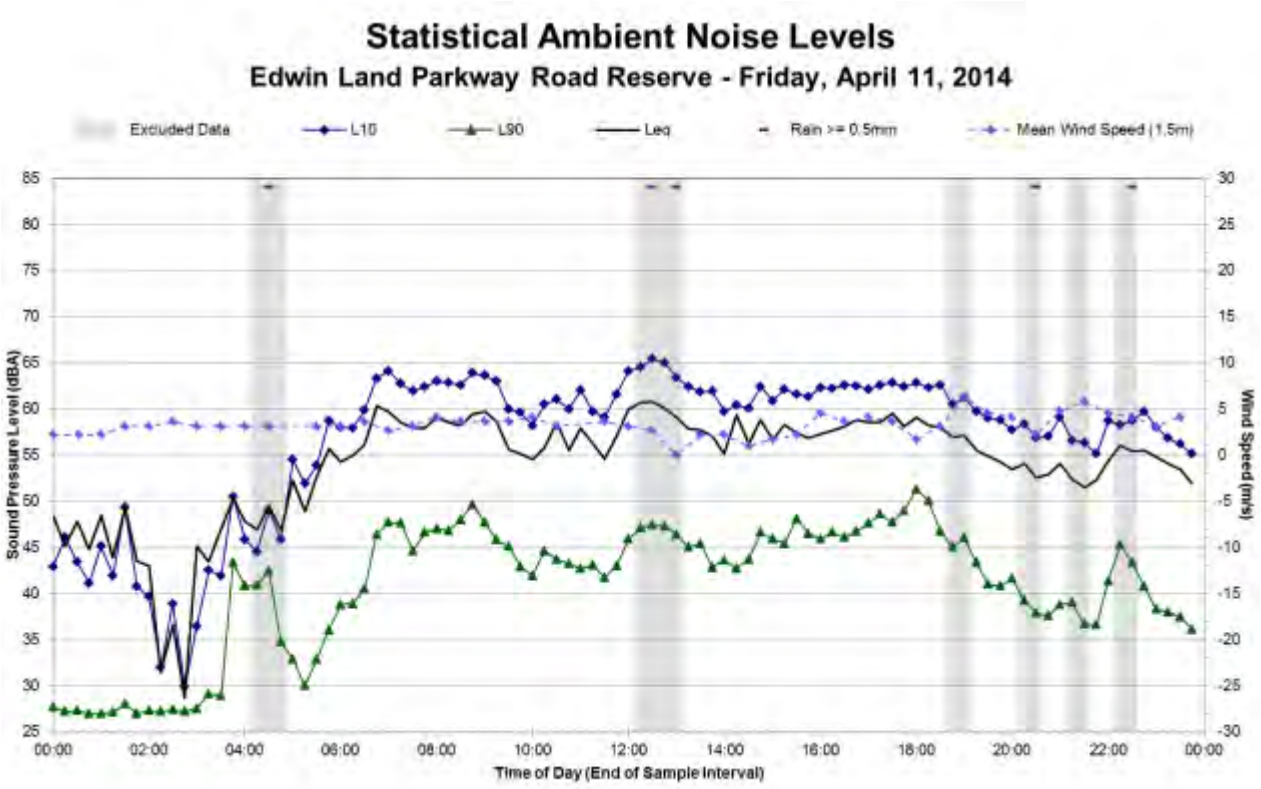
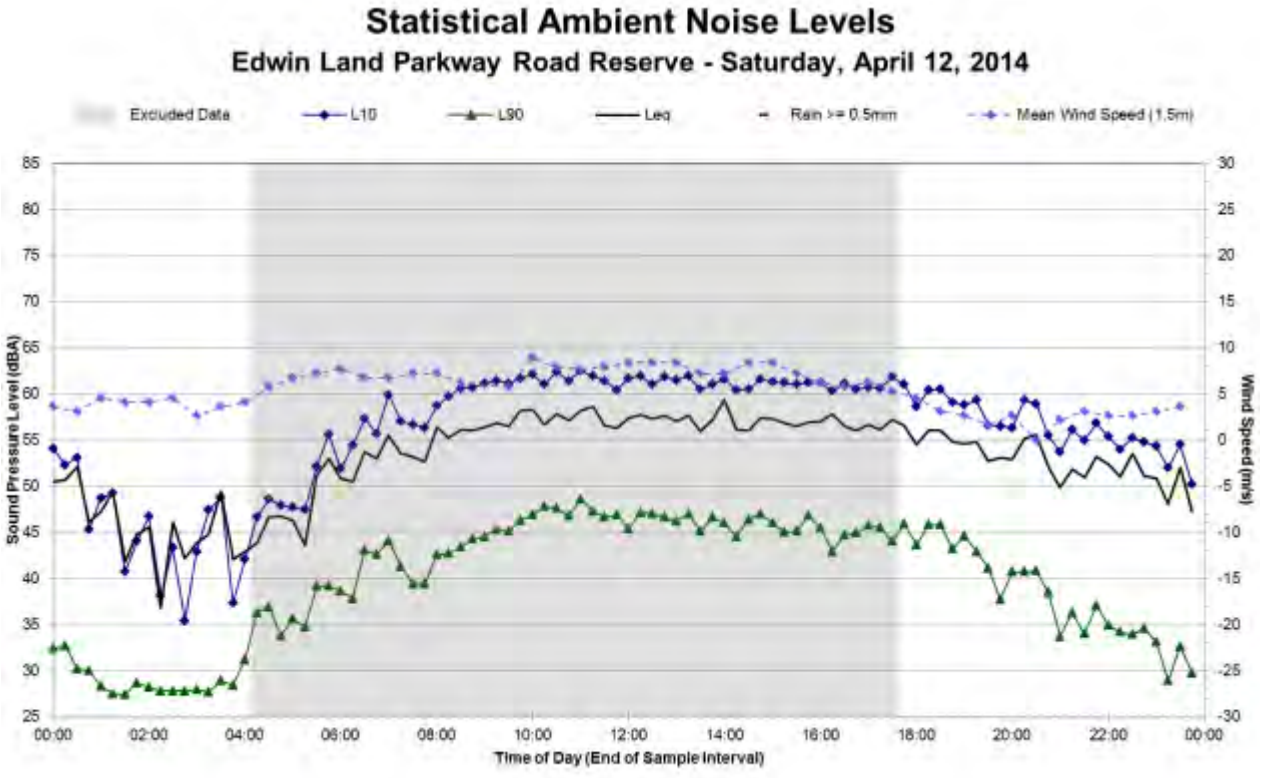

Statistical Ambient Noise Levels
Edwin Land Parkway Road Reserve - Monday, April 07, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

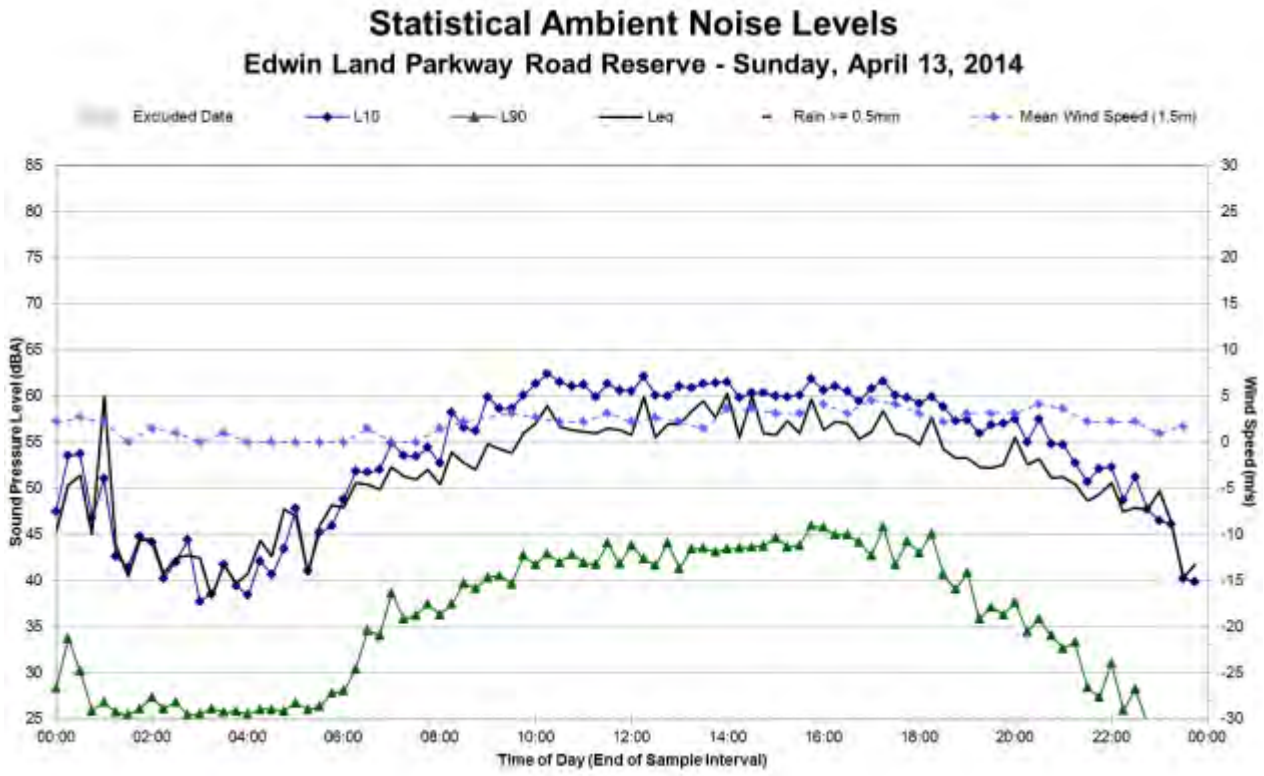

Statistical Ambient Noise Levels
Edwin Land Parkway Road Reserve - Tuesday, April 08, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

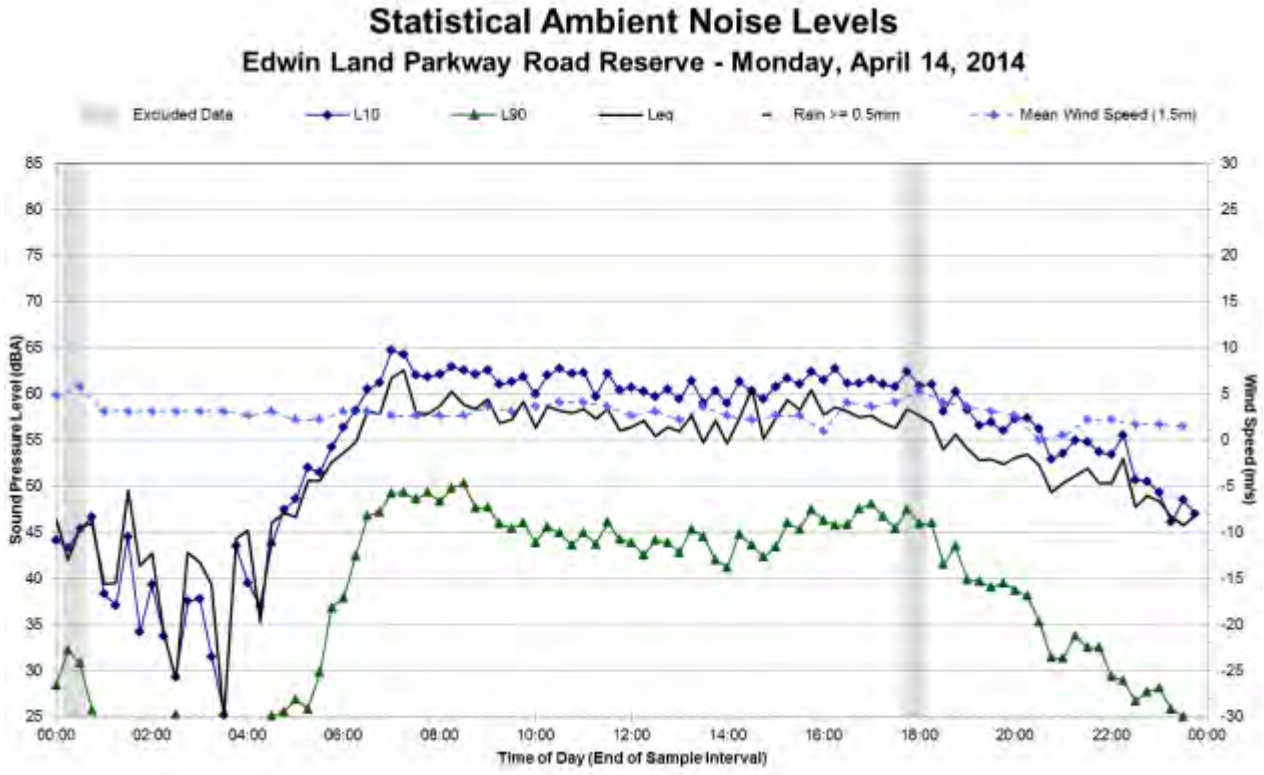

Statistical Ambient Noise Levels
Edwin Land Parkway Road Reserve - Wednesday, April 09, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

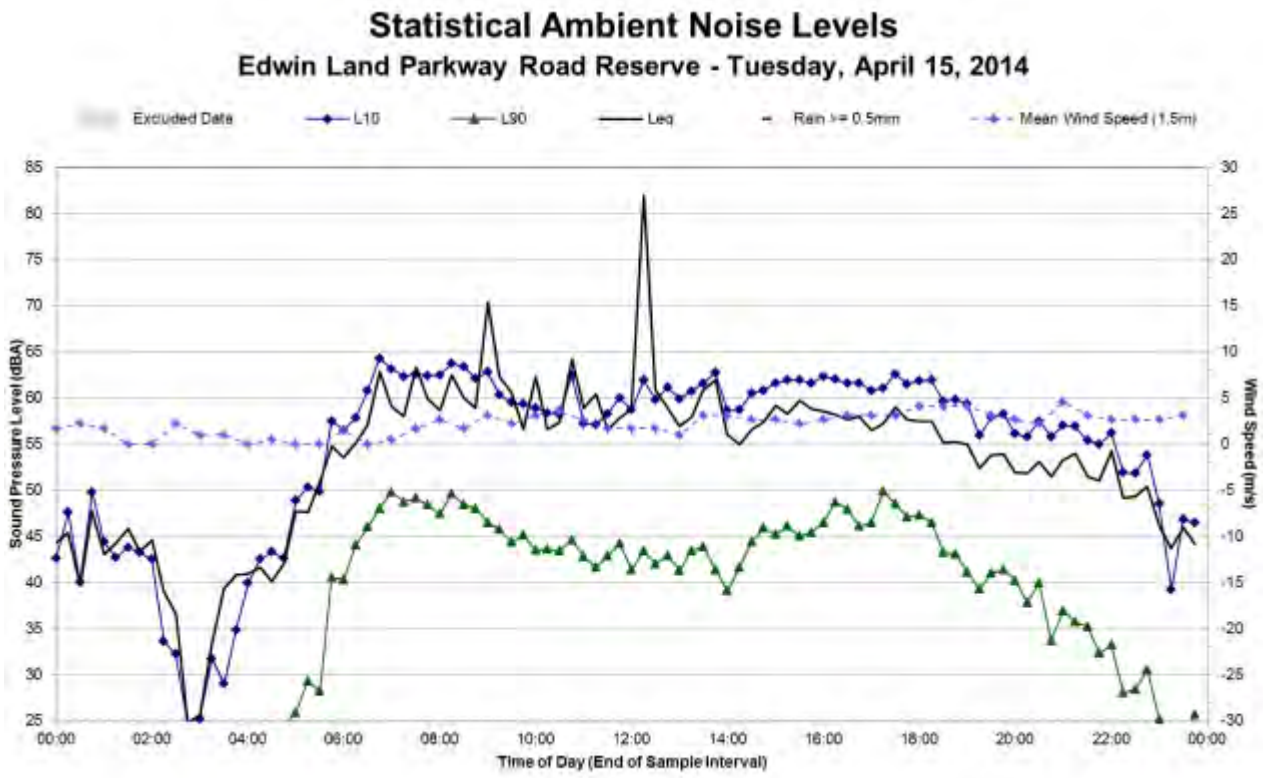

Statistical Ambient Noise Levels
Edwin Land Parkway Road Reserve - Thursday, April 10, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

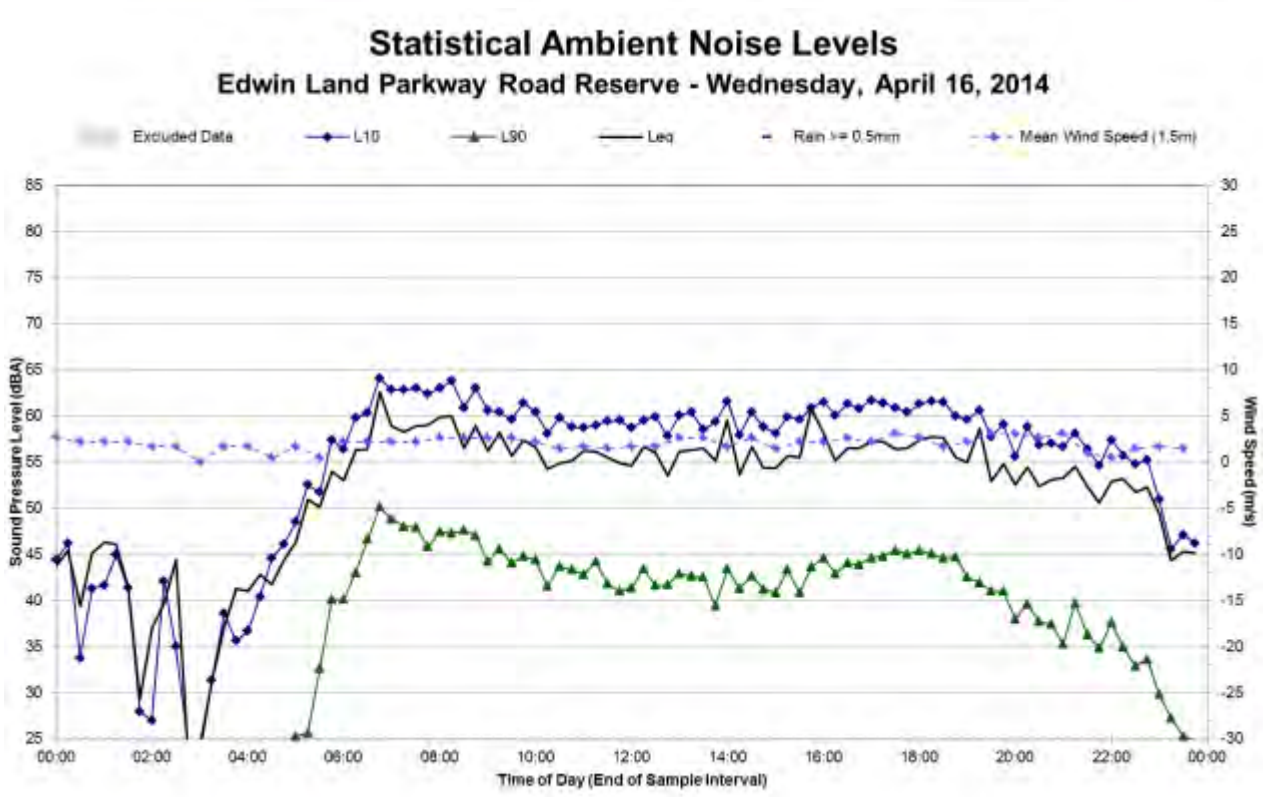

Statistical Ambient Noise Levels
Edwin Land Parkway Road Reserve - Friday, April 11, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

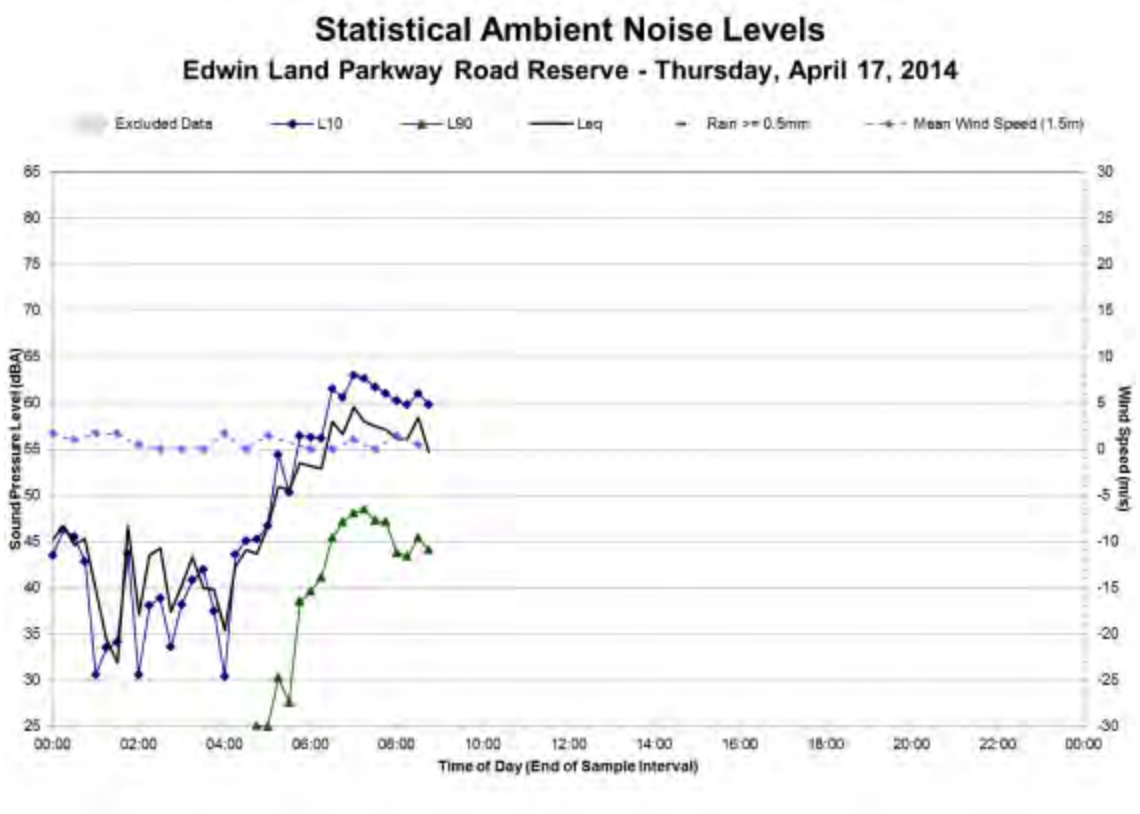

Statistical Ambient Noise Levels
Edwin Land Parkway Road Reserve - Saturday, April 12, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
Edwin Land Parkway Road Reserve - Sunday, April 13, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
Edwin Land Parkway Road Reserve - Monday, April 14, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
Edwin Land Parkway Road Reserve - Tuesday, April 15, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
Edwin Land Parkway Road Reserve - Wednesday, April 16, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)


Statistical Ambient Noise Levels
Edwin Land Parkway Road Reserve - Thursday, April 17, 2014
Excluded Data
L10
L90
Leq
Rain >= 0.5mm
Mean Wind Speed (1.5m)
Sound Pressure Level (dBA)
Wind Speed (m/s)
Time of Day (End of Sample Interval)

Receiver Address	Predicted Noise Levels (dBA)				Relative Increase (dBA)		Design Year 'Build' Scenario Level Above RNP Criteria (dBA) i.e. LAeq(15hour) 55 LAeq(9hour) 50		Design Year 'Build' Scenario Level Exceed 12 dB 'Relative Increase Criteria'?	
	Design Year – 'No Build' Scenario		Design Year – 'Build' Scenario							
	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)
NCA1										
6 PATRICK BRICK COURT - GF	53	45	57	49	3.6	3.3	1.6	-	-	-
6 PATRICK BRICK COURT - F 1	55	47	58	50	3.7	3.4	3.2	0.2	-	-
8 PATRICK BRICK COURT - GF	53	45	61	52	7.3	6.9	5.5	2.3	-	-
8 PATRICK BRICK COURT - F 1	55	47	63	55	8.5	8.0	8	4.8	-	-
33 PATRICK BRICK COURT - GF	42	35	54	46	12.1	10.9	-	-	YES	-
33 PATRICK BRICK COURT - F 1	45	38	61	53	15.4	14.3	5.7	2.5	YES	YES
31 PATRICK BRICK COURT - GF	48	41	60	51	11.5	10.9	4.6	1.4	-	-
31 PATRICK BRICK COURT - F 1	51	43	63	54	11.8	11.1	7.6	4.4	-	-
29 PATRICK BRICK COURT - GF	49	41	61	53	12.3	11.8	5.9	2.7	YES	-
29 PATRICK BRICK COURT - F 1	51	43	63	55	12.4	11.8	8.1	4.8	YES	-
27 PATRICK BRICK COURT - GF	51	43	62	54	11.2	10.7	6.9	3.7	-	-
25 PATRICK BRICK COURT - GF	45	38	59	50	14.0	12.9	3.6	0.4	YES	YES
25 PATRICK BRICK COURT - F 1	47	40	62	54	14.9	13.9	7	3.8	YES	YES
23 PATRICK BRICK COURT - GF	44	37	58	49	13.9	12.7	2.6	-	YES	YES
23 PATRICK BRICK COURT - F 1	46	39	62	54	16.0	14.9	7.1	3.9	YES	YES
21 PATRICK BRICK COURT - GF	45	38	60	52	15.0	13.8	4.7	1.5	YES	YES
19 PATRICK BRICK COURT - GF	45	38	59	51	13.8	12.6	3.8	0.6	YES	YES
31 THOMAS ROYAL GARDENS - GF	44	37	60	51	16.0	14.7	4.5	1.2	YES	YES
33 THOMAS ROYAL GARDENS - GF	45	38	60	52	14.7	13.5	5.1	1.9	YES	YES
35 THOMAS ROYAL GARDENS - GF	44	37	60	52	16.5	15.3	5.2	2	YES	YES
37 THOMAS ROYAL GARDENS - GF	44	37	58	50	14.8	13.5	3.3	0.1	YES	YES
39 THOMAS ROYAL GARDENS - GF	44	37	59	51	15.1	13.9	3.7	0.5	YES	YES
41 THOMAS ROYAL GARDENS - GF	43	36	60	52	16.6	15.4	5	1.8	YES	YES

Receiver Address	Predicted Noise Levels (dBA)				Relative Increase (dBA)		Design Year 'Build' Scenario Level Above RNP Criteria (dBA) i.e. LAeq(15hour) 55 LAeq(9hour) 50		Design Year 'Build' Scenario Level Exceed 12 dB 'Relative Increase Criteria'?	
	Design Year – 'No Build' Scenario		Design Year – 'Build' Scenario							
	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)
43 THOMAS ROYAL GARDENS - GF	44	37	60	52	16.4	15.2	4.9	1.7	YES	YES
45 THOMAS ROYAL GARDENS - GF	44	37	63	55	19.6	18.4	8.2	5	YES	YES
47 THOMAS ROYAL GARDENS - GF	43	36	62	54	18.4	17.2	6.8	3.6	YES	YES
49 THOMAS ROYAL GARDENS - GF	44	37	63	55	19.9	18.7	8.4	5.2	YES	YES
51 THOMAS ROYAL GARDENS - GF	43	36	63	54	19.1	18.0	7.5	4.4	YES	YES
53 THOMAS ROYAL GARDENS - GF	44	37	63	55	19.6	18.4	8.1	4.9	YES	YES
55 THOMAS ROYAL GARDENS - GF	43	36	60	52	17.2	16.0	5.3	2.1	YES	YES
57 THOMAS ROYAL GARDENS - GF	43	36	63	55	19.5	18.3	7.8	4.6	YES	YES
59 THOMAS ROYAL GARDENS - GF	43	36	62	54	18.7	17.4	7	3.8	YES	YES
61 THOMAS ROYAL GARDENS - GF	43	36	62	53	18.3	17.1	6.5	3.3	YES	YES
NCA2										
91 ELLERTON DRIVE - GF	44	37	52	44	8.6	7.5	-	-	-	-
44 STONEHAVEN CIRCUIT - GF	51	43	57	49	6.7	6.1	2.3	-	-	-
46 STONEHAVEN CIRCUIT - GF	51	43	60	52	9.3	8.5	4.8	1.7	-	-
48 STONEHAVEN CIRCUIT - GF	48	41	58	50	10.8	9.7	3.4	0.3	-	-
50 STONEHAVEN CIRCUIT - GF	50	43	57	49	7.3	6.5	2.1	-	-	-
52 STONEHAVEN CIRCUIT - GF	50	42	58	50	8.0	7.3	2.7	-	-	-
54 STONEHAVEN CIRCUIT - GF	50	42	53	45	3.4	2.8	-	-	-	-
56 STONEHAVEN CIRCUIT - GF	49	42	57	49	7.9	7.1	1.9	-	-	-
58 STONEHAVEN CIRCUIT - GF	49	41	58	50	9.2	8.4	2.9	-	-	-
60 STONEHAVEN CIRCUIT - GF	46	39	59	51	12.4	11.4	3.7	0.5	YES	-
62 STONEHAVEN CIRCUIT - GF	46	38	56	48	10.6	9.5	1.1	-	-	-
1 TENNYSON DRIVE - GF	44	37	53	45	8.9	7.8	-	-	-	-
2 TENNYSON DRIVE - GF	44	37	60	52	15.8	14.6	4.7	1.5	YES	YES

Receiver Address	Predicted Noise Levels (dBA)				Relative Increase (dBA)		Design Year 'Build' Scenario Level Above RNP Criteria (dBA) i.e. LAeq(15hour) 55 LAeq(9hour) 50		Design Year 'Build' Scenario Level Exceed 12 dB 'Relative Increase Criteria'?	
	Design Year – 'No Build' Scenario		Design Year – 'Build' Scenario							
	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)
12 NORTHCLIFFE PLACE - GF	44	37	62	54	17.7	16.4	7	3.8	YES	YES
12 NORTHCLIFFE PLACE - GF	45	38	62	54	17.6	16.4	7.2	4.1	YES	YES
10 NORTHCLIFFE PLACE - GF	44	37	51	43	6.6	5.6	-	-	-	-
21 NORTHCLIFFE PLACE - GF	42	35	54	46	12.4	11.2	-	-	YES	-
21 NORTHCLIFFE PLACE - GF	44	37	55	47	11.3	10.0	0.3	-	-	-
13 GEEBUNG PLACE - GF	42	35	51	42	8.8	7.5	-	-	-	-
12 GEEBUNG PLACE - GF	40	33	48	40	8.3	7.1	-	-	-	-
14 GEEBUNG PLACE - GF	40	33	48	40	7.7	6.7	-	-	-	-
16 GEEBUNG PLACE - GF	40	33	47	39	7.4	6.3	-	-	-	-
NCA3										
14 TAYLOR PLACE - GF	43	36	49	42	6.2	5.2	-	-	-	-
16 TAYLOR PLACE - GF	43	36	51	43	8.3	7.2	-	-	-	-
18 TAYLOR PLACE - GF	42	35	52	44	10.7	9.6	-	-	-	-
20 TAYLOR PLACE - GF	39	32	54	45	14.4	13.1	-	-	YES	YES
22 TAYLOR PLACE - GF	41	34	55	47	13.4	12.2	-	-	YES	YES
22 TAYLOR PLACE - F1	41	34	56	48	15.1	13.6	1	-	YES	YES
24 TAYLOR PLACE - GF	41	34	55	46	13.3	12.2	-	-	YES	YES
26 TAYLOR PLACE - GF	40	33	53	44	12.7	11.3	-	-	YES	-
30 TAYLOR PLACE - GF	41	34	58	50	16.8	15.6	2.9	-	YES	YES
30 TAYLOR PLACE - F1	41	34	59	51	18.0	16.5	4	1	YES	YES
32 TAYLOR PLACE - GF	39	32	57	49	18.0	16.6	2	-	YES	YES
32 TAYLOR PLACE - F1	39	32	58	51	18.5	17.8	3	1	YES	YES
34 TAYLOR PLACE - GF	37	30	56	47	18.1	16.8	0.5	-	YES	YES
36 TAYLOR PLACE - GF	38	31	57	49	19.3	17.9	2	-	YES	YES

Receiver Address	Predicted Noise Levels (dBA)				Relative Increase (dBA)		Design Year 'Build' Scenario Level Above RNP Criteria (dBA) i.e. LAeq(15hour) 55 LAeq(9hour) 50		Design Year 'Build' Scenario Level Exceed 12 dB 'Relative Increase Criteria'?	
	Design Year – 'No Build' Scenario		Design Year – 'Build' Scenario							
	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)
38 TAYLOR PLACE - GF	39	32	56	48	18.5	17.1	1	-	YES	YES
40 TAYLOR PLACE - GF	39	32	56	48	18.3	16.8	1	-	YES	YES
NCA4										
28 SEVERNE STREET - GF	39	32	43	36	4.0	3.3	-	-	-	-
26 SEVERNE STREET - GF	42	35	45	37	2.5	2.0	-	-	-	-
30 SEVERNE STREET - GF	38	31	45	37	6.3	5.3	-	-	-	-
32 SEVERNE STREET - GF	42	35	48	40	5.3	4.5	-	-	-	-
34 SEVERNE STREET - GF	39	32	51	43	12.6	11.4	-	-	YES	-
36 SEVERNE STREET - GF	37	31	51	43	13.3	12.0	-	-	YES	-
38 SEVERNE STREET - GF	39	32	52	44	13.4	12.1	-	-	YES	YES
40 SEVERNE STREET - GF	37	30	52	43	14.3	13.0	-	-	YES	YES
42 SEVERNE STREET - GF	38	31	45	37	7.3	6.3	-	-	-	-
44 SEVERNE STREET - GF	37	30	44	36	6.3	5.3	-	-	-	-
46 SEVERNE STREET - GF	37	31	47	39	9.3	8.1	-	-	-	-
48 SEVERNE STREET - GF	38	31	47	39	9.2	8.0	-	-	-	-
50 SEVERNE STREET - GF	40	33	48	40	7.3	6.3	-	-	-	-
NCA5										
1 WOODMAN PLACE - GF	39	32	46	38	7.3	6.2	-	-	-	-
3 WOODMAN PLACE - GF	38	31	47	39	9.2	8.1	-	-	-	-
5 WOODMAN PLACE - GF	41	34	49	41	7.9	7.0	-	-	-	-
11 WOODMAN PLACE - GF	40	33	47	39	6.4	5.4	-	-	-	-
12 WOODMAN PLACE - GF	41	34	50	42	9.8	8.8	-	-	-	-
13 WOODMAN PLACE - GF	40	33	54	46	14.0	12.9	-	-	YES	YES
26 LONERGAN DRIVE - GF	36	29	55	46	18.8	17.5	-	-	YES	YES

Receiver Address	Predicted Noise Levels (dBA)				Relative Increase (dBA)		Design Year 'Build' Scenario Level Above RNP Criteria (dBA) i.e. LAeq(15hour) 55 LAeq(9hour) 50		Design Year 'Build' Scenario Level Exceed 12 dB 'Relative Increase Criteria'?	
	Design Year – 'No Build' Scenario		Design Year – 'Build' Scenario							
	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)
26 LONERGAN DRIVE – F1	36	29	56	47	19.8	18.2	1	-	YES	YES
24 LONERGAN DRIVE – GF	40	33	54	46	13.8	12.5	-	-	YES	YES
35 LONERGAN DRIVE - GF	36	29	57	49	21.0	19.7	1.9	-	YES	YES
35 LONERGAN DRIVE – F1	36	29	58	50	22.0	20.8	3	-	YES	YES
NCA6										
40A Serverne Street	39	32	57	49	18.5	17.2	2	-	YES	YES
NCA7										
125 BARRACKS FLAT PLACE - GF	37	30	62	53	24.9	23.6	6.5	3.3	YES	YES
132 BARRACKS FLAT PLACE - GF	36	29	62	53	25.3	24.0	6.5	3.2	YES	YES
132 BARRACKS FLAT PLACE - F 1	38	31	62	54	24.6	23.3	7.1	3.8	YES	YES
6 DOEBERL PLACE - GF	37	30	61	53	24.1	22.8	6.2	2.9	YES	YES
6 DOEBERL PLACE - F 1	38	31	62	54	24.6	23.2	7.2	3.9	YES	YES
6 DOEBERL PLACE - GF	38	31	62	54	24.3	23.0	6.9	3.6	YES	YES
6 DOEBERL PLACE - F 1	38	31	63	54	24.4	23.1	7.6	4.4	YES	YES
20 DOEBERL PLACE - GF	38	31	58	50	20.7	19.4	3.4	0.1	YES	YES
20 DOEBERL PLACE - GF	38	31	59	51	21.8	20.5	4.4	1.1	YES	YES
22 DOEBERL PLACE - GF	38	31	60	52	22.3	21.0	4.9	1.6	YES	YES
24 DOEBERL PLACE - GF	38	31	59	51	21.5	20.3	4.4	1.2	YES	YES
24 DOEBERL PLACE - F 1	39	32	61	53	22.3	21.1	5.9	2.7	YES	YES
26 DOEBERL PLACE - GF	39	32	59	51	20.6	19.3	4.1	0.9	YES	YES
28 DOEBERL PLACE - GF	39	32	59	51	19.6	18.3	3.9	0.6	YES	YES
28 DOEBERL PLACE - F 1	40	33	61	53	21.2	19.8	6.3	3	YES	YES
30 DOEBERL PLACE - GF	40	33	61	53	21.6	20.2	6.4	3.1	YES	YES

Receiver Address	Predicted Noise Levels (dBA)				Relative Increase (dBA)		Design Year 'Build' Scenario Level Above RNP Criteria (dBA) i.e. LAeq(15hour) 55 LAeq(9hour) 50		Design Year 'Build' Scenario Level Exceed 12 dB 'Relative Increase Criteria'?	
	Design Year – 'No Build' Scenario		Design Year – 'Build' Scenario							
	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)
Unit 3, 4 - 32 DOEBERL PLACE - GF	41	34	62	54	21.8	20.5	7.4	4.1	YES	YES
Unit 5, 6, 7 - 32 DOEBERL PLACE - GF	41	34	57	49	16.4	15.1	2.3	-	YES	YES
Unit 8 to 12 - 32 DOEBERL PLACE - GF	42	35	60	52	18.7	17.4	5.3	2	YES	YES
Unit 8 to 12 - 32 DOEBERL PLACE - F 1	42	35	62	54	20.7	19.4	7.3	4	YES	YES
Unit 13 - 32 DOEBERL PLACE - GF	42	35	62	53	19.7	18.3	6.5	3.2	YES	YES
Unit 13 - 32 DOEBERL PLACE - F 1	42	35	64	55	21.7	20.3	8.5	5.2	YES	YES
NCA8										
75 RIVER DRIVE - GF	39	31	53	44	13.6	13.4	-	-	YES	YES
73 RIVER DRIVE - GF	39	31	51	43	12.1	11.9	-	-	YES	-
73 RIVER DRIVE - F1	40	33	53	45	13.2	11.5	-	-	YES	-
69 RIVER DRIVE - GF	39	32	50	42	11.9	10.4	-	-	-	-
69 RIVER DRIVE - F1	40	32	52	44	12.4	12.2	-	-	YES	YES
107 BARRACKS FLAT DRIVE - GF	39	32	53	45	14.3	13.0	-	-	YES	YES
105 BARRACKS FLAT DRIVE - GF	39	32	53	44	13.8	12.4	-	-	YES	YES
105 BARRACKS FLAT DRIVE - F1	40	33	55	46	14.8	13.4	-	-	YES	YES
126A BARRACKS FLAT DRIVE - GF	33	26	55	47	21.4	20.2	-	-	YES	YES
126A BARRACKS FLAT DRIVE - F 1	36	29	57	49	20.7	19.4	1.8	No	YES	YES
122 BARRACKS FLAT DRIVE - GF	36	29	54	46	18.8	17.4	-	-	YES	YES
120 BARRACKS FLAT DRIVE - GF	36	29	56	48	20.1	18.7	0.9	-	YES	YES
118 BARRACKS FLAT DRIVE - GF	35	28	57	48	21.5	20.2	1.5	-	YES	YES
116 BARRACKS FLAT DRIVE - GF	33	26	57	49	23.8	22.6	2.2	-	YES	YES
116 BARRACKS FLAT DRIVE - F 1	37	30	59	51	21.8	20.6	3.7	0.5	YES	YES
114 BARRACKS FLAT DRIVE - GF	36	29	59	50	22.4	21.1	3.7	0.4	YES	YES
112 BARRACKS FLAT DRIVE - GF	36	29	59	51	23.2	21.8	4.1	0.8	YES	YES

Receiver Address	Predicted Noise Levels (dBA)				Relative Increase (dBA)		Design Year 'Build' Scenario Level Above RNP Criteria (dBA) i.e. LAeq(15hour) 55 LAeq(9hour) 50		Design Year 'Build' Scenario Level Exceed 12 dB 'Relative Increase Criteria'?	
	Design Year – 'No Build' Scenario		Design Year – 'Build' Scenario							
	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)
110 BARRACKS FLAT DRIVE - GF	34	27	59	51	24.8	23.5	3.8	0.5	YES	YES
110 BARRACKS FLAT DRIVE - F 1	37	30	61	53	23.8	22.5	5.8	2.5	YES	YES
108 BARRACKS FLAT DRIVE - GF	34	27	59	51	24.6	23.4	4	0.7	YES	YES
108 BARRACKS FLAT DRIVE - F 1	38	31	61	53	23.4	22.2	6.2	3	YES	YES
108 BARRACKS FLAT DRIVE - GF	37	30	59	51	22.3	21.0	4.3	1	YES	YES
106 BARRACKS FLAT DRIVE - GF	37	30	60	52	22.9	21.7	5	1.8	YES	YES
102 BARRACKS FLAT DRIVE - GF	35	28	57	48	21.8	20.5	1.7	-	YES	YES
102 BARRACKS FLAT DRIVE - F 1	39	32	59	51	20.5	19.2	4.2	0.9	YES	YES
98 BARRACKS FLAT DRIVE - GF	36	29	58	50	22.2	21.0	3.3	-	YES	YES
98 BARRACKS FLAT DRIVE - F 1	39	32	60	52	20.4	19.2	4.7	1.5	YES	YES
96 BARRACKS FLAT DRIVE - GF	37	30	55	47	18.0	17.0	0.1	-	YES	YES
96 BARRACKS FLAT DRIVE - F 1	40	33	57	49	17.3	16.2	2.2	No	YES	YES
90 BARRACKS FLAT DRIVE - GF	39	32	59	51	20.5	19.3	4.4	1.1	YES	YES
92 BARRACKS FLAT DRIVE - F 1	40	33	56	48	16.1	15.0	0.7	No	YES	YES
86 BARRACKS FLAT DRIVE - GF	39	32	52	44	13.8	12.5	-	-	YES	YES
86 BARRACKS FLAT DRIVE - GF	38	31	52	44	14.0	12.8	-	-	YES	YES
1 WEBBER PLACE - GF	37	30	54	45	16.5	15.3	-	-	YES	YES
82 BARRACKS FLAT DRIVE - GF	41	34	49	41	8.8	7.8	-	-	-	-
82 BARRACKS FLAT DRIVE - F 1	40	33	60	51	19.6	18.4	4.5	1.2	YES	YES
3 WEBBER PLACE - GF	36	29	50	42	13.6	12.5	-	-	YES	YES
3 WEBBER PLACE - F 1	42	35	53	44	10.9	9.8	No	No	-	-
80 BARRACKS FLAT DRIVE - GF	42	35	60	52	18.1	16.9	5	1.9	YES	YES
80 BARRACKS FLAT DRIVE - F 1	42	35	61	53	19.1	18.0	6	2.8	YES	YES
78 BARRACKS FLAT DRIVE - GF	40	33	53	45	13.0	12.1	-	-	YES	YES

Receiver Address	Predicted Noise Levels (dBA)				Relative Increase (dBA)		Design Year 'Build' Scenario Level Above RNP Criteria (dBA) i.e. LAeq(15hour) 55 LAeq(9hour) 50		Design Year 'Build' Scenario Level Exceed 12 dB 'Relative Increase Criteria'?	
	Design Year – 'No Build' Scenario		Design Year – 'Build' Scenario							
	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)
78 BARRACKS FLAT DRIVE - F 1	42	35	58	50	15.8	14.7	3.2	No	YES	YES
74 BARRACKS FLAT DRIVE - GF	45	38	53	44	7.5	6.6	No	No	-	-
5 WEBBER PLACE - GF	40	33	51	43	11.7	10.7	-	-	-	-
7 WEBBER PLACE - GF	37	30	52	44	15.4	14.3	-	-	YES	YES
7 WEBBER PLACE - F 1	42	35	56	48	14.2	13.0	1.1	No	YES	YES
9 WEBBER PLACE - GF	40	33	54	46	13.8	12.8	-	-	YES	YES
9 WEBBER PLACE - F 1	44	36	59	50	15.0	13.9	3.6	0.3	YES	YES
11 WEBBER PLACE - GF	45	38	53	44	7.5	6.6	-	-	-	-
11 FITZGIBBON PLACE - GF	48	41	54	46	5.5	4.8	-	-	-	-
13 WEBBER PLACE - GF	46	39	53	45	6.7	5.9	-	-	-	-
12 WEBBER PLACE - GF	50	42	53	45	3.0	2.2	-	-	-	-
12 WEBBER PLACE - F 1	52	44	60	52	8.8	7.9	5.4	2.3	-	-
16 FITZGIBBON PLACE - GF	50	42	57	49	7.6	6.8	2.3	-	-	-
15 FITZGIBBON PLACE - GF	50	42	57	49	7.5	6.6	2.1	-	-	-
13 CAROLINE PLACE - GF	52	45	60	52	7.5	6.6	4.6	1.5	-	-
17 FITZGIBBON PLACE - GF	53	46	59	51	6.1	5.3	4	1	-	-
17 CAROLINE PLACE - GF	52	45	60	52	8.0	7.2	5.3	2.2	-	-
19 CAROLINE PLACE - GF	56	48	62	54	6.2	5.4	6.7	3.7	-	-
16 ALFRED PLACE - GF	57	50	60	52	3.1	2.7	5.1	2.4	-	-
18 ALFRED PLACE - GF	57	49	60	52	3.3	2.9	5	2.3	-	-
18 ALFRED PLACE - F 1	58	50	62	54	4.4	3.8	6.9	4.1	-	-
14 ALFRED PLACE - GF	58	51	60	53	2.5	2.0	5.2	2.6	-	-
12 ALFRED PLACE - GF	57	49	59	52	2.6	2.1	4.1	1.5	-	-

Receiver Address	Predicted Noise Levels (dBA)				Relative Increase (dBA)		Design Year 'Build' Scenario Level Above RNP Criteria (dBA) i.e. LAeq(15hour) 55 LAeq(9hour) 50		Design Year 'Build' Scenario Level Exceed 12 dB 'Relative Increase Criteria'?	
	Design Year – 'No Build' Scenario		Design Year – 'Build' Scenario							
	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)
NCA1										
6 PATRICK BRICK COURT - GF	53	45	57	49	3.6	3.3	1.6	-	-	-
6 PATRICK BRICK COURT - F 1	55	47	58	50	3.7	3.4	3.2	-	-	-
8 PATRICK BRICK COURT - GF	53	45	61	52	7.3	6.9	5.5	2.3	-	-
8 PATRICK BRICK COURT - F 1	55	47	63	55	8.5	8.0	8	4.8	-	-
33 PATRICK BRICK COURT - GF	42	35	54	46	12.1	10.9	-	-	-	-
33 PATRICK BRICK COURT - F 1	45	38	61	53	15.4	14.3	5.7	2.5	YES	YES
31 PATRICK BRICK COURT - GF	48	41	60	51	11.5	10.9	4.6	1.4	-	-
31 PATRICK BRICK COURT - F 1	51	43	63	54	11.8	11.1	7.6	4.4	-	-
29 PATRICK BRICK COURT - GF	49	41	61	53	12.3	11.8	5.9	2.7	YES	-
29 PATRICK BRICK COURT - F 1	51	43	63	55	12.4	11.8	8.1	4.8	YES	-
27 PATRICK BRICK COURT - GF	51	43	62	54	11.2	10.7	6.9	3.7	-	-
25 PATRICK BRICK COURT - GF	45	38	59	50	14.0	12.9	3.6	-	YES	YES
25 PATRICK BRICK COURT - F 1	47	40	62	54	14.9	13.9	7	3.8	YES	YES
23 PATRICK BRICK COURT - GF	44	37	58	49	13.9	12.7	2.6	-	YES	YES
23 PATRICK BRICK COURT - F 1	46	39	62	54	16.0	14.9	7.1	3.9	YES	YES
21 PATRICK BRICK COURT - GF	45	38	60	52	15.0	13.8	4.7	1.5	YES	YES
19 PATRICK BRICK COURT - GF	45	38	59	51	13.8	12.6	3.8	0.6	YES	YES
31 THOMAS ROYAL GARDENS - GF	44	37	60	51	16.0	14.7	4.5	1.2	YES	YES
33 THOMAS ROYAL GARDENS - GF	45	38	60	52	14.7	13.5	5.1	1.9	YES	YES
35 THOMAS ROYAL GARDENS - GF	44	37	60	52	16.5	15.3	5.2	2	YES	YES
37 THOMAS ROYAL GARDENS - GF	44	37	58	50	14.8	13.5	3.3	-	YES	YES
39 THOMAS ROYAL GARDENS - GF	44	37	59	51	15.1	13.9	3.7	0.5	YES	YES
41 THOMAS ROYAL GARDENS - GF	43	36	60	52	16.6	15.4	5	1.8	YES	YES

Receiver Address	Predicted Noise Levels (dBA)				Relative Increase (dBA)		Design Year 'Build' Scenario Level Above RNP Criteria (dBA) i.e. LAeq(15hour) 55 LAeq(9hour) 50		Design Year 'Build' Scenario Level Exceed 12 dB 'Relative Increase Criteria'?	
	Design Year – 'No Build' Scenario		Design Year – 'Build' Scenario							
	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)
43 THOMAS ROYAL GARDENS - GF	44	37	60	52	16.4	15.2	4.9	1.7	YES	YES
45 THOMAS ROYAL GARDENS - GF	44	37	63	55	19.6	18.4	8.2	5	YES	YES
47 THOMAS ROYAL GARDENS - GF	43	36	62	54	18.4	17.2	6.8	3.6	YES	YES
49 THOMAS ROYAL GARDENS - GF	44	37	63	55	19.9	18.7	8.4	5.2	YES	YES
51 THOMAS ROYAL GARDENS - GF	43	36	63	54	19.1	18.0	7.5	4.4	YES	YES
53 THOMAS ROYAL GARDENS - GF	44	37	63	55	19.6	18.4	8.1	4.9	YES	YES
55 THOMAS ROYAL GARDENS - GF	43	36	60	52	17.2	16.0	5.3	2.1	YES	YES
57 THOMAS ROYAL GARDENS - GF	43	36	63	55	19.5	18.3	7.8	4.6	YES	YES
59 THOMAS ROYAL GARDENS - GF	43	36	62	54	18.7	17.4	7	3.8	YES	YES
61 THOMAS ROYAL GARDENS - GF	43	36	62	53	18.3	17.1	6.5	3.3	YES	YES
NCA2										
91 ELLERTON DRIVE - GF	44	37	52	44	8.6	7.5	-	-	-	-
44 STONEHAVEN CIRCUIT - GF	51	43	57	49	6.7	6.1	2.3	-	-	-
46 STONEHAVEN CIRCUIT - GF	51	43	60	52	9.3	8.5	4.8	1.7	-	-
48 STONEHAVEN CIRCUIT - GF	48	41	58	50	10.8	9.7	3.4	-	-	-
50 STONEHAVEN CIRCUIT - GF	50	43	57	49	7.3	6.5	2.1	-	-	-
52 STONEHAVEN CIRCUIT - GF	50	42	58	50	8.0	7.3	2.7	-	-	-
54 STONEHAVEN CIRCUIT - GF	50	42	53	45	3.4	2.8	-	-	-	-
56 STONEHAVEN CIRCUIT - GF	49	42	57	49	7.9	7.1	1.9	-	-	-
58 STONEHAVEN CIRCUIT - GF	49	41	58	50	9.2	8.4	2.9	-	-	-
60 STONEHAVEN CIRCUIT - GF	46	39	59	51	12.4	11.4	3.7	0.5	YES	-
62 STONEHAVEN CIRCUIT - GF	46	38	56	48	10.6	9.5	1.1	-	-	-
1 TENNYSON DRIVE - GF	44	37	53	45	8.9	7.8	-	-	-	-
2 TENNYSON DRIVE - GF	44	37	60	52	15.8	14.6	4.7	1.5	YES	YES

Receiver Address	Predicted Noise Levels (dBA)				Relative Increase (dBA)		Design Year 'Build' Scenario Level Above RNP Criteria (dBA) i.e. LAeq(15hour) 55 LAeq(9hour) 50		Design Year 'Build' Scenario Level Exceed 12 dB 'Relative Increase Criteria'?	
	Design Year – 'No Build' Scenario		Design Year – 'Build' Scenario							
	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)
12 NORTHCLIFFE PLACE - GF	44	37	62	54	17.7	16.4	7	4	YES	YES
23 NORTHCLIFFE PLACE - GF	45	38	62	54	17.6	16.4	7	4	YES	YES
10 NORTHCLIFFE PLACE - GF	44	37	51	43	6.6	5.6	-	-	-	-
21 NORTHCLIFFE PLACE - GF	42	35	54	46	12.4	11.2	-	-	YES	-
21 NORTHCLIFFE PLACE - GF	44	37	55	47	11.3	10.0	-	-	-	-
13 GEEBUNG PLACE - GF	42	35	51	42	8.8	7.5	-	-	-	-
12 GEEBUNG PLACE - GF	40	33	48	40	8.3	7.1	-	-	-	-
14 GEEBUNG PLACE - GF	40	33	48	40	7.7	6.7	-	-	-	-
16 GEEBUNG PLACE - GF	40	33	47	39	7.4	6.3	-	-	-	-
NCA3										
14 TAYLOR PLACE - GF	43	36	49	42	6.2	5.2	-	-	-	-
16 TAYLOR PLACE - GF	43	36	51	43	8.3	7.2	-	-	-	-
18 TAYLOR PLACE - GF	42	35	52	44	10.7	9.6	-	-	-	-
20 TAYLOR PLACE - GF	39	32	54	45	14.4	13.1	-	-	YES	YES
22 TAYLOR PLACE - GF	41	34	54	46	12.7	11.7	-	-	YES	-
22 TAYLOR PLACE - F1	41	34	55	47	13.7	12.7	-	-	YES	YES
24 TAYLOR PLACE - GF	41	34	55	46	13.3	12.2	-	-	YES	YES
26 TAYLOR PLACE - GF	40	33	53	44	12.7	11.3	-	-	YES	-
30 TAYLOR PLACE - GF	41	34	58	50	16.8	15.6	3	-	YES	YES
30 TAYLOR PLACE - F1	41	34	59	50	17.9	16.0	4	-	YES	YES
32 TAYLOR PLACE - GF	39	32	56	48	17.0	15.9	1	-	YES	YES
32 TAYLOR PLACE - F1	39	32	57	49	18.0	16.9	2	-	YES	YES
34 TAYLOR PLACE - GF	40	34	51	43	11.0	9.0	-	-		
36 TAYLOR PLACE - GF	40	34	51	43	11.0	9.0	-	-		

Receiver Address	Predicted Noise Levels (dBA)				Relative Increase (dBA)		Design Year 'Build' Scenario Level Above RNP Criteria (dBA) i.e. LAeq(15hour) 55 LAeq(9hour) 50		Design Year 'Build' Scenario Level Exceed 12 dB 'Relative Increase Criteria'?	
	Design Year – 'No Build' Scenario		Design Year – 'Build' Scenario							
	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)
38 TAYLOR PLACE - GF	37	30	56	47	18.1	16.8	1	-	YES	YES
40 TAYLOR PLACE - GF	38	31	57	49	19.3	17.9	2	-	YES	YES
42 TAYLOR PLACE - GF	39	32	57	49	18.0	17.0	2	-	YES	YES
NCA4										
28 SEVERNE STREET - GF	39	32	43	36	4.0	3.3	-	-	-	-
26 SEVERNE STREET - GF	42	35	45	37	2.5	2.0	-	-	-	-
30 SEVERNE STREET - GF	38	31	45	37	6.3	5.3	-	-	-	-
32 SEVERNE STREET - GF	42	35	48	40	5.3	4.5	-	-	-	-
34 SEVERNE STREET - GF	39	32	51	43	12.6	11.4	-	-	YES	-
36 SEVERNE STREET - GF	37	31	51	43	13.3	12.0	-	-	YES	-
38 SEVERNE STREET - GF	39	32	52	44	13.4	12.1	-	-	YES	YES
40 SEVERNE STREET - GF	37	30	52	43	14.3	13.0	-	-	YES	YES
42 SEVERNE STREET - GF	38	31	45	37	7.3	6.3	-	-	-	-
44 SEVERNE STREET - GF	37	30	44	36	6.3	5.3	-	-	-	-
46 SEVERNE STREET - GF	37	31	47	39	9.3	8.1	-	-	-	-
48 SEVERNE STREET - GF	38	31	47	39	9.2	8.0	-	-	-	-
50 SEVERNE STREET - GF	40	33	48	40	7.3	6.3	-	-	-	-
NCA5										
52 SEVERNE STREET - GF	39	32	46	38	7.0	5.9	-	-	-	-
1 WOODMAN PLACE - GF	39	32	46	38	7.3	6.2	-	-	-	-
3 WOODMAN PLACE - GF	38	31	47	39	9.2	8.1	-	-	-	-
5 WOODMAN PLACE - GF	41	34	49	41	7.9	7.0	-	-	-	-
11 WOODMAN PLACE - GF	40	33	47	39	6.4	5.4	-	-	-	-
12 WOODMAN PLACE - GF	41	34	50	42	9.8	8.8	-	-	-	-

Receiver Address	Predicted Noise Levels (dBA)				Relative Increase (dBA)		Design Year 'Build' Scenario Level Above RNP Criteria (dBA) i.e. LAeq(15hour) 55 LAeq(9hour) 50		Design Year 'Build' Scenario Level Exceed 12 dB 'Relative Increase Criteria'?	
	Design Year – 'No Build' Scenario		Design Year – 'Build' Scenario							
	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)
13 WOODMAN PLACE - GF	40	33	54	46	14.0	12.9	-	-	YES	YES
26 LONERGAN DRIVE - GF	38	33	55	46	16.6	13.3	-	-	YES	YES
26 LONERGAN DRIVE - F1	38	33	56	47	18.0	14.0	1	-	YES	YES
24 LONERGAN DRIVE - GF	40	33	54	46	13.8	12.5	-	-	YES	YES
22 LONERGAN DRIVE - GF	40	33	50	42	10.0	9.0	-	-	-	-
35 LONERGAN DRIVE - GF	36	29	56	48	20.0	19.0	1	-	YES	YES
35 LONERGAN DRIVE - F1	36	29	57	49	21.0	20.0	2	-	YES	YES
33 LONERGAN DRIVE - GF	39	32	55	47	16.0	15.0	-	-	YES	YES
31 LONERGAN DRIVE - GF	38	32	51	43	13.0	11.0	-	-	YES	-
NCA6										
40A Serverne Street	39	32	57	49	18.5	17.2	2	-	YES	YES
NCA7										
123 BARRACKS FLAT PLACE - GF	37	30	53	45	16.1	14.8	-	-	YES	YES
125 BARRACKS FLAT PLACE - GF	38	31	53	45	14.9	13.6	-	-	YES	YES
127 BARRACKS FLAT PLACE - GF	38	31	52	44	14.1	12.9	-	-	YES	YES
129 BARRACKS FLAT PLACE - GF	38	31	52	43	13.6	12.4	-	-	YES	YES
131 BARRACKS FLAT PLACE - GF	38	31	50	42	12.1	10.9	-	-	YES	-
130 BARRACKS FLAT PLACE - GF	36	29	59	51	23.0	21.8	4	1	YES	YES
130 BARRACKS FLAT PLACE - F 1	38	31	61	53	23.2	22.2	6	3	YES	YES
132 BARRACKS FLAT PLACE - GF	37	31	53	45	16.0	13.7	-	-	YES	YES
132 BARRACKS FLAT PLACE - F1	38	31	56	47	18.1	16.9	1	-	YES	YES
134 BARRACKS FLAT PLACE - GF	37	30	52	44	15.3	14.1	-	-	YES	YES
134 BARRACKS FLAT PLACE - F1	38	31	55	47	16.9	15.6	-	-	YES	YES

Receiver Address	Predicted Noise Levels (dBA)				Relative Increase (dBA)		Design Year 'Build' Scenario Level Above RNP Criteria (dBA) i.e. LAeq(15hour) 55 LAeq(9hour) 50		Design Year 'Build' Scenario Level Exceed 12 dB 'Relative Increase Criteria'?	
	Design Year – 'No Build' Scenario		Design Year – 'Build' Scenario							
	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)
136 BARRACKS FLAT PLACE - GF	37	31	51	43	14.4	12.2	-	-	YES	YES
138 BARRACKS FLAT PLACE - GF	37	30	50	42	13.4	12.2	-	-	YES	YES
140 BARRACKS FLAT PLACE - GF	36	29	49	41	13.1	12.0	-	-	YES	-
142 BARRACKS FLAT PLACE - GF	36	29	49	41	13.5	12.2	-	-	YES	YES
146 BARRACKS FLAT PLACE - GF	35	28	48	40	12.9	11.6	-	-	YES	-
6 DOEBERL PLACE - GF	37	30	61	53	24.1	22.8	6	3	YES	YES
6 DOEBERL PLACE - F 1	38	31	62	54	24.6	23.2	7	4	YES	YES
6 DOEBERL PLACE - GF	38	31	62	54	24.3	23.0	7	4	YES	YES
6 DOEBERL PLACE - F 1	38	31	63	54	24.4	23.1	8	4	YES	YES
20 DOEBERL PLACE - GF	38	31	58	50	20.7	19.4	3	-	YES	YES
20 DOEBERL PLACE - GF	38	31	59	51	21.8	20.5	4	1	YES	YES
22 DOEBERL PLACE - GF	38	31	60	52	22.3	21.0	5	2	YES	YES
24 DOEBERL PLACE - GF	38	31	59	51	21.5	20.3	4	1	YES	YES
24 DOEBERL PLACE - F 1	39	32	61	53	22.3	21.1	6	3	YES	YES
26 DOEBERL PLACE - GF	39	32	59	51	20.6	19.3	4	1	YES	YES
28 DOEBERL PLACE - GF	39	32	59	51	19.6	18.3	4	1	YES	YES
28 DOEBERL PLACE - F 1	40	33	61	53	21.2	19.8	6	3	YES	YES
30 DOEBERL PLACE - GF	40	33	61	53	21.6	20.2	6	3	YES	YES
Unit 3, 4 - 32 DOEBERL PLACE - GF	41	34	62	54	21.8	20.5	7	4	YES	YES
Unit 5, 6, 7 - 32 DOEBERL PLACE - GF	41	34	57	49	16.4	15.1	2	-	YES	YES
Unit 8 to 12 - 32 DOEBERL PLACE - GF	42	35	60	52	18.7	17.4	5	2	YES	YES
Unit 8 to 12 - 32 DOEBERL PLACE - F 1	42	35	62	54	20.7	19.4	7	4	YES	YES
Unit 13 - 32 DOEBERL PLACE - GF	42	35	62	53	19.7	18.3	7	3	YES	YES
Unit 13 - 32 DOEBERL PLACE - F 1	42	35	64	55	21.7	20.3	9	5	YES	YES

Receiver Address	Predicted Noise Levels (dBA)				Relative Increase (dBA)		Design Year 'Build' Scenario Level Above RNP Criteria (dBA) i.e. LAeq(15hour) 55 LAeq(9hour) 50		Design Year 'Build' Scenario Level Exceed 12 dB 'Relative Increase Criteria'?	
	Design Year – 'No Build' Scenario		Design Year – 'Build' Scenario							
	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)
NCA8										
75 RIVER DRIVE - GF	39	31	53	44	13.6	13.4	-	-	YES	YES
73 RIVER DRIVE - GF	39	31	51	43	12.1	11.9	-	-	YES	-
73 RIVER DRIVE - F1	40	33	53	45	13.2	11.5	-	-	YES	-
69 RIVER DRIVE - GF	39	32	50	42	11.9	10.4	-	-	-	-
69 RIVER DRIVE - F1	40	32	52	44	12.4	12.2	-	-	YES	YES
107 BARRACKS FLAT DRIVE - GF	39	32	53	45	14.3	13.0	-	-	YES	YES
105 BARRACKS FLAT DRIVE - GF	39	32	53	44	13.8	12.4	-	-	YES	YES
105 BARRACKS FLAT DRIVE - F1	40	33	55	46	14.8	13.4	-	-	YES	YES
126A BARRACKS FLAT DRIVE - GF	33	26	55	47	21.4	20.2	-	-	YES	YES
126A BARRACKS FLAT DRIVE - F 1	36	29	57	49	20.7	19.4	2	-	YES	YES
122 BARRACKS FLAT DRIVE - GF	36	29	54	46	18.8	17.4	-	-	YES	YES
120 BARRACKS FLAT DRIVE - GF	36	29	56	48	20.1	18.7	1	-	YES	YES
118 BARRACKS FLAT DRIVE - GF	35	28	57	48	21.5	20.2	2	-	YES	YES
116 BARRACKS FLAT DRIVE - GF	33	26	57	49	23.8	22.6	2	-	YES	YES
116 BARRACKS FLAT DRIVE - F 1	37	30	59	51	21.8	20.6	4	1	YES	YES
114 BARRACKS FLAT DRIVE - GF	36	29	59	50	22.4	21.1	4	-	YES	YES
112 BARRACKS FLAT DRIVE - GF	36	29	59	51	23.2	21.8	4	1	YES	YES
110 BARRACKS FLAT DRIVE - GF	34	27	59	51	24.8	23.5	4	1	YES	YES
110 BARRACKS FLAT DRIVE - F 1	37	30	61	53	23.8	22.5	6	3	YES	YES
108 BARRACKS FLAT DRIVE - GF	34	27	59	51	24.6	23.4	4	1	YES	YES
108 BARRACKS FLAT DRIVE - F 1	38	31	61	53	23.4	22.2	6	3	YES	YES
108 BARRACKS FLAT DRIVE - GF	37	30	59	51	22.3	21.0	4	1	YES	YES
106 BARRACKS FLAT DRIVE - GF	37	30	60	52	22.9	21.7	5	2	YES	YES

Receiver Address	Predicted Noise Levels (dBA)				Relative Increase (dBA)		Design Year 'Build' Scenario Level Above RNP Criteria (dBA) i.e. LAeq(15hour) 55 LAeq(9hour) 50		Design Year 'Build' Scenario Level Exceed 12 dB 'Relative Increase Criteria'?	
	Design Year – 'No Build' Scenario		Design Year – 'Build' Scenario							
	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)
102 BARRACKS FLAT DRIVE - GF	35	28	57	48	21.8	20.5	2	-	YES	YES
102 BARRACKS FLAT DRIVE - F 1	39	32	59	51	20.5	19.2	4	1	YES	YES
98 BARRACKS FLAT DRIVE - GF	36	29	58	50	22.2	21.0	3	-	YES	YES
98 BARRACKS FLAT DRIVE - F 1	39	32	60	52	20.4	19.2	5	2	YES	YES
96 BARRACKS FLAT DRIVE - GF	37	30	55	47	18.0	17.0	-	-	YES	YES
96 BARRACKS FLAT DRIVE - F 1	40	33	57	49	17.3	16.2	2	-	YES	YES
90 BARRACKS FLAT DRIVE - GF	39	32	59	51	20.5	19.3	4	1	YES	YES
92 BARRACKS FLAT DRIVE - F 1	40	33	56	48	16.1	15.0	1	-	YES	YES
86 BARRACKS FLAT DRIVE - GF	39	32	52	44	13.8	12.5	-	-	YES	YES
86 BARRACKS FLAT DRIVE - GF	38	31	52	44	14.0	12.8	-	-	YES	YES
1 WEBBER PLACE - GF	37	30	54	45	16.5	15.3	-	-	YES	YES
82 BARRACKS FLAT DRIVE - GF	41	34	58	49	17.4	15.5	3	-	YES	YES
82 BARRACKS FLAT DRIVE - F 1	40	33	60	51	19.6	18.4	5	1	YES	YES
3 WEBBER PLACE - GF	36	29	50	42	13.6	12.5	-	-	YES	YES
3 WEBBER PLACE - F 1	42	35	53	44	10.9	9.8	-	-	-	-
80 BARRACKS FLAT DRIVE - GF	42	35	60	52	18.0	16.9	5	2	YES	YES
80 BARRACKS FLAT DRIVE - F 1	42	35	61	53	19.1	18.0	6	3	YES	YES
78 BARRACKS FLAT DRIVE - GF	40	33	53	45	13.0	12.1	-	-	YES	YES
78 BARRACKS FLAT DRIVE - F 1	42	35	58	50	15.8	14.7	3	-	YES	YES
74 BARRACKS FLAT DRIVE - GF	45	38	53	44	7.5	6.6	-	-	-	-
5 WEBBER PLACE - GF	40	33	51	43	11.7	10.7	-	-	-	-
7 WEBBER PLACE - GF	37	30	52	44	15.4	14.3	-	-	YES	YES
7 WEBBER PLACE - F 1	42	35	56	48	14.2	13.0	1	-	YES	YES
9 WEBBER PLACE - GF	40	33	54	46	13.8	12.8	-	-	YES	YES

Receiver Address	Predicted Noise Levels (dBA)				Relative Increase (dBA)		Design Year 'Build' Scenario Level Above RNP Criteria (dBA) i.e. LAeq(15hour) 55 LAeq(9hour) 50		Design Year 'Build' Scenario Level Exceed 12 dB 'Relative Increase Criteria'?	
	Design Year – 'No Build' Scenario		Design Year – 'Build' Scenario							
	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)
9 WEBBER PLACE - F 1	44	36	59	50	15.0	13.9	4	-	YES	YES
11 WEBBER PLACE - GF	45	38	53	44	7.5	6.6	-	-	-	-
11 FITZGIBBON PLACE - GF	48	41	54	46	5.5	4.8	-	-	-	-
13 WEBBER PLACE - GF	46	39	53	45	6.7	5.9	-	-	-	-
12 WEBBER PLACE - GF	50	42	57	49	7.5	6.7	2	-	-	-
12 WEBBER PLACE - F 1	52	44	60	52	8.8	7.9	5	2	-	-
16 FITZGIBBON PLACE - GF	50	42	57	49	7.6	6.8	2	-	-	-
15 FITZGIBBON PLACE - GF	50	42	57	49	7.5	6.6	2	-	-	-
13 CAROLINE PLACE - GF	52	45	60	52	7.5	6.6	5	2	-	-
17 FITZGIBBON PLACE - GF	53	46	59	51	6.1	5.3	4	1	-	-
17 CAROLINE PLACE - GF	52	45	60	52	8.0	7.2	5	2	-	-
19 CAROLINE PLACE - GF	56	48	62	54	6.2	5.4	7	4	-	-
16 ALFRED PLACE - GF	57	50	60	52	3.1	2.7	5	2	-	-
18 ALFRED PLACE - GF	57	49	60	52	3.3	2.9	5	2	-	-
18 ALFRED PLACE - F 1	58	50	62	54	4.4	3.8	7	4	-	-
14 ALFRED PLACE - GF	58	51	60	53	2.5	2.0	5	3	-	-
12 ALFRED PLACE - GF	57	49	59	52	2.6	2.1	4	2	-	-

Receiver Address	Predicted Noise Levels (dBA)				Relative Increase (dBA)		Design Year 'Build' Scenario Level Above RNP Criteria (dBA) i.e. LAeq(15hour) 55 LAeq(9hour) 50		Design Year 'Build' Scenario Level Exceed 12 dB 'Relative Increase Criteria'?	
	Design Year – 'No Build' Scenario		Design Year – 'Build' Scenario							
	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)
NCA1										
6 PATRICK BRICK COURT - GF	53	45	55	47	2	1.8	-	-	-	-
6 PATRICK BRICK COURT - F 1	55	47	57	49	2.5	2.2	2	-	-	-
8 PATRICK BRICK COURT - GF	53	45	53	45	0.1	0	-	-	-	-
8 PATRICK BRICK COURT - F 1	55	47	62	54	7.8	7.4	7	4	-	-
33 PATRICK BRICK COURT - GF	42	35	50	42	8.2	7.1	-	-	-	-
33 PATRICK BRICK COURT - F 1	45	38	56	48	11	9.9	1	-	-	-
31 PATRICK BRICK COURT - GF	48	41	54	46	5.9	5.4	-	-	-	-
31 PATRICK BRICK COURT - F 1	51	43	61	53	10.6	9.9	6	3	-	-
29 PATRICK BRICK COURT - GF	49	41	55	47	6	5.6	-	-	-	-
29 PATRICK BRICK COURT - F 1	51	43	62	54	11.5	11	7	4	-	-
27 PATRICK BRICK COURT - GF	51	43	56	48	5	4.6	1	-	-	-
25 PATRICK BRICK COURT - GF	45	38	54	46	9.1	8.1	-	-	-	-
25 PATRICK BRICK COURT - F 1	47	40	61	53	13.6	12.6	6	3	YES	YES
23 PATRICK BRICK COURT - GF	44	37	53	45	9.1	7.9	-	-	-	-
23 PATRICK BRICK COURT - F 1	46	39	60	52	13.7	12.6	5	2	YES	YES
21 PATRICK BRICK COURT - GF	45	38	54	46	8.9	7.8	-	-	-	-
19 PATRICK BRICK COURT - GF	45	38	53	45	8.4	7.3	-	-	-	-
31 THOMAS ROYAL GARDENS - GF	44	37	54	46	10.4	9.3	-	-	-	-
33 THOMAS ROYAL GARDENS - GF	45	38	56	48	10.3	9.2	1	-	-	-
35 THOMAS ROYAL GARDENS - GF	44	37	53	45	9	7.9	-	-	-	-
37 THOMAS ROYAL GARDENS - GF	44	37	53	45	9.7	8.5	-	-	-	-
39 THOMAS ROYAL GARDENS - GF	44	37	53	45	9.8	8.6	-	-	-	-
41 THOMAS ROYAL GARDENS - GF	43	36	54	46	11	9.8	-	-	-	-

Receiver Address	Predicted Noise Levels (dBA)				Relative Increase (dBA)		Design Year 'Build' Scenario Level Above RNP Criteria (dBA) i.e. LAeq(15hour) 55 LAeq(9hour) 50		Design Year 'Build' Scenario Level Exceed 12 dB 'Relative Increase Criteria'?	
	Design Year – 'No Build' Scenario		Design Year – 'Build' Scenario							
	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)
43 THOMAS ROYAL GARDENS - GF	44	37	55	47	11.4	10.3	-	-	-	-
45 THOMAS ROYAL GARDENS - GF	44	37	56	48	12.4	11.2	1	-	YES	-
47 THOMAS ROYAL GARDENS - GF	43	36	55	47	11.4	10.3	-	-	-	-
49 THOMAS ROYAL GARDENS - GF	44	37	56	47	12	10.8	1	-	-	-
51 THOMAS ROYAL GARDENS - GF	43	36	55	47	11.5	10.4	-	-	-	-
53 THOMAS ROYAL GARDENS - GF	44	37	52	44	8.9	7.8	-	-	-	-
55 THOMAS ROYAL GARDENS - GF	43	36	53	45	10.2	9.1	-	-	-	-
57 THOMAS ROYAL GARDENS - GF	43	36	53	45	10	8.9	-	-	-	-
59 THOMAS ROYAL GARDENS - GF	43	36	53	44	9.2	8	-	-	-	-
61 THOMAS ROYAL GARDENS - GF	43	36	53	45	9.4	8.4	-	-	-	-
NCA2										
91 ELLERTON DRIVE - GF	44	37	52	44	8.6	7.5	-	-	-	-
44 STONEHAVEN CIRCUIT - GF	51	43	55	47	4.7	4.1	-	-	-	-
46 STONEHAVEN CIRCUIT - GF	51	43	55	48	5.4	4.7	-	-	-	-
48 STONEHAVEN CIRCUIT - GF	48	41	55	47	7.8	6.8	-	-	-	-
50 STONEHAVEN CIRCUIT - GF	50	43	54	46	4.1	3.3	-	-	-	-
52 STONEHAVEN CIRCUIT - GF	50	42	54	46	4.7	4.1	-	-	-	-
54 STONEHAVEN CIRCUIT - GF	50	42	51	43	1.1	0.5	-	-	-	-
56 STONEHAVEN CIRCUIT - GF	49	42	53	45	4.2	3.4	-	-	-	-
58 STONEHAVEN CIRCUIT - GF	49	41	53	45	4.7	3.9	-	-	-	-
60 STONEHAVEN CIRCUIT - GF	46	39	55	47	8.8	7.9	-	-	-	-
62 STONEHAVEN CIRCUIT - GF	46	38	54	46	8.4	7.4	-	-	-	-
1 TENNYSON DRIVE - GF	44	37	51	43	6.5	5.4	-	-	-	-
2 TENNYSON DRIVE - GF	44	37	56	47	11.6	10.5	1	-	-	-

Receiver Address	Predicted Noise Levels (dBA)				Relative Increase (dBA)		Design Year 'Build' Scenario Level Above RNP Criteria (dBA) i.e. LAeq(15hour) 55 LAeq(9hour) 50		Design Year 'Build' Scenario Level Exceed 12 dB 'Relative Increase Criteria'?	
	Design Year – 'No Build' Scenario		Design Year – 'Build' Scenario							
	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)
12 NORTHCLIFFE PLACE - GF	44	37	59	50	14.2	12.9	4	-	YES	YES
23 NORTHCLIFFE PLACE - GF	45	38	54	46	9.2	8	-	-	-	-
10 NORTHCLIFFE PLACE - GF	44	37	50	42	5.7	4.6	-	-	-	-
21 NORTHCLIFFE PLACE - GF	42	35	54	46	12.2	11	-	-	-	-
21 NORTHCLIFFE PLACE - GF	44	37	55	47	10.6	9.4	-	-	-	-
13 GEEBUNG PLACE - GF	42	35	51	42	8.8	7.5	-	-	-	-
12 GEEBUNG PLACE - GF	40	33	48	40	8.3	7.1	-	-	-	-
14 GEEBUNG PLACE - GF	40	33	48	40	7.7	6.7	-	-	-	-
16 GEEBUNG PLACE - GF	40	33	47	39	7.4	6.3	-	-	-	-
NCA3										
14 TAYLOR PLACE - GF	43	36	47	40	4.1	3.3	-	-	-	-
16 TAYLOR PLACE - GF	43	36	48	40	5.1	4.3	-	-	-	-
18 TAYLOR PLACE - GF	42	35	48	40	6.1	5.2	-	-	-	-
20 TAYLOR PLACE - GF	39	32	47	39	7.6	6.5	-	-	-	-
22 TAYLOR PLACE - GF	41	34	47	39	6	5	-	-	-	-
22 TAYLOR PLACE - F1	41	34	48	40	6.9	6	-	-	-	-
24 TAYLOR PLACE - GF	41	34	48	40	6.9	6	-	-	-	-
26 TAYLOR PLACE - GF	40	33	47	39	7.4	6.2	-	-	-	-
30 TAYLOR PLACE - GF	41	34	50	42	9	8	-	-	-	-
30 TAYLOR PLACE - F1	41	34	51	43	10.2	9.2	-	-	-	-
32 TAYLOR PLACE - GF	39	32	49	41	10.4	9.2	-	-	-	-
32 TAYLOR PLACE - F1	39	32	51	43	11.7	10.5	-	-	-	-
34 TAYLOR PLACE - GF	40	34	48	40	7.7	5.8	-	-	-	-
36 TAYLOR PLACE - GF	40	34	48	40	7.5	5.6	-	-	-	-

Receiver Address	Predicted Noise Levels (dBA)				Relative Increase (dBA)		Design Year 'Build' Scenario Level Above RNP Criteria (dBA) i.e. LAeq(15hour) 55 LAeq(9hour) 50		Design Year 'Build' Scenario Level Exceed 12 dB 'Relative Increase Criteria'?	
	Design Year – 'No Build' Scenario		Design Year – 'Build' Scenario							
	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)
38 TAYLOR PLACE - GF	37	30	50	42	12.8	11.6	-	-	YES	-
40 TAYLOR PLACE - GF	38	31	52	44	14.5	13.2	-	-	YES	YES
42 TAYLOR PLACE - GF	39	32	52	44	13.2	12	-	-	YES	-
NCA4 (No barrier)										
28 SEVERNE STREET - GF	39	32	43	36	4.0	3.3	-	-	-	-
26 SEVERNE STREET - GF	42	35	45	37	2.5	2.0	-	-	-	-
30 SEVERNE STREET - GF	38	31	45	37	6.3	5.3	-	-	-	-
32 SEVERNE STREET - GF	42	35	48	40	5.3	4.5	-	-	-	-
34 SEVERNE STREET - GF	39	32	51	43	12.6	11.4	-	-	YES	-
36 SEVERNE STREET - GF	37	31	51	43	13.3	12.0	-	-	YES	-
38 SEVERNE STREET - GF	39	32	52	44	13.4	12.1	-	-	YES	YES
40 SEVERNE STREET - GF	37	30	52	43	14.3	13.0	-	-	YES	YES
42 SEVERNE STREET - GF	38	31	45	37	7.3	6.3	-	-	-	-
44 SEVERNE STREET - GF	37	30	44	36	6.3	5.3	-	-	-	-
46 SEVERNE STREET - GF	37	31	47	39	9.3	8.1	-	-	-	-
48 SEVERNE STREET - GF	38	31	47	39	9.2	8.0	-	-	-	-
50 SEVERNE STREET - GF	40	33	48	40	7.3	6.3	-	-	-	-
NCA5										
52 SEVERNE STREET - GF	39	32	45	37	6.7	5.7	-	-	-	-
1 WOODMAN PLACE - GF	39	32	45	37	6.7	5.7	-	-	-	-
3 WOODMAN PLACE - GF	38	31	47	39	8.8	7.8	-	-	-	-
5 WOODMAN PLACE - GF	41	34	48	40	7.2	6.4	-	-	-	-
11 WOODMAN PLACE - GF	40	33	46	38	5.4	4.6	-	-	-	-
12 WOODMAN PLACE - GF	41	34	49	41	8.8	7.9	-	-	-	-

Receiver Address	Predicted Noise Levels (dBA)				Relative Increase (dBA)		Design Year 'Build' Scenario Level Above RNP Criteria (dBA) i.e. LAeq(15hour) 55 LAeq(9hour) 50		Design Year 'Build' Scenario Level Exceed 12 dB 'Relative Increase Criteria'?	
	Design Year – 'No Build' Scenario		Design Year – 'Build' Scenario							
	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)
13 WOODMAN PLACE - GF	40	33	52	44	11.8	10.7	-	-	-	-
26 LONERGAN DRIVE - GF	38	33	50	42	11.7	8.5	-	-	-	-
26 LONERGAN DRIVE - F1	38	33	51	42	13	9.4	-	-	YES	-
24 LONERGAN DRIVE - GF	40	33	51	43	10.5	9.3	-	-	-	-
22 LONERGAN DRIVE - GF	40	33	48	40	8.2	7.1	-	-	-	-
35 LONERGAN DRIVE - GF	36	29	52	44	15.7	14.5	-	-	YES	YES
35 LONERGAN DRIVE - F1	36	29	53	44	16.6	15.4	-	-	YES	YES
33 LONERGAN DRIVE - GF	39	32	51	44	12.0	11.7	-	-	-	-
31 LONERGAN DRIVE - GF	38	32	50	42	11.9	9.9	-	-	-	-
NCA6 (No barrier)										
40A Serverne Street	39	32	57	49	18.5	17.2	2	-	YES	YES
NCA7										
123 BARRACKS FLAT PLACE - GF	37	30	54	46	17.3	15.8	-	-	YES	YES
125 BARRACKS FLAT PLACE - GF	38	31	50	41	11.6	10.4	-	-	-	-
127 BARRACKS FLAT PLACE - GF	38	31	49	41	11.1	9.9	-	-	-	-
129 BARRACKS FLAT PLACE - GF	38	31	49	40	10.6	9.4	-	-	-	-
131 BARRACKS FLAT PLACE - GF	38	31	47	39	9.4	8.3	-	-	-	-
130 BARRACKS FLAT PLACE - GF	36	29	54	46	17.9	16.6	-	-	YES	YES
130 BARRACKS FLAT PLACE - F 1	38	31	60	51	22.1	20.7	5	1	YES	YES
132 BARRACKS FLAT PLACE - GF	37	31	49	41	12.3	10.2	-	-	YES	-
132 BARRACKS FLAT PLACE - F1	38	31	52	44	14.7	13.5	-	-	YES	YES
134 BARRACKS FLAT PLACE - GF	37	30	48	40	11.4	10.2	-	-	-	-
134 BARRACKS FLAT PLACE - F1	38	31	51	43	13.2	12	-	-	YES	-

Receiver Address	Predicted Noise Levels (dBA)				Relative Increase (dBA)		Design Year 'Build' Scenario Level Above RNP Criteria (dBA) i.e. LAeq(15hour) 55 LAeq(9hour) 50		Design Year 'Build' Scenario Level Exceed 12 dB 'Relative Increase Criteria'?	
	Design Year – 'No Build' Scenario		Design Year – 'Build' Scenario							
	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)
136 BARRACKS FLAT PLACE - GF	37	31	48	40	11.2	9	-	-	-	-
138 BARRACKS FLAT PLACE - GF	37	30	48	40	10.6	9.5	-	-	-	-
140 BARRACKS FLAT PLACE - GF	36	29	47	38	10.6	9.4	-	-	-	-
142 BARRACKS FLAT PLACE - GF	36	29	46	38	10.8	9.6	-	-	-	-
146 BARRACKS FLAT PLACE - GF	35	28	46	37	10.3	9.1	-	-	-	-
6 DOEBERL PLACE - GF	37	30	50	42	13.1	11.8	-	-	YES	-
6 DOEBERL PLACE - F 1	38	31	60	52	22.7	21.2	5	2	YES	YES
6 DOEBERL PLACE - GF	38	31	53	45	15.3	14	-	-	YES	YES
6 DOEBERL PLACE - F 1	38	31	63	54	24.3	22.8	8	4	YES	YES
20 DOEBERL PLACE - GF	38	31	51	43	13.7	12.4	-	-	YES	YES
20 DOEBERL PLACE - GF	38	31	54	46	16.6	15.3	-	-	YES	YES
22 DOEBERL PLACE - GF	38	31	55	46	17.1	15.8	-	-	YES	YES
24 DOEBERL PLACE - GF	38	31	53	45	14.9	13.6	-	-	YES	YES
24 DOEBERL PLACE - F 1	39	32	58	50	19.7	18.4	3	-	YES	YES
26 DOEBERL PLACE - GF	39	32	55	47	16.3	15	-	-	YES	YES
28 DOEBERL PLACE - GF	39	32	52	44	12.6	11.4	-	-	YES	-
28 DOEBERL PLACE - F 1	40	33	57	48	16.6	15.2	2	-	YES	YES
30 DOEBERL PLACE - GF	40	33	56	47	15.9	14.5	1	-	YES	YES
Unit 3, 4 - 32 DOEBERL PLACE - GF	41	34	51	43	10.2	8.9	-	-	-	-
Unit 5, 6, 7 - 32 DOEBERL PLACE - GF	41	34	54	46	13	11.8	-	-	YES	-
Unit 8 to 12 - 32 DOEBERL PLACE - GF	42	35	54	46	12.6	11.4	-	-	YES	-
Unit 8 to 12 - 32 DOEBERL PLACE - F 1	42	35	62	54	20.2	18.9	7	4	YES	YES
Unit 13 - 32 DOEBERL PLACE - GF	42	35	54	45	11.8	10.5	-	-	-	-
Unit 13 - 32 DOEBERL PLACE - F 1	42	35	63	55	21.5	20	8	5	YES	YES

Receiver Address	Predicted Noise Levels (dBA)				Relative Increase (dBA)		Design Year 'Build' Scenario Level Above RNP Criteria (dBA) i.e. LAeq(15hour) 55 LAeq(9hour) 50		Design Year 'Build' Scenario Level Exceed 12 dB 'Relative Increase Criteria'?	
	Design Year – 'No Build' Scenario		Design Year – 'Build' Scenario							
	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)
NCA8										
75 RIVER DRIVE - GF	39	31	50	42	11.3	11.2	-	-	-	-
73 RIVER DRIVE - GF	39	31	49	41	10.3	10.2	-	-	-	-
73 RIVER DRIVE - F1	40	33	51	43	11.2	9.6	-	-	-	-
69 RIVER DRIVE - GF	39	32	49	41	10.7	9.3	-	-	-	-
69 RIVER DRIVE - F1	40	32	51	43	10.6	10.5	-	-	-	-
107 BARRACKS FLAT DRIVE - GF	39	32	49	41	10.1	8.9	-	-	-	-
105 BARRACKS FLAT DRIVE - GF	39	32	49	41	10.5	9.1	-	-	-	-
105 BARRACKS FLAT DRIVE - F1	40	33	51	43	10.8	9.6	-	-	-	-
126A BARRACKS FLAT DRIVE - GF	33	26	49	41	15.8	14.7	-	-	YES	YES
126A BARRACKS FLAT DRIVE - F 1	36	29	51	43	14.9	13.7	-	-	YES	YES
122 BARRACKS FLAT DRIVE - GF	36	29	50	41	14	12.7	-	-	YES	YES
120 BARRACKS FLAT DRIVE - GF	36	29	51	43	15.1	13.9	-	-	YES	YES
118 BARRACKS FLAT DRIVE - GF	35	28	52	44	16.7	15.5	-	-	YES	YES
116 BARRACKS FLAT DRIVE - GF	33	26	53	45	19.4	18.3	-	-	YES	YES
116 BARRACKS FLAT DRIVE - F 1	37	30	54	46	17.2	15.9	-	-	YES	YES
114 BARRACKS FLAT DRIVE - GF	36	29	53	45	16.7	15.5	-	-	YES	YES
112 BARRACKS FLAT DRIVE - GF	36	29	53	45	17.5	16.2	-	-	YES	YES
110 BARRACKS FLAT DRIVE - GF	34	27	53	45	19.2	18	-	-	YES	YES
110 BARRACKS FLAT DRIVE - F 1	37	30	55	47	17.7	16.5	-	-	YES	YES
108 BARRACKS FLAT DRIVE - GF	34	27	53	45	18.6	17.6	-	-	YES	YES
108 BARRACKS FLAT DRIVE - F 1	38	31	55	47	17.4	16.2	-	-	YES	YES
108 BARRACKS FLAT DRIVE - GF	37	30	52	44	15.1	13.9	-	-	YES	YES
106 BARRACKS FLAT DRIVE - GF	37	30	53	45	15.7	14.6	-	-	YES	YES

Receiver Address	Predicted Noise Levels (dBA)				Relative Increase (dBA)		Design Year 'Build' Scenario Level Above RNP Criteria (dBA) i.e. LAeq(15hour) 55 LAeq(9hour) 50		Design Year 'Build' Scenario Level Exceed 12 dB 'Relative Increase Criteria'?	
	Design Year – 'No Build' Scenario		Design Year – 'Build' Scenario							
	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)
102 BARRACKS FLAT DRIVE - GF	35	28	53	45	17.8	16.7	-	-	YES	YES
102 BARRACKS FLAT DRIVE - F 1	39	32	55	47	16.4	15.3	-	-	YES	YES
98 BARRACKS FLAT DRIVE - GF	36	29	55	46	18.4	17.3	-	-	YES	YES
98 BARRACKS FLAT DRIVE - F 1	39	32	56	48	17.1	16	1.4	-	YES	YES
96 BARRACKS FLAT DRIVE - GF	37	30	52	44	15.1	14.2	-	-	YES	YES
96 BARRACKS FLAT DRIVE - F 1	40	33	54	46	14.5	13.6	-	-	YES	YES
90 BARRACKS FLAT DRIVE - GF	39	32	56	48	17.4	16.3	1.3	-	YES	YES
92 BARRACKS FLAT DRIVE - F 1	40	33	53	45	13.6	12.6	-	-	YES	YES
86 BARRACKS FLAT DRIVE - GF	39	32	49	41	10.1	9	-	-	-	-
86 BARRACKS FLAT DRIVE - GF	38	31	49	41	10.8	9.7	-	-	-	-
1 WEBBER PLACE - GF	37	30	47	39	9.9	9	-	-	-	-
82 BARRACKS FLAT DRIVE - GF	41	34	53	44	11.9	10.8	-	-	-	-
82 BARRACKS FLAT DRIVE - F 1	40	33	56	47	15.6	14.5	0.5	-	YES	YES
3 WEBBER PLACE - GF	36	29	46	38	9.9	8.9	-	-	-	-
3 WEBBER PLACE - F 1	42	35	48	41	6.7	5.9	-	-	-	-
80 BARRACKS FLAT DRIVE - F 1	42	35	57	49	14.8	13.7	1.7	-	YES	YES
78 BARRACKS FLAT DRIVE - GF	40	33	51	43	10.6	9.7	-	-	-	-
78 BARRACKS FLAT DRIVE - F 1	42	35	55	47	12.8	11.8	-	-	YES	-
74 BARRACKS FLAT DRIVE - GF	45	38	51	43	5.8	4.9	-	-	-	-
5 WEBBER PLACE - GF	40	33	47	39	7.7	6.8	-	-	-	-
7 WEBBER PLACE - GF	37	30	48	40	11	9.9	-	-	-	-
7 WEBBER PLACE - F 1	42	35	50	42	8	7.1	-	-	-	-
9 WEBBER PLACE - GF	40	33	50	41	9.6	8.7	-	-	-	-
9 WEBBER PLACE - F 1	44	36	52	43	7.9	7	-	-	-	-

Receiver Address	Predicted Noise Levels (dBA)				Relative Increase (dBA)		Design Year 'Build' Scenario Level Above RNP Criteria (dBA) i.e. LAeq(15hour) 55 LAeq(9hour) 50		Design Year 'Build' Scenario Level Exceed 12 dB 'Relative Increase Criteria'?	
	Design Year – 'No Build' Scenario		Design Year – 'Build' Scenario							
	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)	Daytime LAeq(15hour)	Night-time LAeq(9hour)
11 WEBBER PLACE - GF	45	38	50	42	5.2	4.4	-	-	-	-
11 FITZGIBBON PLACE - GF	48	41	52	44	3.5	3	-	-	-	-
13 WEBBER PLACE - GF	46	39	51	43	5.1	4.4	-	-	-	-
12 WEBBER PLACE - GF	50	42	55	47	5.5	4.9	-	-	-	-
12 WEBBER PLACE - F 1	52	44	57	49	5.2	4.5	1.8	-	-	-
16 FITZGIBBON PLACE - GF	50	42	53	45	2.8	2.4	-	-	-	-
15 FITZGIBBON PLACE - GF	50	42	54	46	4	3.4	-	-	-	-
13 CAROLINE PLACE - GF	52	45	54	47	2.1	1.7	-	-	-	-
17 FITZGIBBON PLACE - GF	53	46	55	47	2	1.6	-	-	-	-
17 CAROLINE PLACE - GF	52	45	55	48	3.1	2.7	-	-	-	-
19 CAROLINE PLACE - GF	56	48	57	49	1.5	1.1	2	-	-	-
16 ALFRED PLACE - GF	57	50	57	50	0.4	0.2	2.4	-	-	-
18 ALFRED PLACE - GF	57	49	58	50	0.8	0.6	2.5	-	-	-
18 ALFRED PLACE - F 1	58	50	59	52	1.8	1.5	4.3	1.8	-	-
14 ALFRED PLACE - GF	58	51	58	51	0.7	-	2.3	-	-	-
12 ALFRED PLACE - GF	57	49	57	50	0.8	0.5	2.3	-	-	-

* Note: Exceedance of criteria due to contribution Old Cooma Road.

H:\Projects-SLR\630-Srv\NT\L670-CAN\670.10568 Ellerton Drive Extension\SLR670.10568_P_AssessedBuildings_03.mxd

SLR
SUITE 3, LEVEL 4
11 LONDON CRT
CANBERRA ACT 2600
AUSTRALIA
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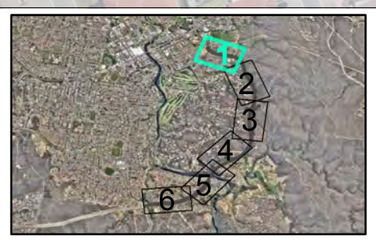
Project No.:	670.10568
Date:	12/02/2015
Drawn by:	NT
Scale:	1:2,000
Sheet Size:	A3
Projection:	GDA 1994 MGA Zone 55



Noise Protection Wall Height

- 2.4m
- 3.0m
- 3.6m
- 4.2m
- 4.8m

Proposed Design

Assessed Buildings (Building Base Height, Building Roof Height)

Queanbeyan City Council

ELLERTON DRIVE EXTENTION

Assessed Buildings

FIGURE P - 1