

## Road surface noise – Summary of CPX measurements 2021



*Prepared for*  
NZ Transport Agency  
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Wellington.

**Date:** 18 August 2021  
**Ref:** 20-118/R01/B

## Quality information

Prepared for (the Client):  
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Project: Road surface noise  
Report: Summary of CPX measurements 2021  
Reference: 20-118/R01/B

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Version history:

Version	Date	Comment
A	18 July 2021	Draft for review
B	18 August 2021	Updated in response to comments

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## 1 Summary

Road surface noise testing was performed using the Close Proximity measurement trailer (CPX trailer). Measurements were performed following the NZ Transport Agency's "*Close proximity (CPX) road surface noise measurement trailer guide*". This report details the measurements, locations, general observations, and presents the results of testing.

For convenience, the summary results are provided below. These are the results for full runs and have not been filtered for surface types or areas.

Comprehensive maps of the measured sites and CPX levels are presented in Appendix A, and longitudinal results are presented in the following Appendices. Areas that were previously measured in 2019 are presented with both the 2019 and 2020 results, and comparative longitudinal results are plotted.

**Table 1 Overall average  $L_{CPX:P1,80}$  by location**

Site	$L_{CPX:P1,80}$	Acoustic variability	Predominant surface type
Southwestern Motorway – Waterview tunnel approach	96.6 dB	1.2 dB	PA-10
Northwestern Motorway – Waterview to Whenuapai	96.5 dB	1.4 dB	PA-10
Upper Harbour Motorway – Hobsonville to Albany Highway	95.9 dB	1.6 dB	ENRAC
Northern Motorway – Wairau Valley to Silverdale	97.4 dB	1.2 dB	PA-10
Southern Motorway – Greenlane to Otara	98.2 dB	1.9 dB	PA-10
Waikato Expressway – Taupiri to Hampton Downs	97.4 dB	1.2 dB	PA-10
McKays to Peka Peka	96.4 dB	1.2 dB	PA-10
Wellington Urban Motorway – Thorndon to Upper Hutt	97.6 dB	1.5 dB	PA-10
Western Belfast Bypass, Johns Road, and Russley Road	97.0 dB	2.9 dB	PA-10
Christchurch Southern Motorway (1 and 2)	96.4 dB	3.8 dB	PA-10 and PA-7

## 2 Measurement locations

The locations detailed in the following table were tested between November 2020 and June 2021.

**Table 2 Road surface noise measurement sites**

Site	Highway	Southern RP	Northern RP
Southwestern Motorway – Waterview tunnel approach	SH20	020-0020-D/1.378 020-0020-I/1.378	020-0010-D/6.479 020-0010-I/6.479
Northwestern Motorway – Waterview to Whenuapai	SH16	016-0007-D/5.679 016-0007-I/5.679	016-0000-D/6.600 016-0000-I/6.600
Upper Harbour Motorway –Hobsonville to Albany Highway	SH18	018-0007-D/3.168 018-0007-I/3.168	018-0000-I/2.796 018-0000-D/2.796
Northern Motorway – Wairau Valley to Silverdale	SH1	01N-0398-D/13.152 01N-0398-I/13.152	01N-0398-D/0.442 01N-0398-I/0.442
Southern Motorway – Greenlane to Otara	SH1	01N-0431-D/12.815 01N-0431-I/12.815	01N-0431-D/2.400 01N-0431-I/2.400
Huntly Expressway	SH1	01N-0513-D/14.863 01N-0513-I/14.842	01N-0486-D/8.312 01N-0486-I/8.312
McKays to Peka Peka	SH1	01N-1011-D/18.572 01N-1011-I/18.107	01N-1011-D/0.039 01N-1011-I/0.046
Pukerua Bay	SH1	01N-1035-B/5.750	01N-1035-B/0.078
Plimerton to Pukerua Bay	SH1	01N-1035-I/12.692 01N-1035-D/12.694	01N-1035-B/7.777
Wellington Urban Motorway and Western Hutt Road	SH1/SH2	01N-1068-I/3.472 01N-1068-D/3.475	002-0931-B/6.485
Western Belfast Bypass	SH1	01S-0333-I/1.213 01S-0333-D/1.233	01S-0327-I/1.066 01S-0327-D/1.041
Johns Road and Russley Road	SH1	01S-0333-I/9.798 01S-0333-D/9.797	01S-0333-I/1.464 01S-0333-D/1.464
Christchurch Southern Motorway	SH76/SH1	01S-0365-I/1.962 01S-0365-D/1.963	076-0003-I/5.062 076-0003-D/5.064



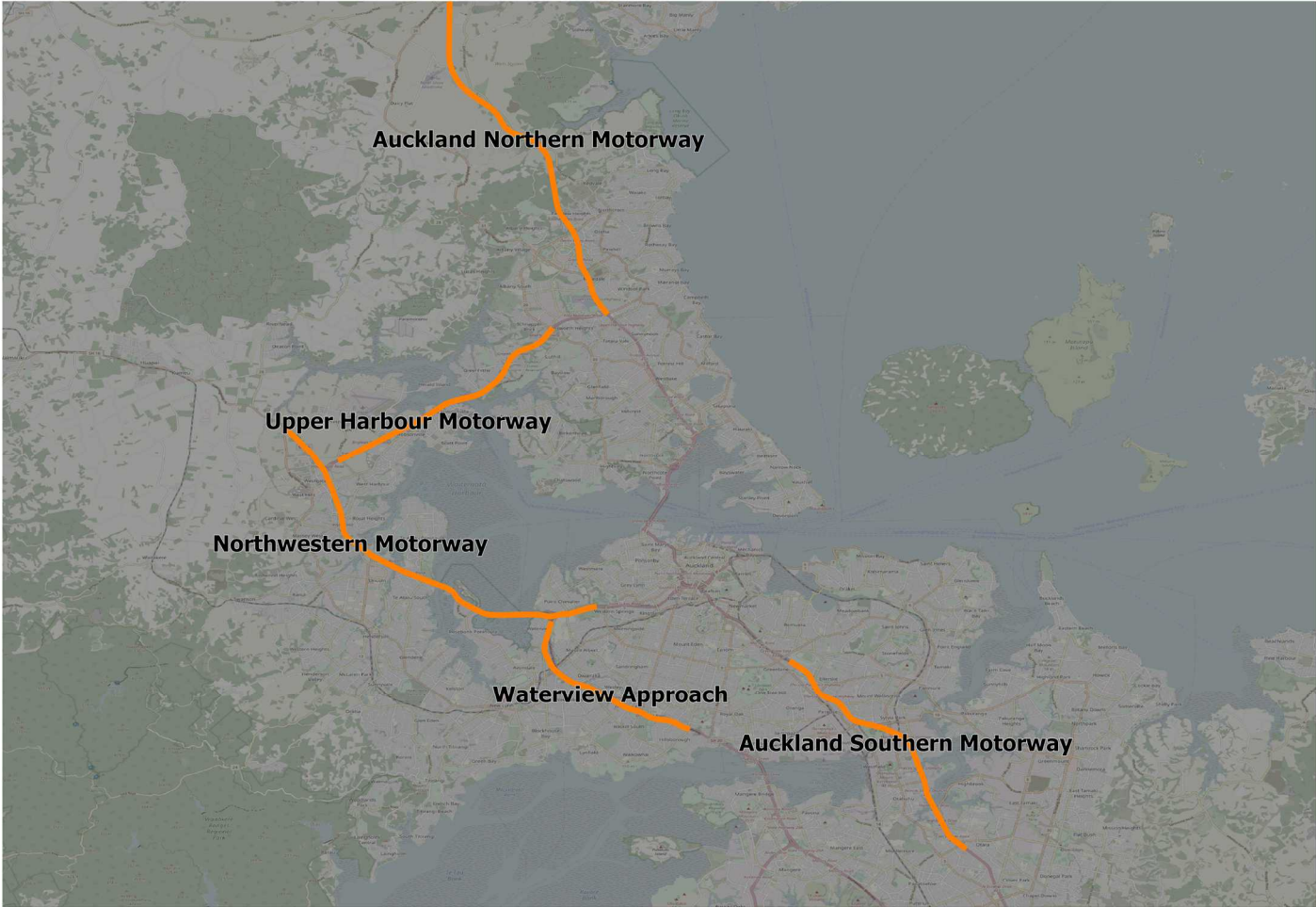


Figure 1 Auckland measurement sites for 2020 CPX study

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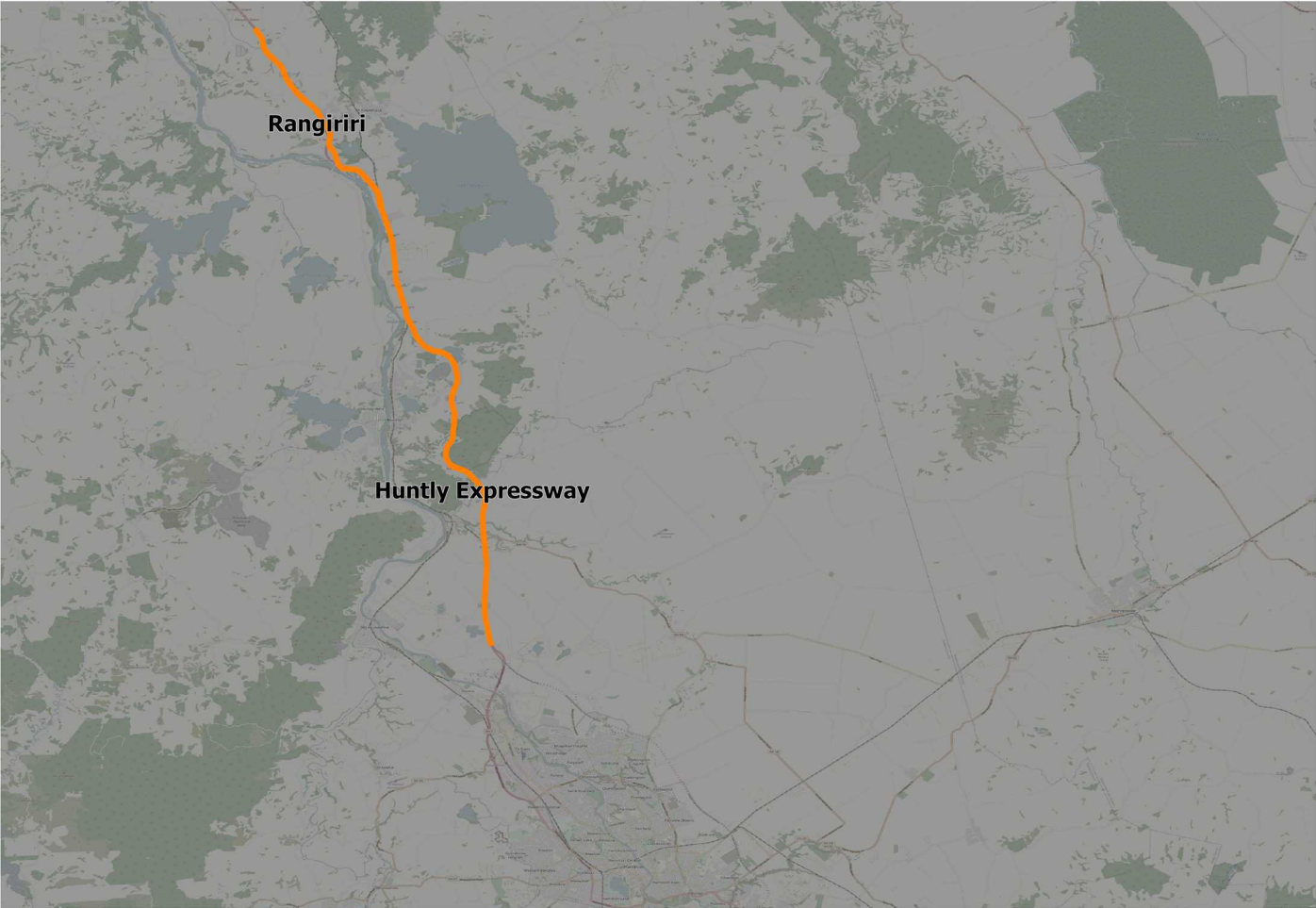


Figure 2 Hamilton measurement sites for 2020 CPX study

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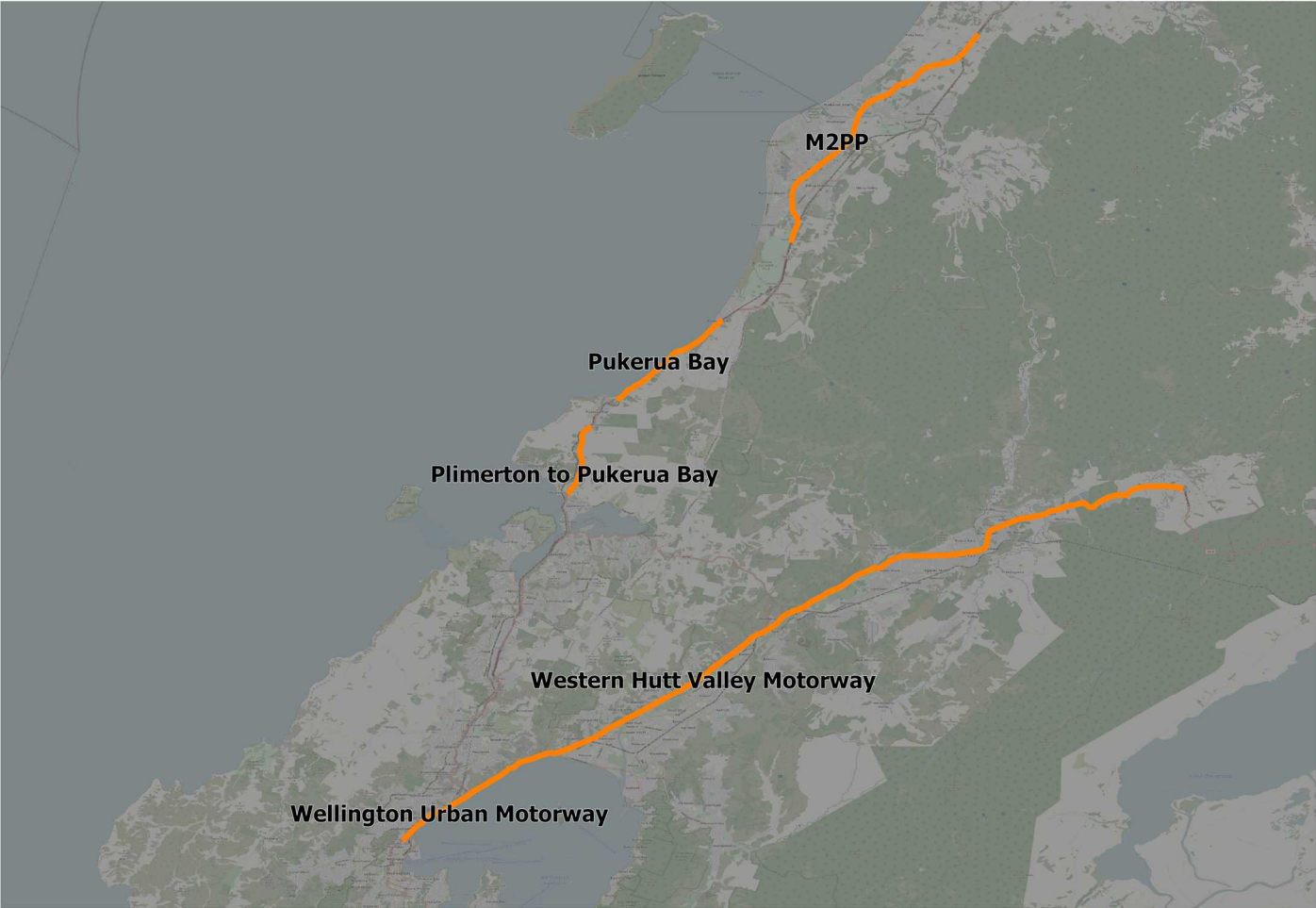


Figure 3 Wellington measurement sites for 2020 CPX study

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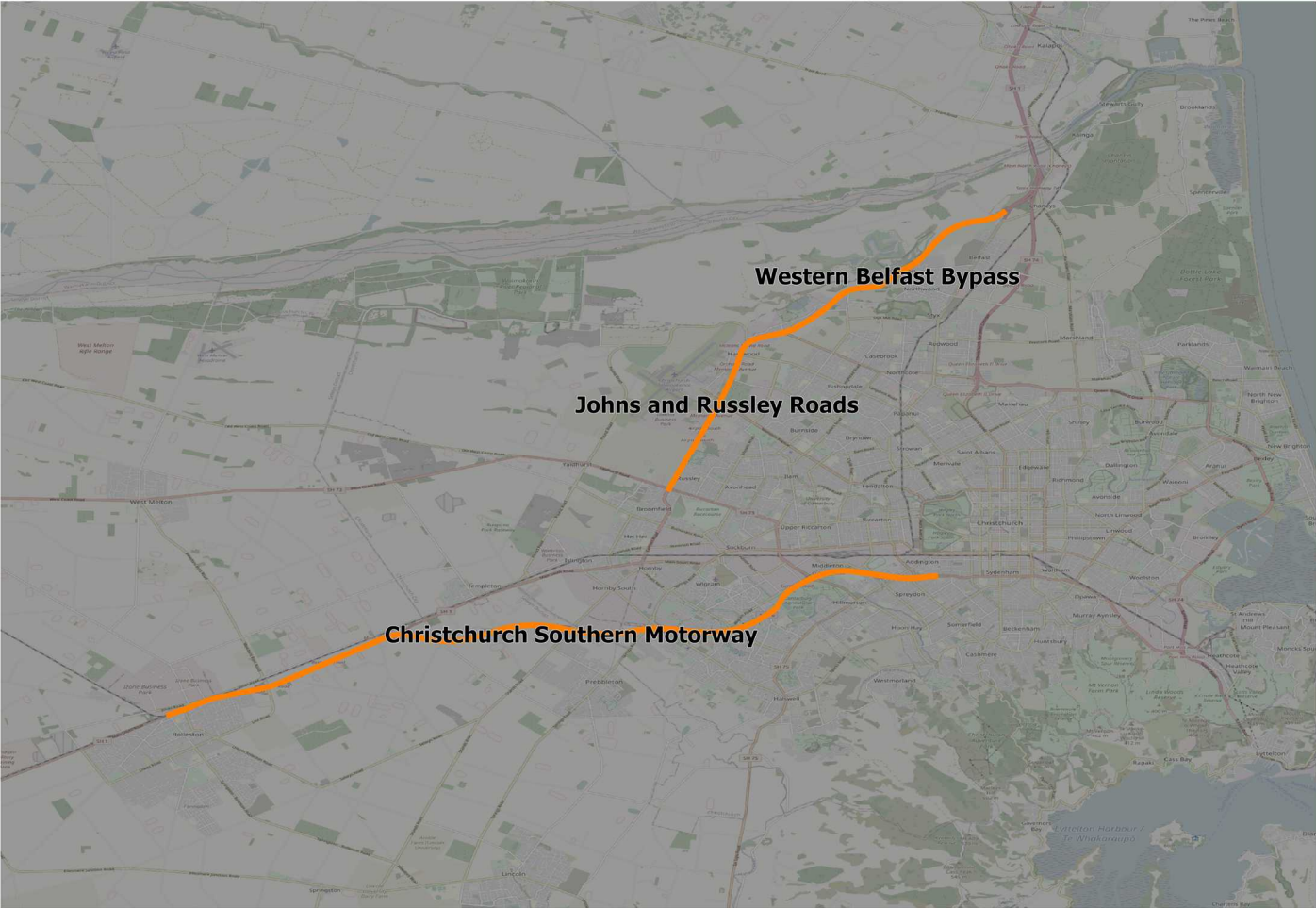


Figure 4 Christchurch measurement sites for 2020 CPX study

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## Appendix A: Maps of CPX levels

A.1 SH1 – Western Belfast Bypass



Western Belfast Bypass

dB CPX Level

- <90
- 91 - 92
- 92 - 93
- 93 - 94
- 94 - 95
- 95 - 96
- 96 - 97
- 97 - 98
- 98 - 99
- 99 - 100
- 100 - 101
- 101 - 102
- 102 - 103
- 103 - 104
- 104 - 105
- >105

A.2 SH1 – Johns Road



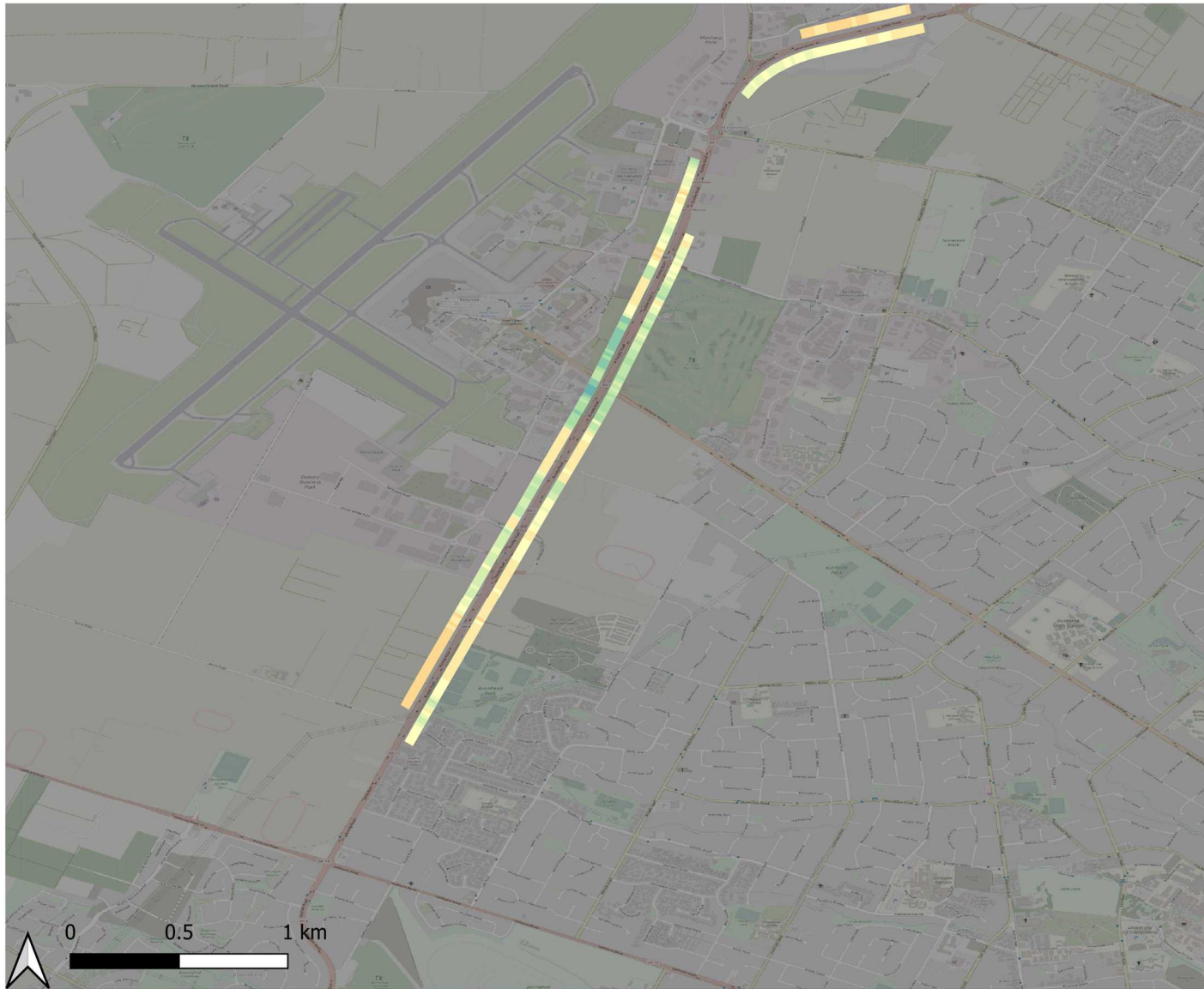
Johns Road

dB CPX Level

- <90
- 91 - 92
- 92 - 93
- 93 - 94
- 94 - 95
- 95 - 96
- 96 - 97
- 97 - 98
- 98 - 99
- 99 - 100
- 100 - 101
- 101 - 102
- 102 - 103
- 103 - 104
- 104 - 105
- >105



A.3 SH1 – Russley Road



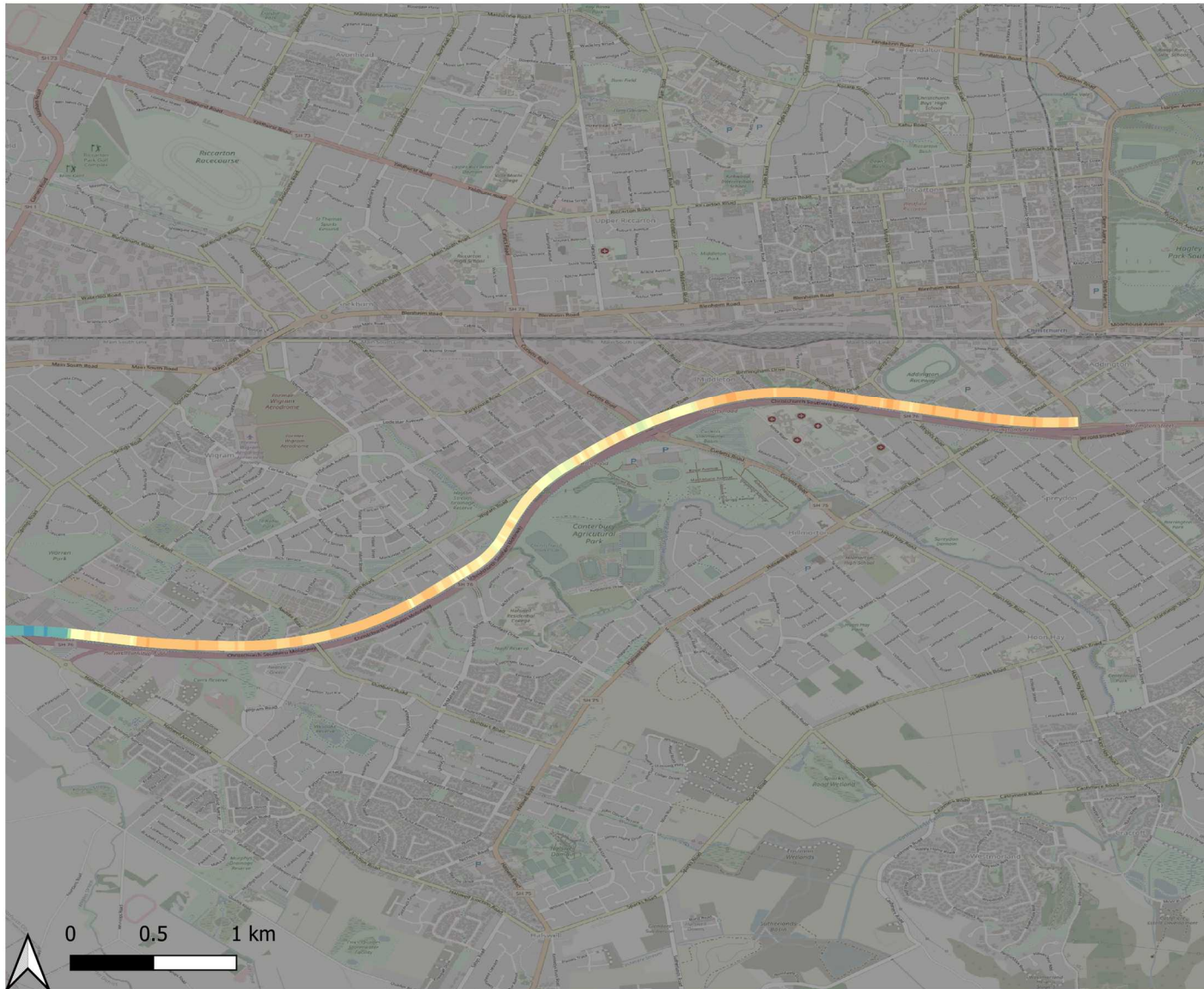
Russley Road

dB CPX Level

- <90
- 91 - 92
- 92 - 93
- 93 - 94
- 94 - 95
- 95 - 96
- 96 - 97
- 97 - 98
- 98 - 99
- 99 - 100
- 100 - 101
- 101 - 102
- 102 - 103
- 103 - 104
- 104 - 105
- >105

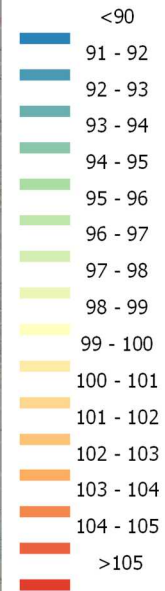


A.4 SH76 – Christchurch Southern Motorway 1



Christchurch Southern Motorway 1

dB CPX Level

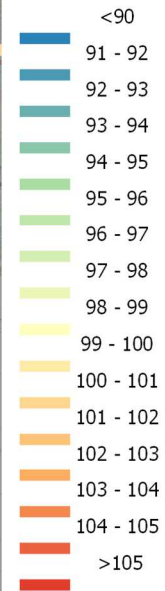


A.5 SH76 – Christchurch Southern Motorway 2



Christchurch Southern Motorway 2

dB CPX Level



A.6 SH2 – Upper Hutt



Upper  
Hutt

dB CPX Level

- <90
- 91 - 92
- 92 - 93
- 93 - 94
- 94 - 95
- 95 - 96
- 96 - 97
- 97 - 98
- 98 - 99
- 99 - 100
- 100 - 101
- 101 - 102
- 102 - 103
- 103 - 104
- 104 - 105
- >105



A.7 SH1 and SH2 – Wellington Urban Motorway and Western Hutt Motorway

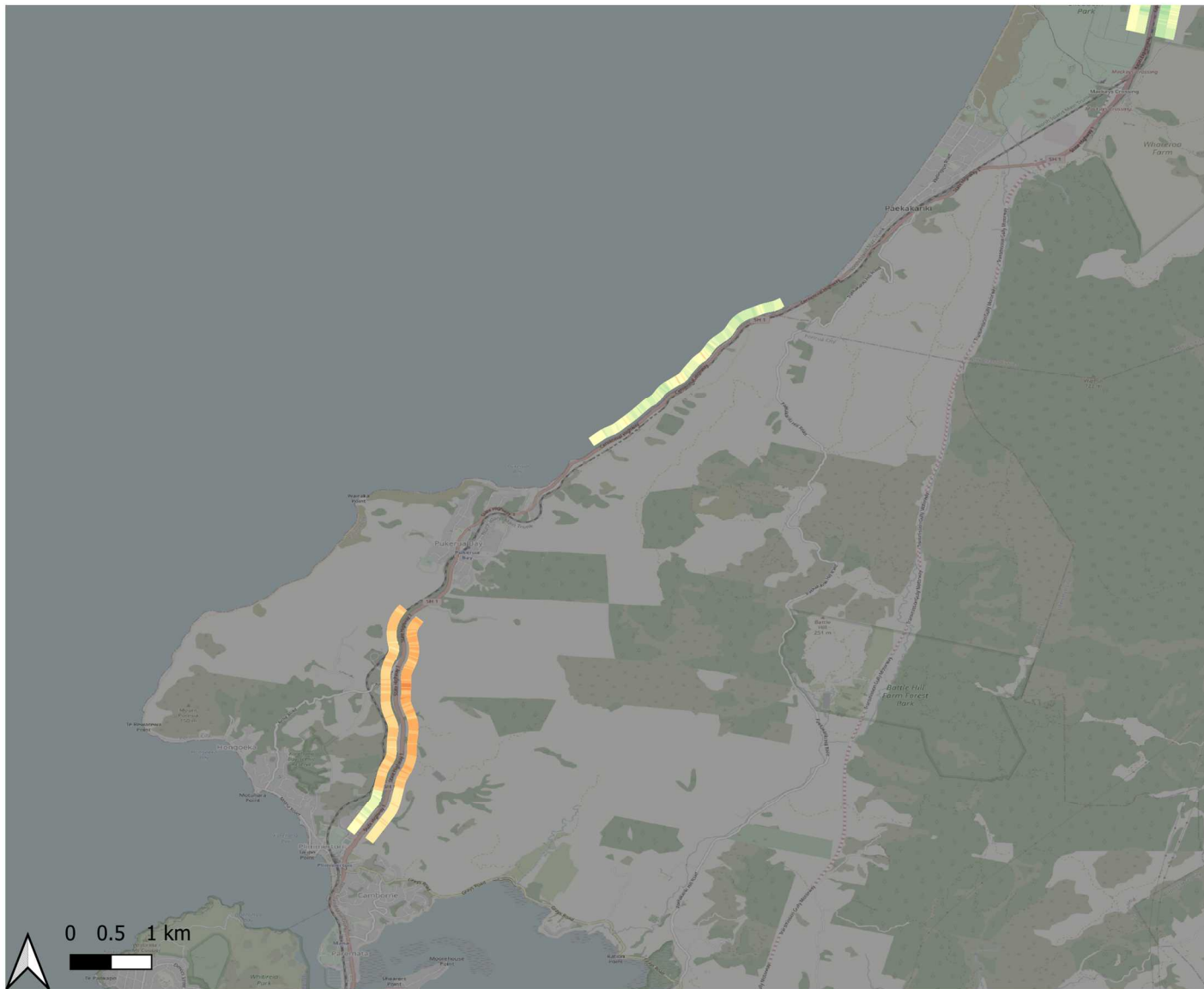


Wellington  
Urban  
Motorway

dB CPX Level

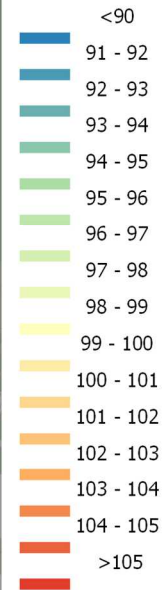
- <90
- 91 - 92
- 92 - 93
- 93 - 94
- 94 - 95
- 95 - 96
- 96 - 97
- 97 - 98
- 98 - 99
- 99 - 100
- 100 - 101
- 101 - 102
- 102 - 103
- 103 - 104
- 104 - 105
- >105

A.8 SH1 – Pukerua Bay and Plimerton



Pukerua Bay

dB CPX Level

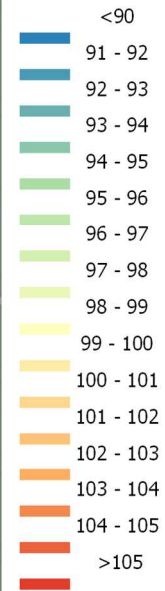


A.9 SH1 – McKays to Peka Peka



McKays to Peka Peka

dB CPX Level



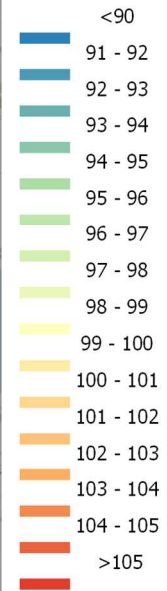


A.10 SH1 – Rangiriri

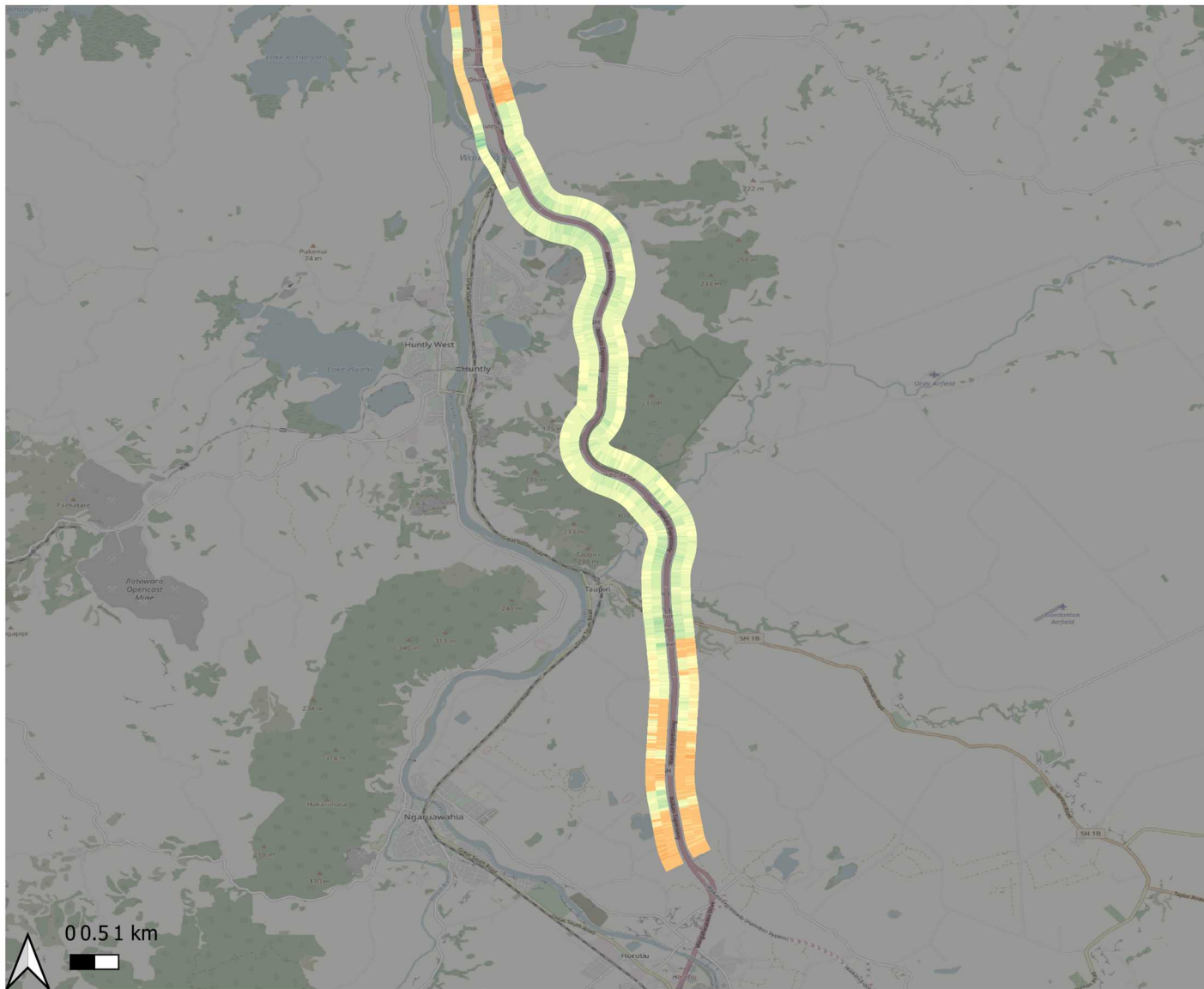


Rangiriri

dB CPX Level

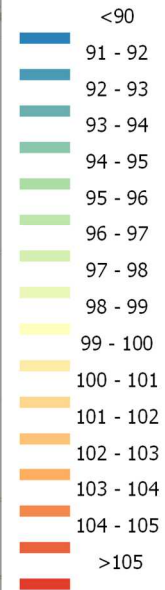


A.11 SH1 – Huntly Expressway



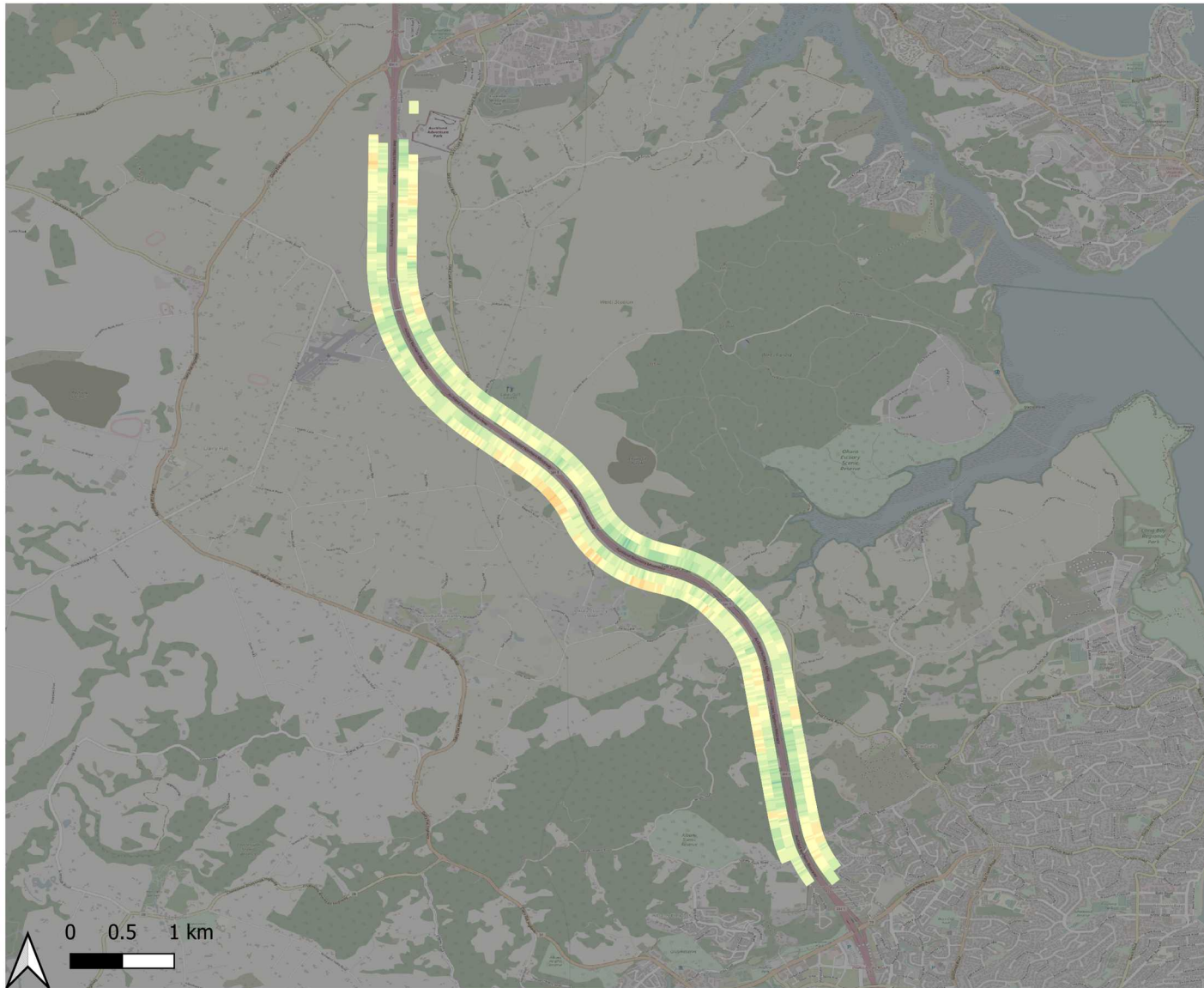
Huntly Expressway

dB CPX Level





A.12 SH1 – Auckland Northern Motorway

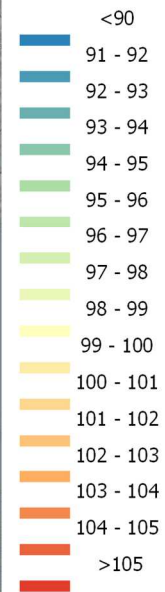


A.13 SH18 – Upper Harbour Motorway 1



Upper Harbour Drive

dB CPX Level



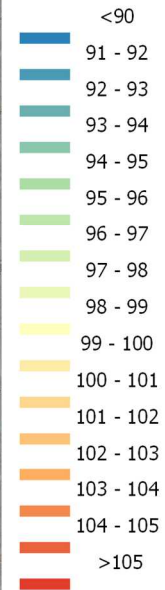


A.14 SH18 – Upper Harbour Motorway 2



Upper Harbour Motorway

dB CPX Level

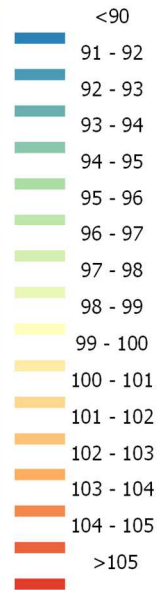


A.15 SH16 – Te Atatu to Whenuapai



Te Atatu  
to  
Whenuapai

dB CPX Level



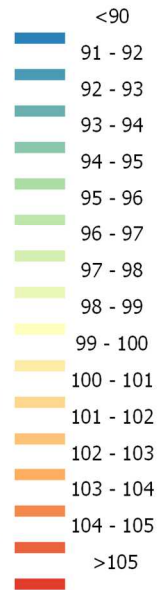


A.16 SH16 – Northwestern Motorway



Waterview Exchange

dB CPX Level



A.17 SH20 – Waterview Approach



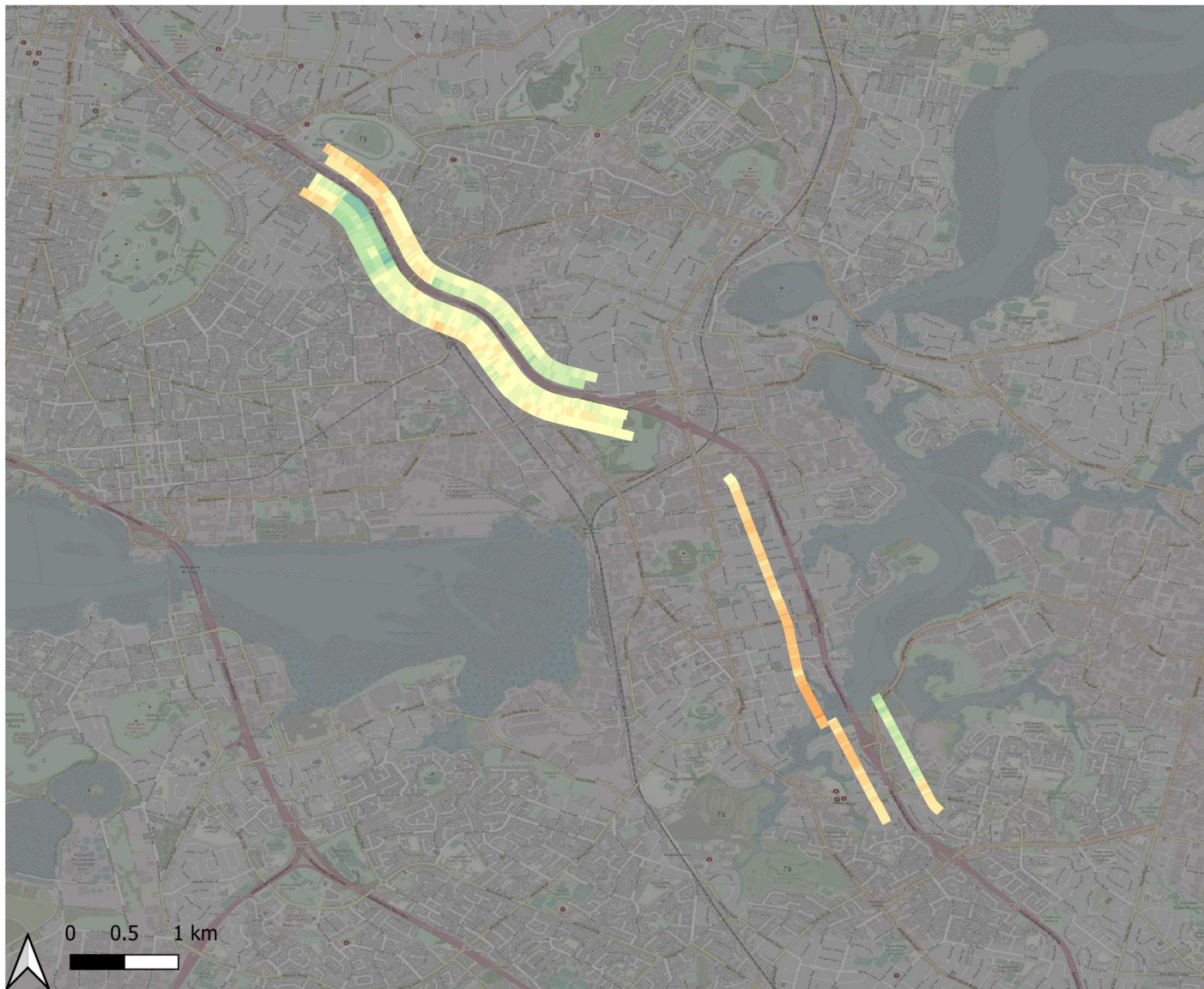
Waterview Approach

dB CPX Level

- <90
- 91 - 92
- 92 - 93
- 93 - 94
- 94 - 95
- 95 - 96
- 96 - 97
- 97 - 98
- 98 - 99
- 99 - 100
- 100 - 101
- 101 - 102
- 102 - 103
- 103 - 104
- 104 - 105
- >105

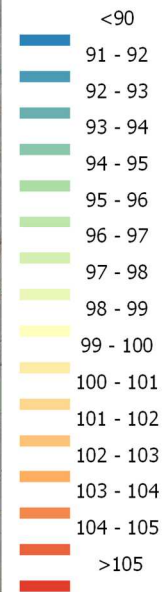


A.18 SH1 – Auckland Southern Motorway



Greenlane

dB CPX Level

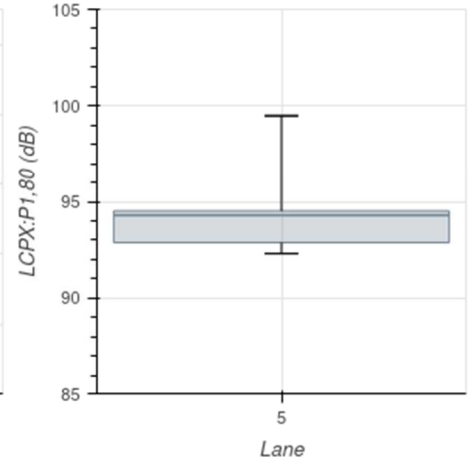
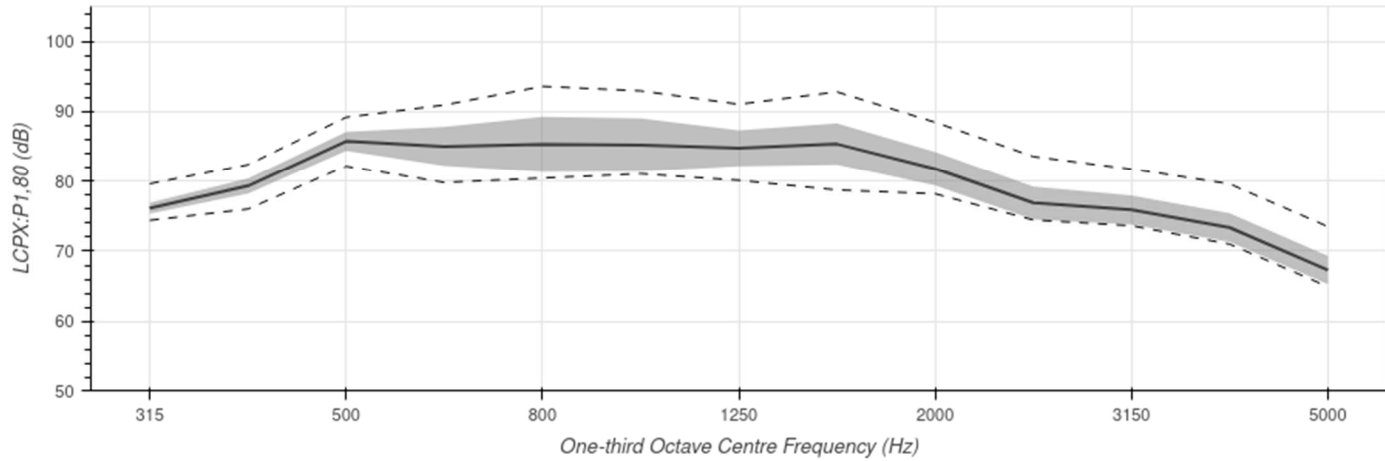
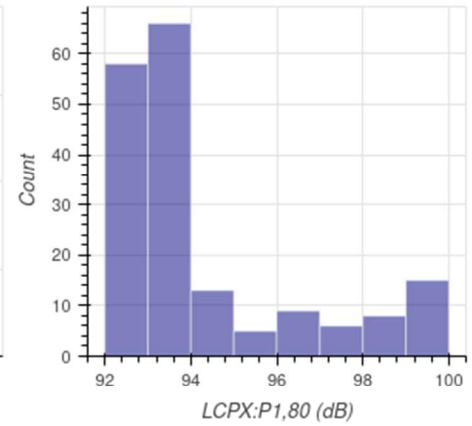
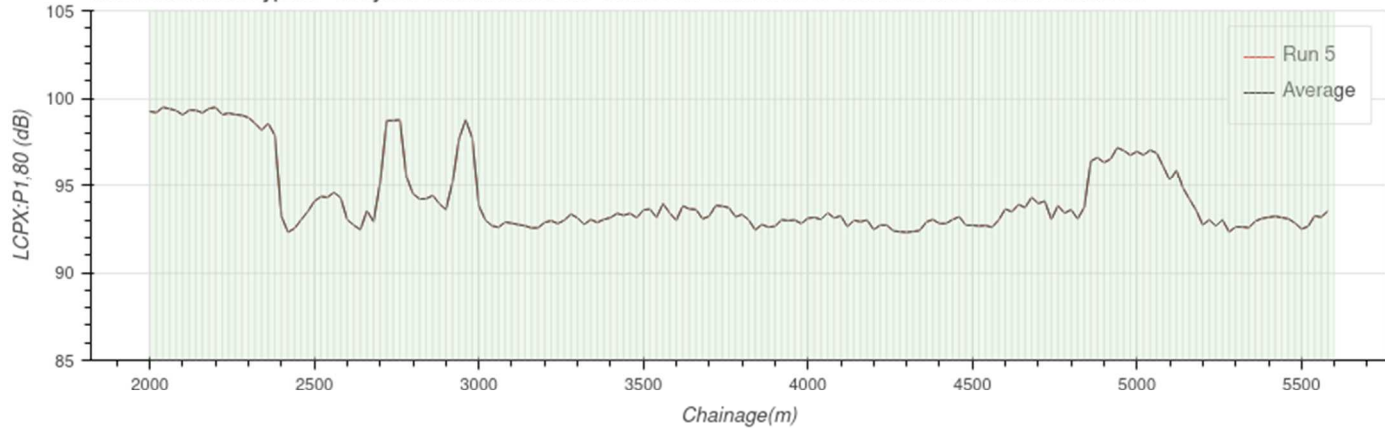


## Appendix B: SH1 – Western Belfast Bypass

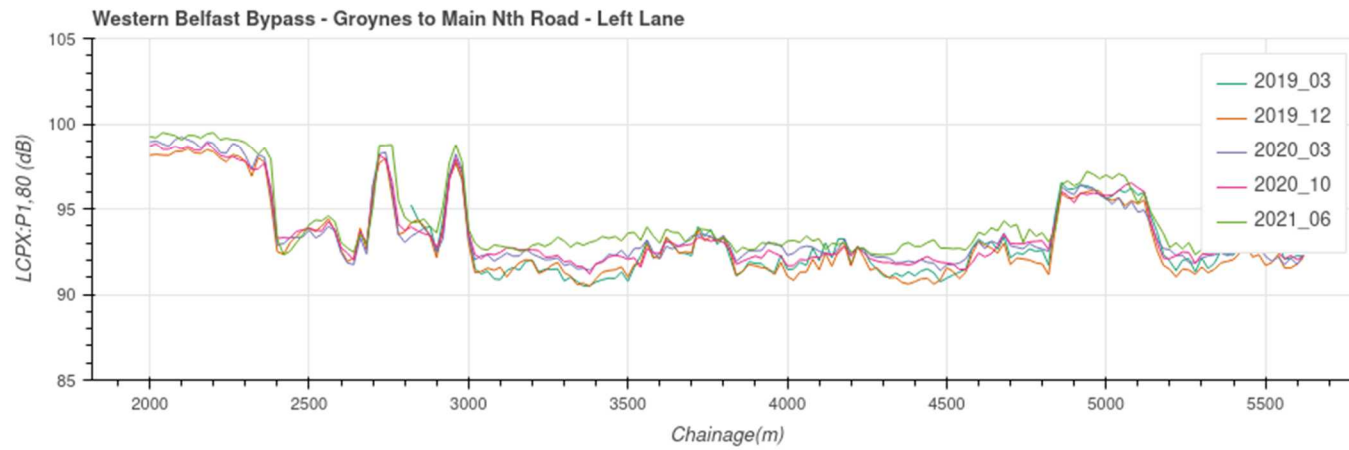
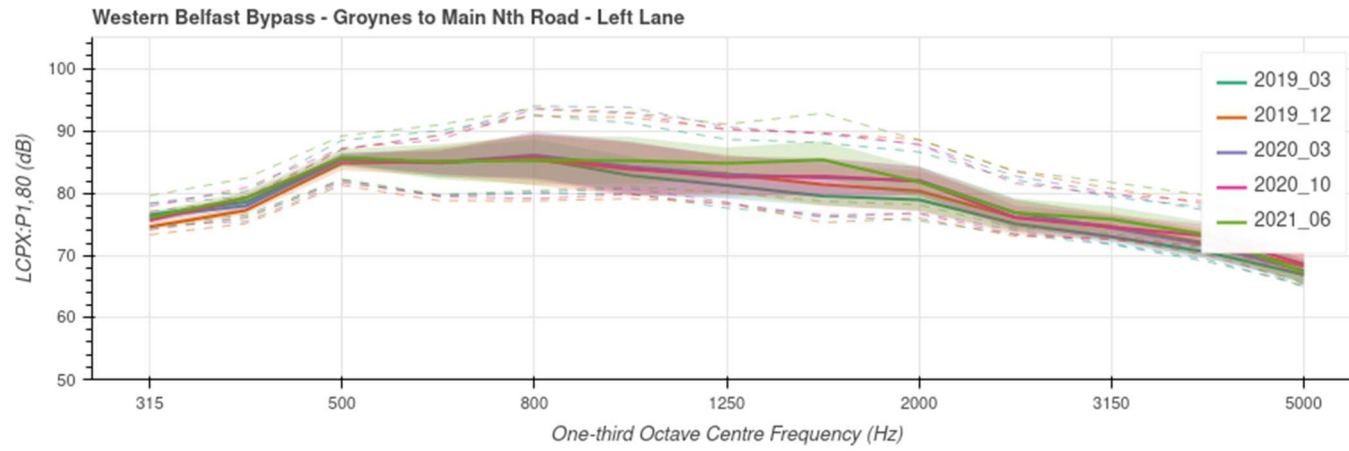


**B.1 SH1 – Western Belfast Bypass – Groynes to Main North Road – Northbound – Left Lane**

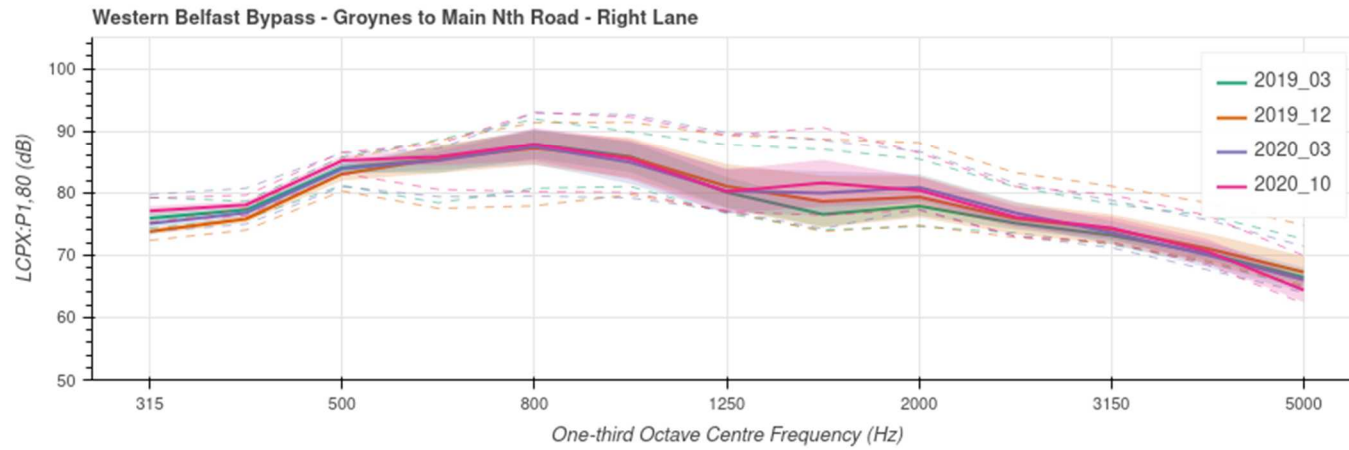
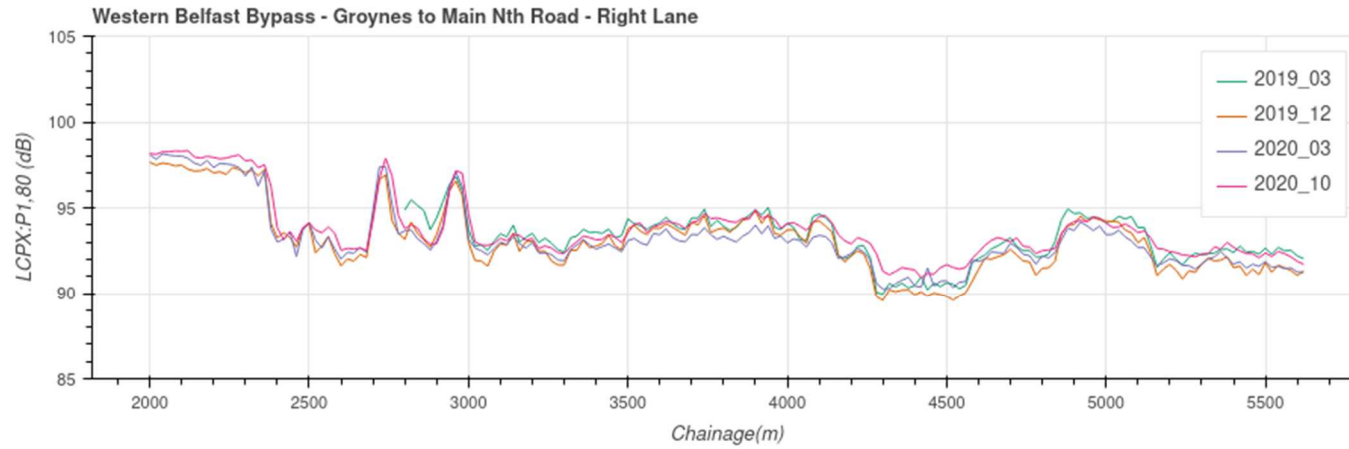
Western Belfast Bypass - Groynes to Main Nth Road - Lane: left - Direction: D - Road ID: 1715 - Date: 03/06/2021



	Average	Run 5
Lcpx (dB)	94.3	94.3
Variation (dB)	2.2	2.2

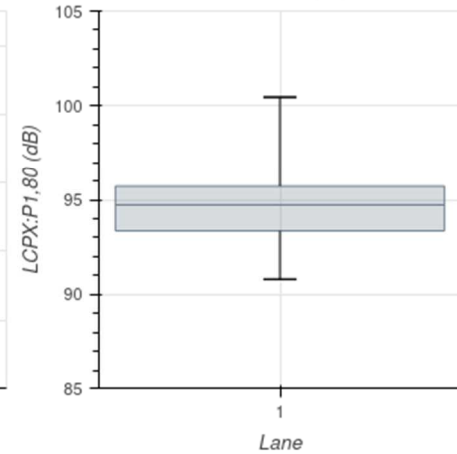
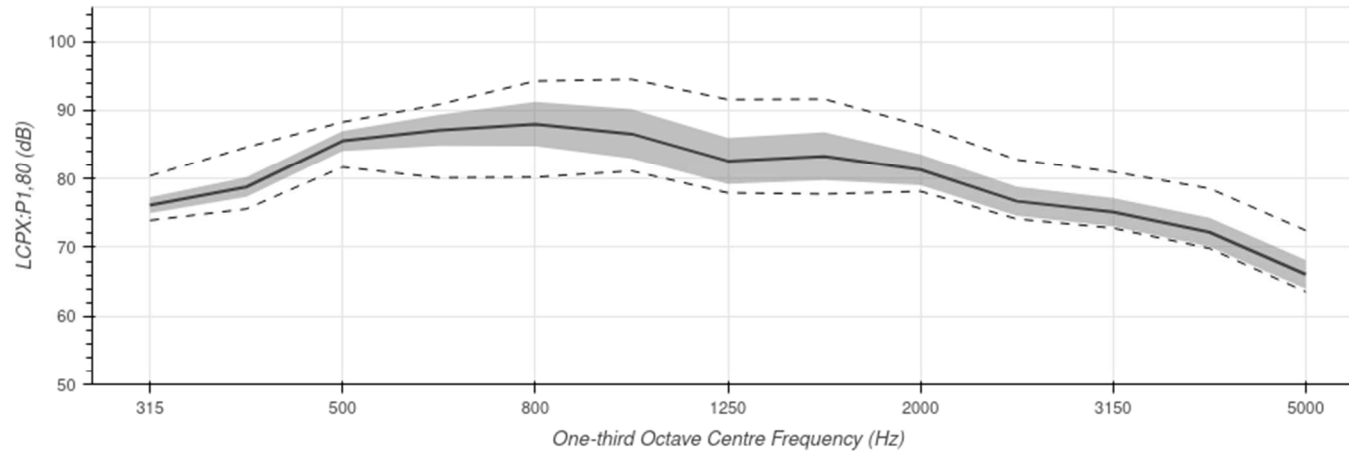
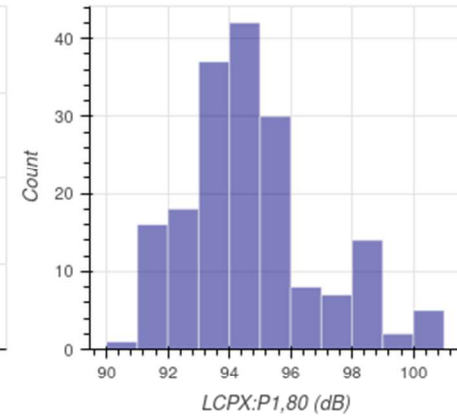
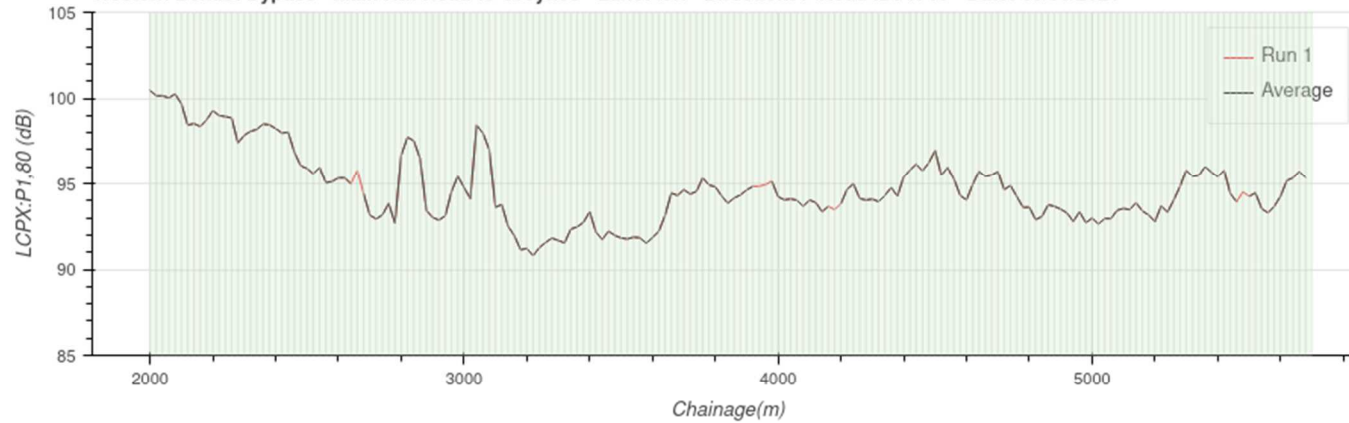


### B.2 SH1 – Western Belfast Bypass – Groynes to Main North Road – Northbound – Right Lane

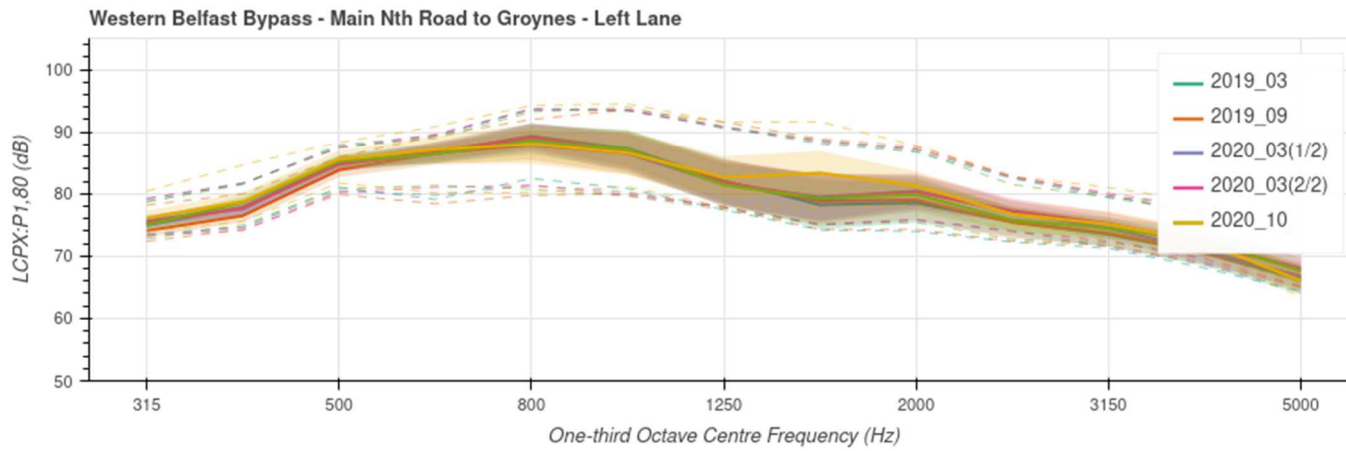
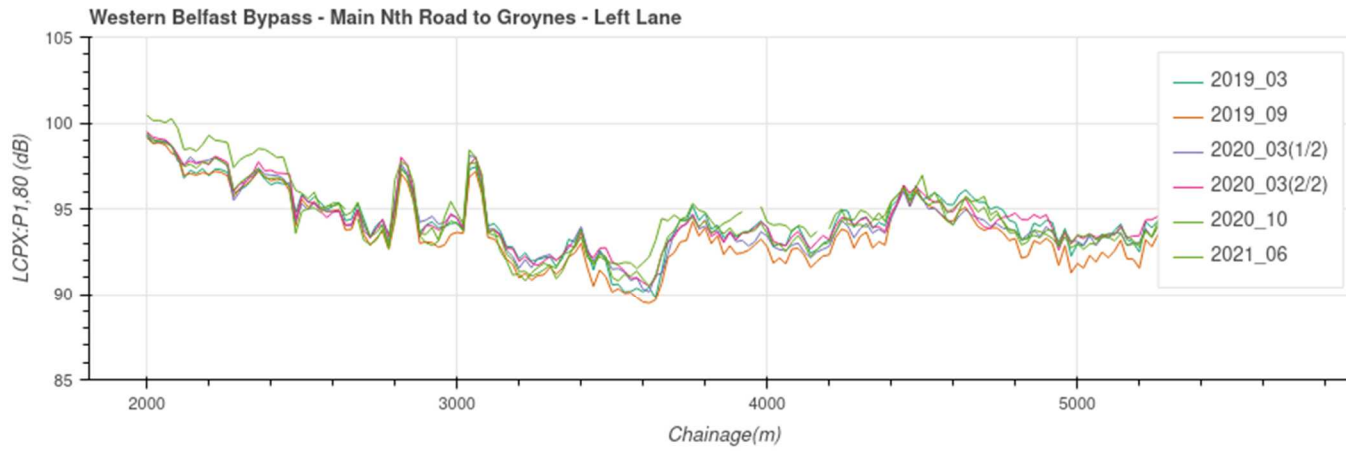


### B.3 SH1 – Western Belfast Bypass – Groynes to Main North Road – Southbound – Left Lane

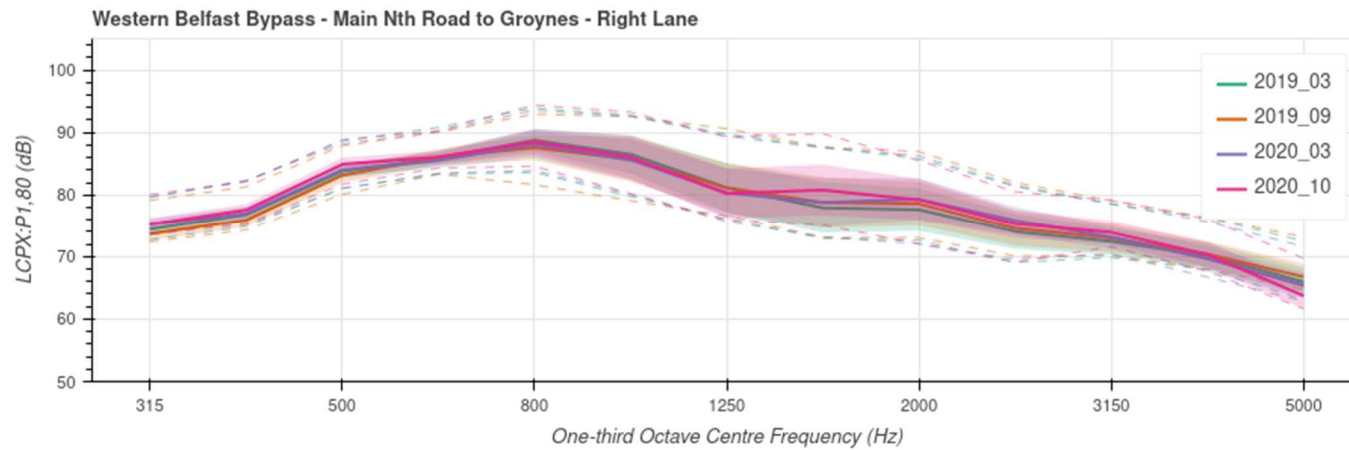
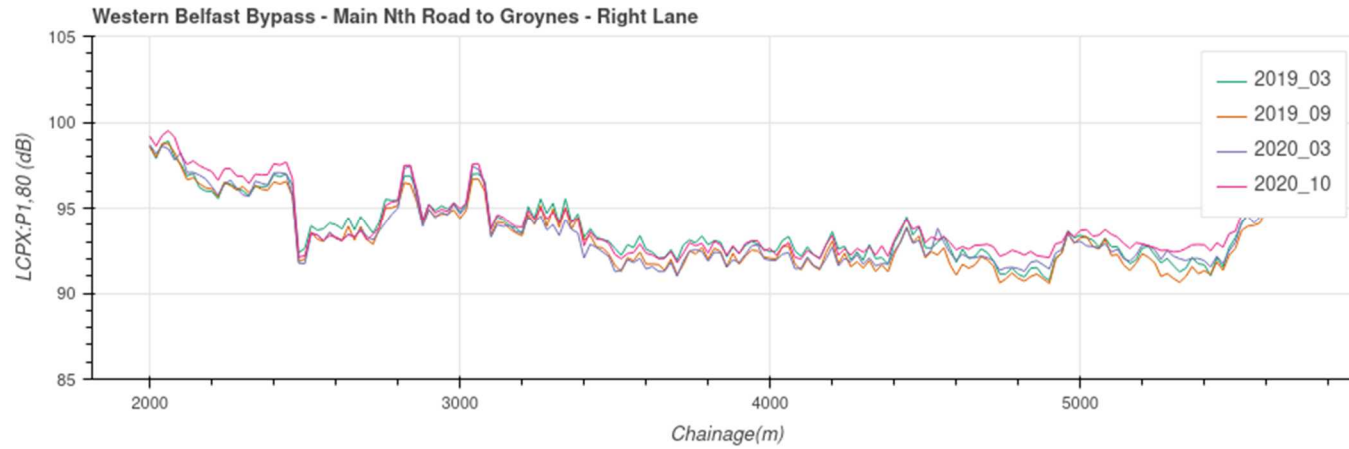
Western Belfast Bypass - Main Nth Road to Groynes - Lane: left - Direction: I -Road ID: 1716 - Date: 03/06/2021



	Average	Run 1
Lcpx (dB)	94.7	94.7
Variation (dB)	2.1	2.1

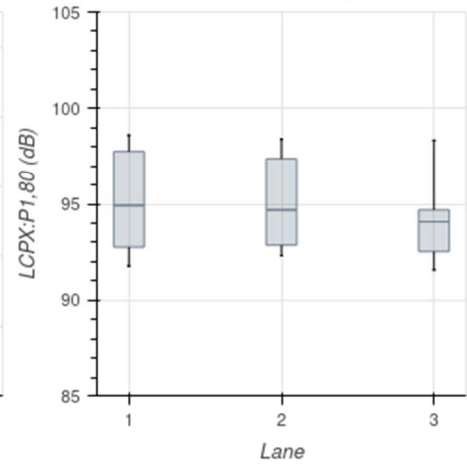
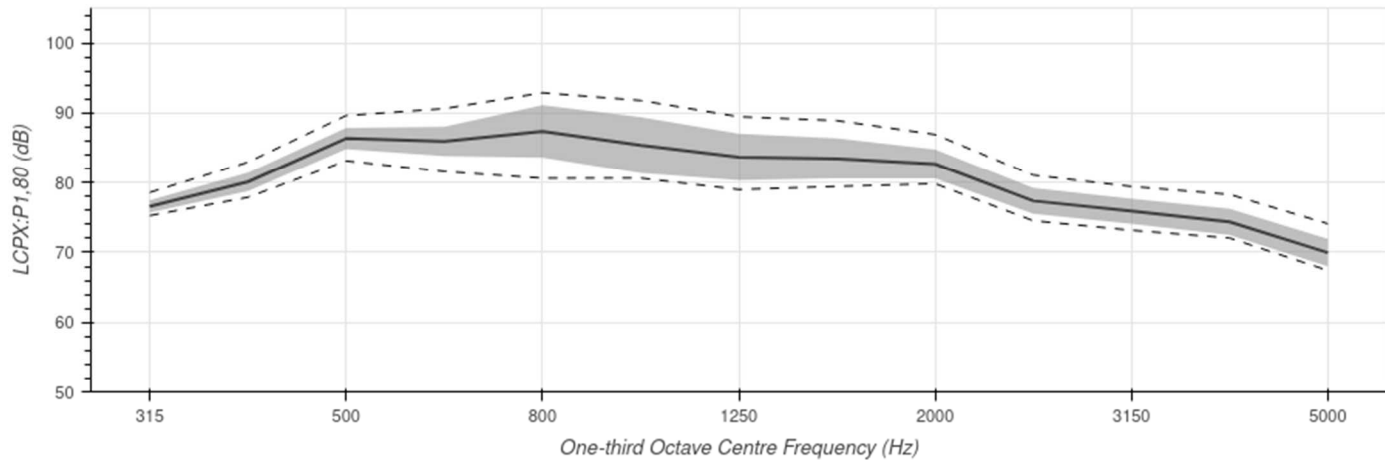
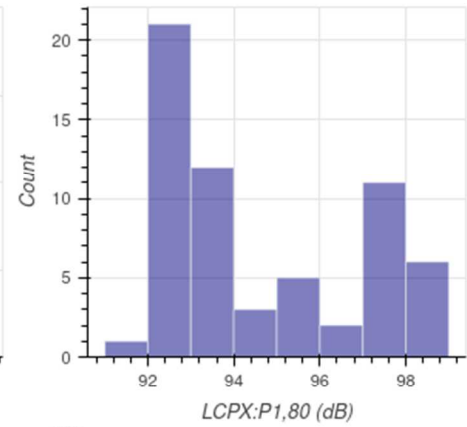
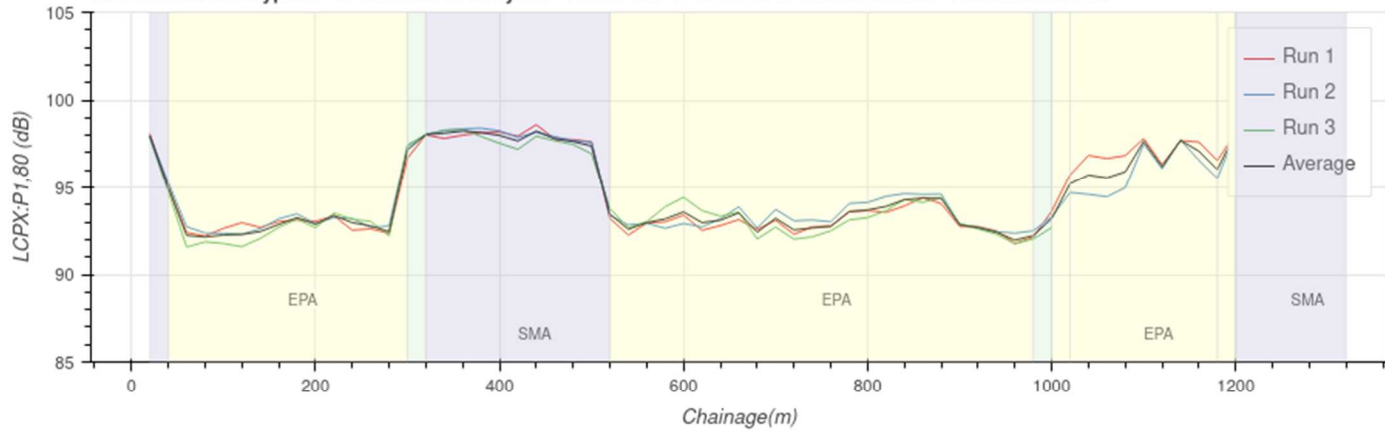


**B.4 SH1 – Western Belfast Bypass – Groynes to Main North Road – Southbound – Right Lane**



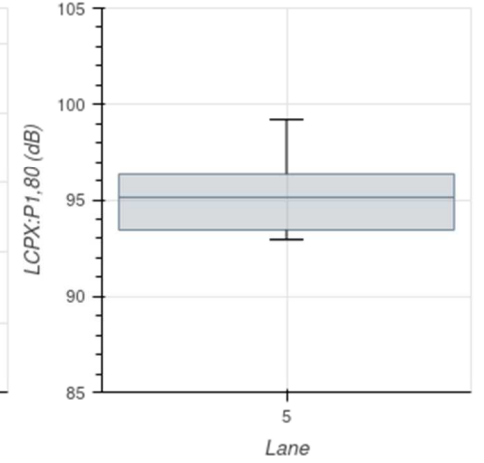
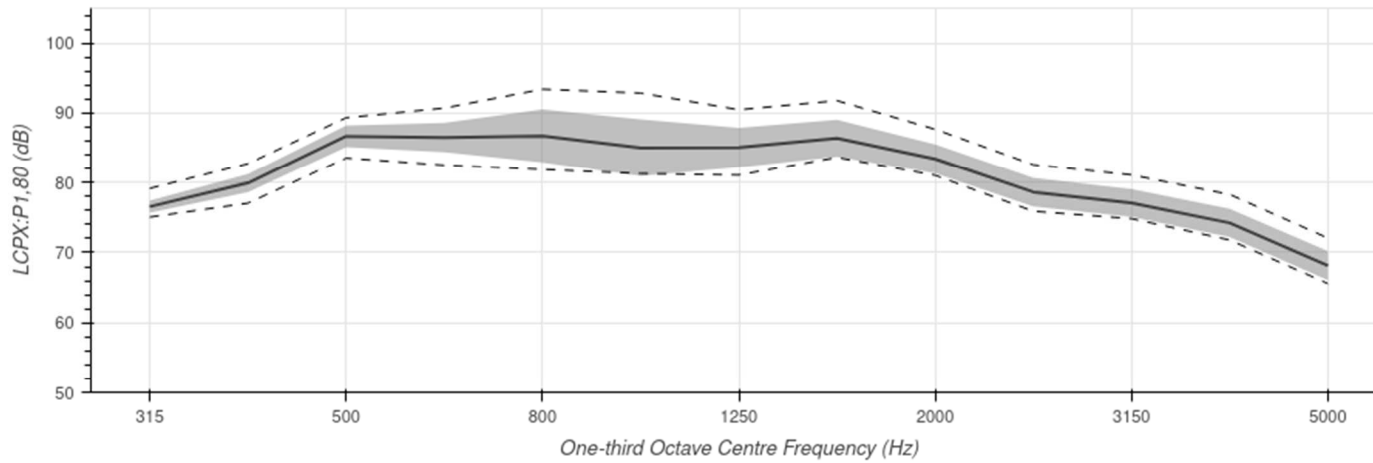
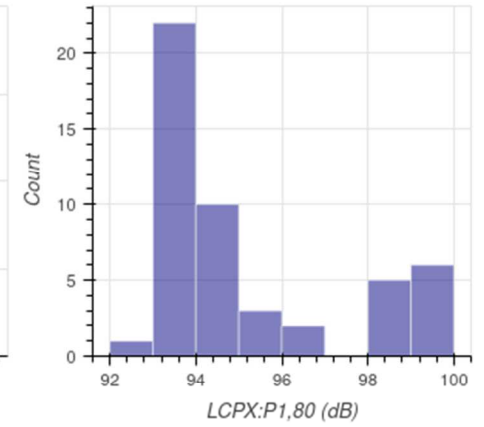
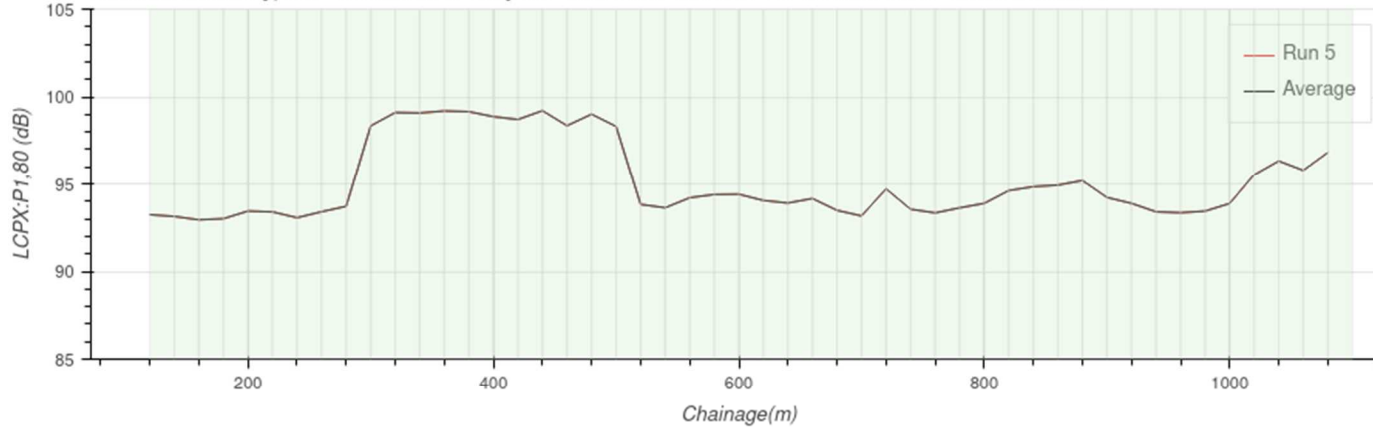
**B.5 SH1 – Western Belfast Bypass – Clearwater to Groynes – Northbound – Left Lane**

Western Belfast Bypass - Clearwater to Groynes - Lane: left - Direction: D -Road ID: 3656 - Date: 01/10/2020



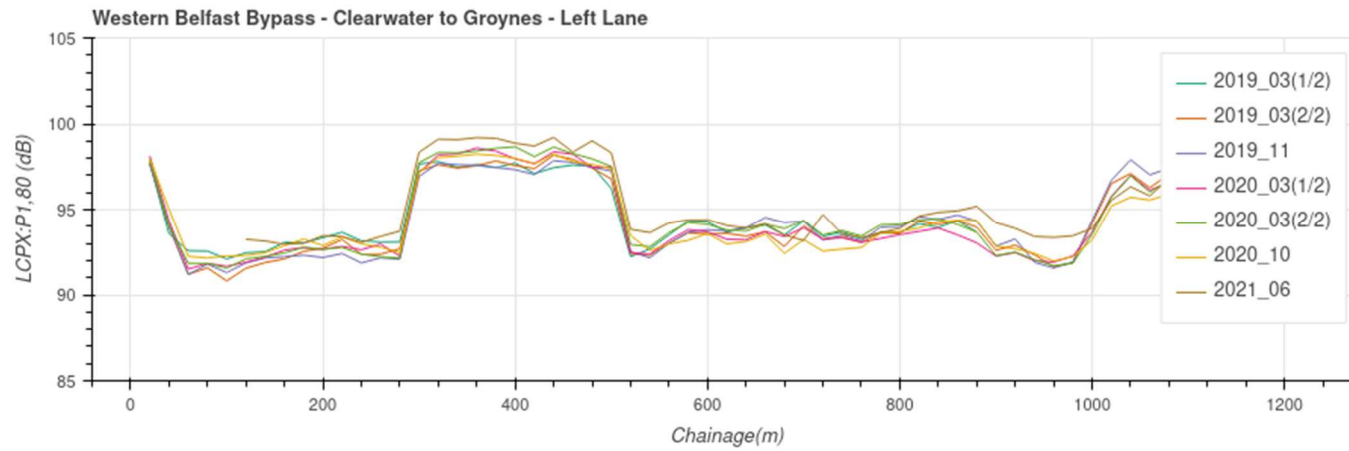
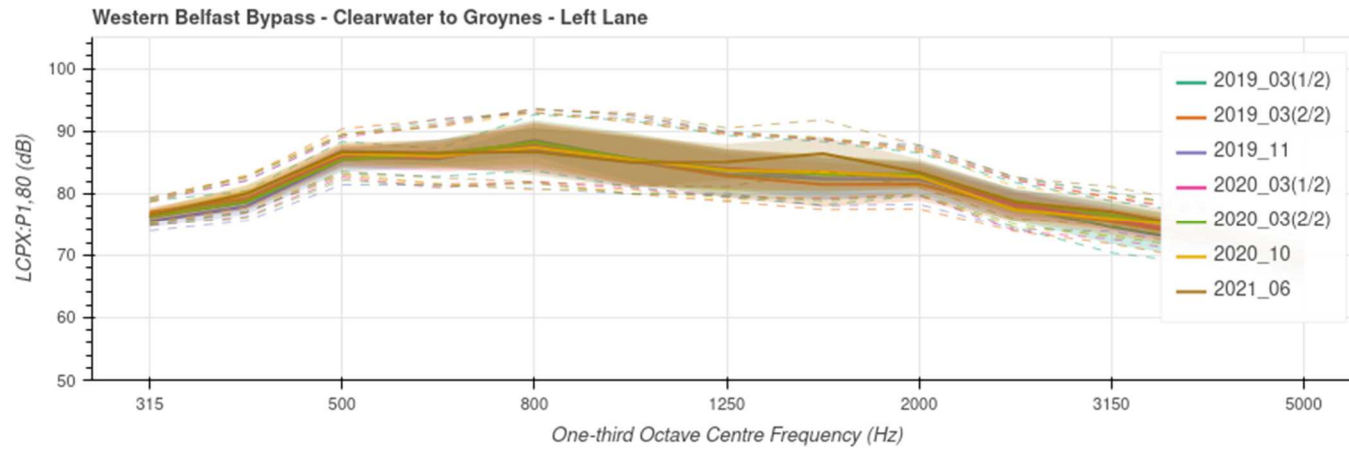
	Average	Run 1	Run 2	Run 3
Lcpx (dB)	94.6	94.9	94.7	94.1
Variation (dB)	2.3	2.4	2.2	2.2

Western Belfast Bypass - Clearwater to Groynes - Lane: left - Direction: D -Road ID: 3656 - Date: 03/06/2021



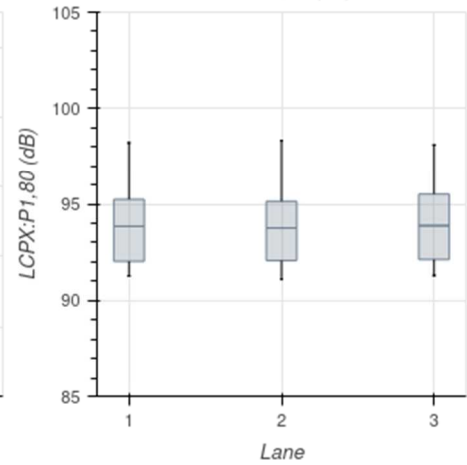
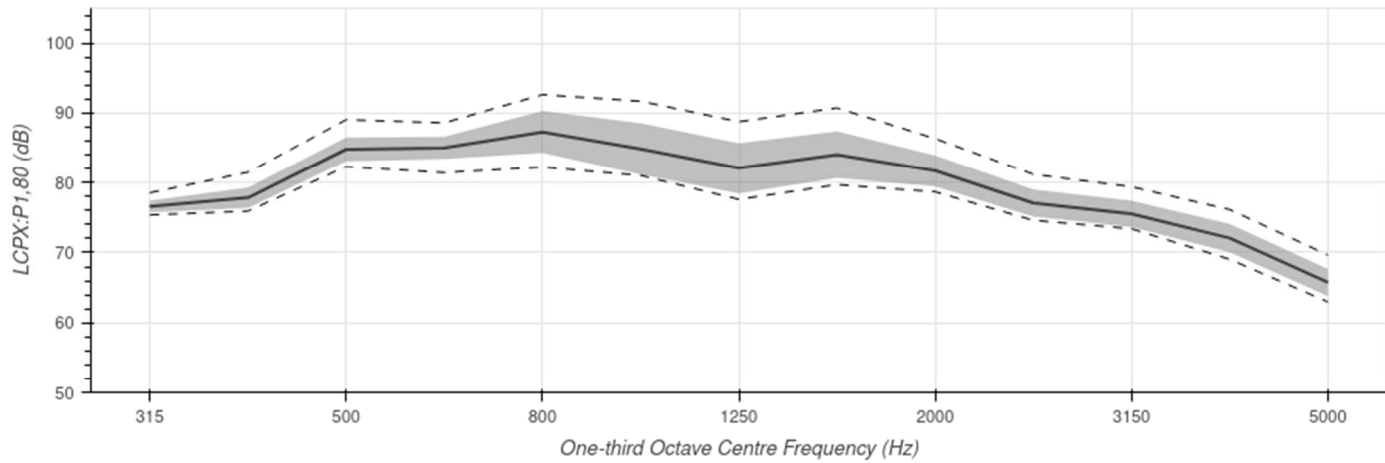
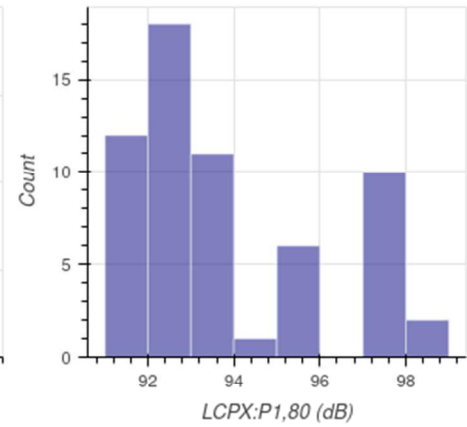
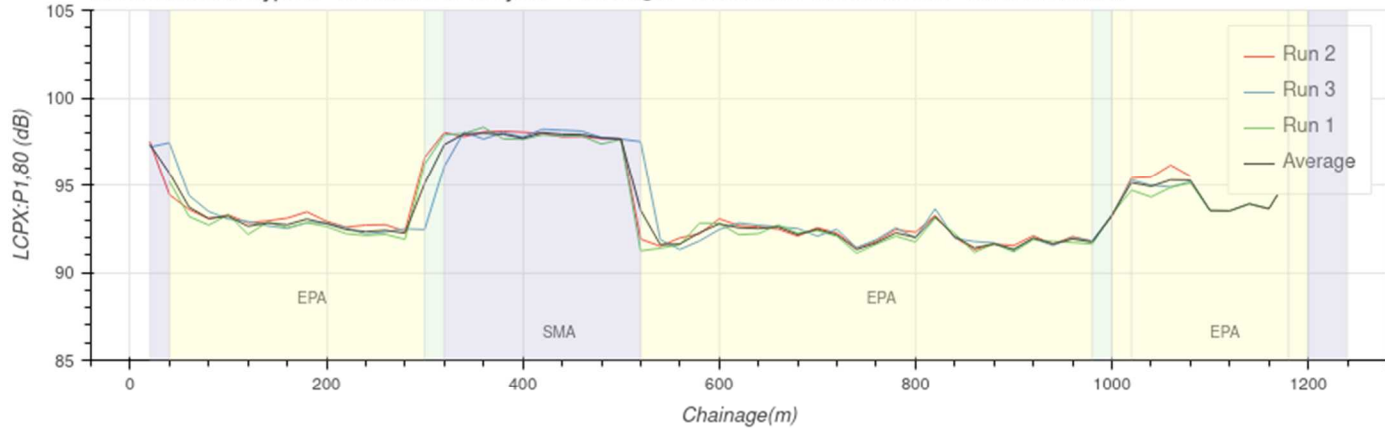
	Average	Run 5
LcpX (dB)	95.1	95.1
Variation (dB)	2.2	2.2





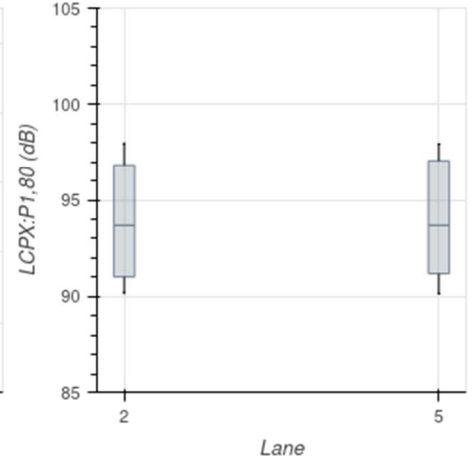
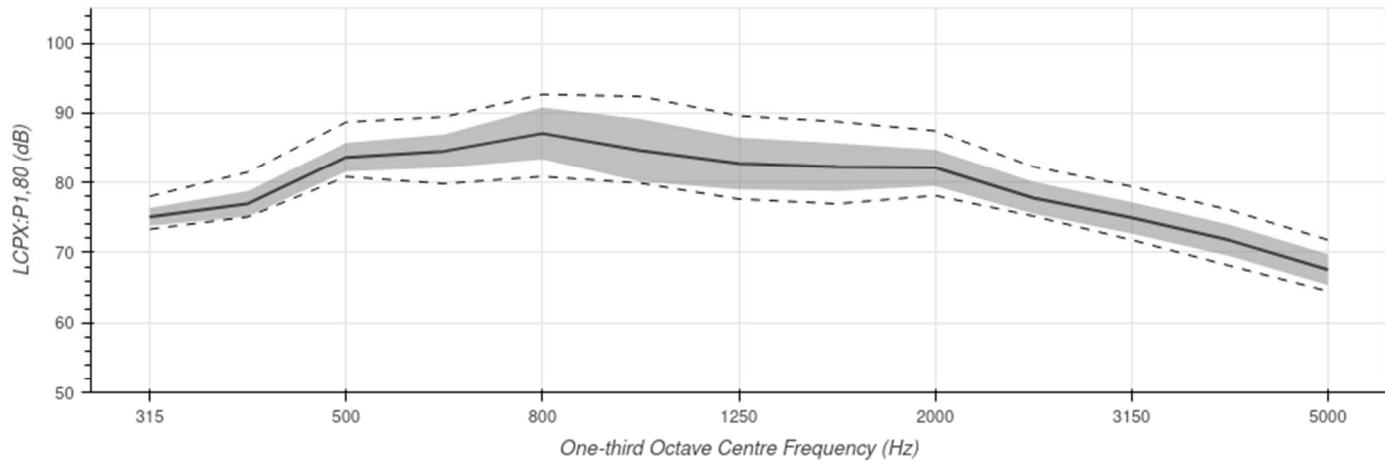
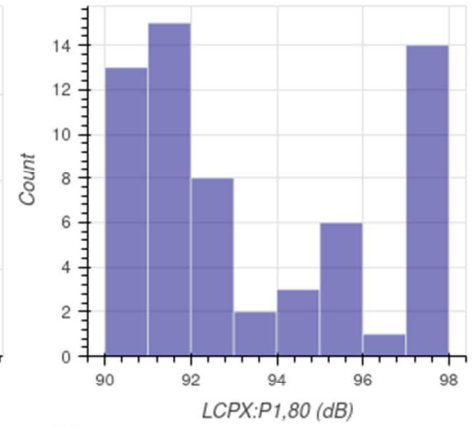
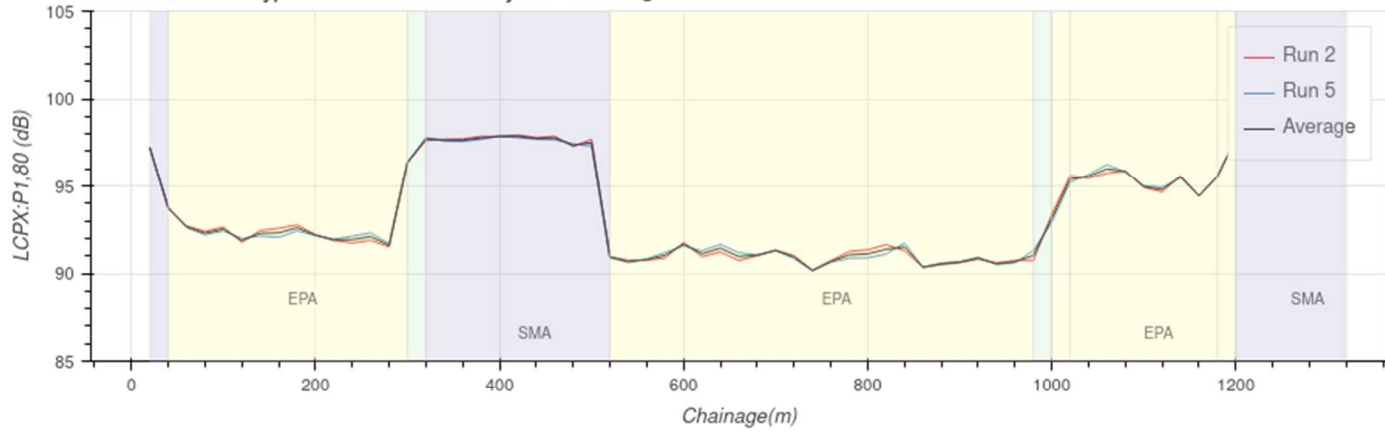
**B.6 SH1 – Western Belfast Bypass – Clearwater to Groynes – Northbound – Right Lane**

Western Belfast Bypass - Clearwater to Groynes - Lane: right - Direction: D -Road ID: 3656 - Date: 11/10/2020

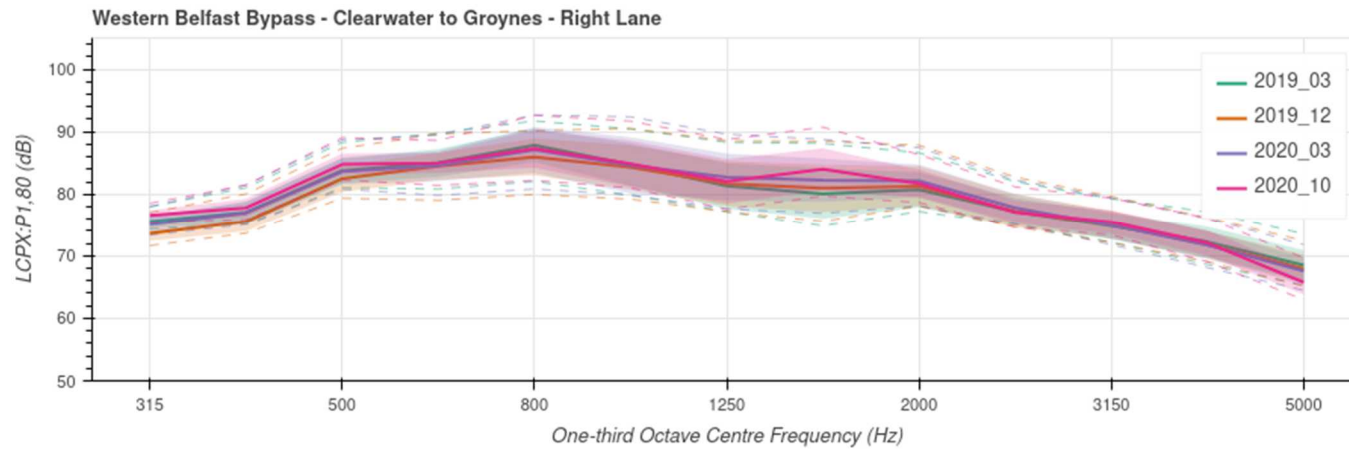
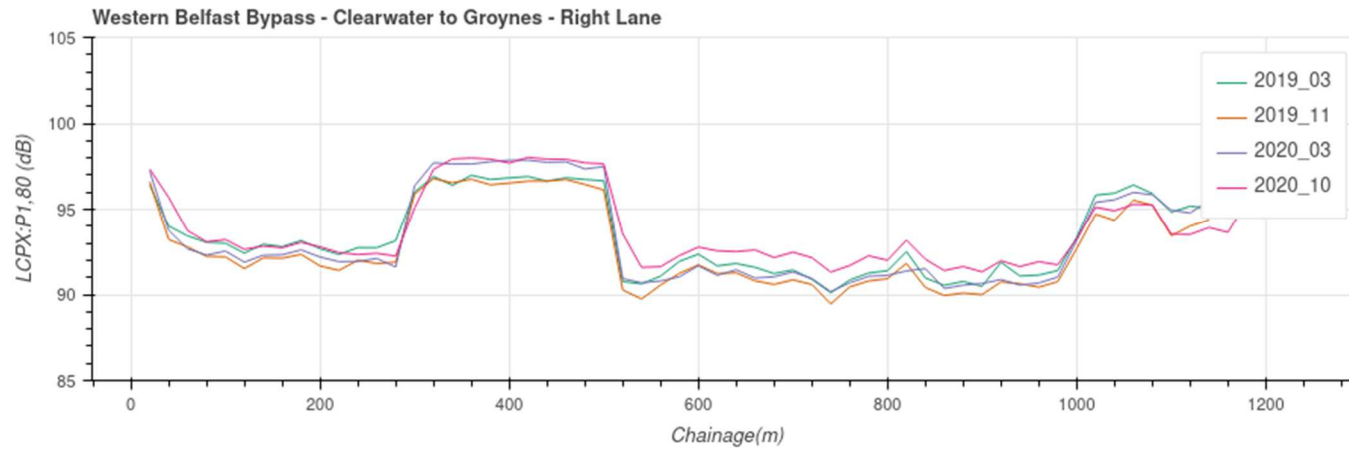


	Average	Run 2	Run 3	Run 1
Lcpx (dB)	93.8	93.7	93.9	93.8
Variation (dB)	2.3	2.4	2.3	2.3

Western Belfast Bypass - Clearwater to Groynes - Lane: right - Direction: D - Road ID: 3656 - Date: 09/03/2020



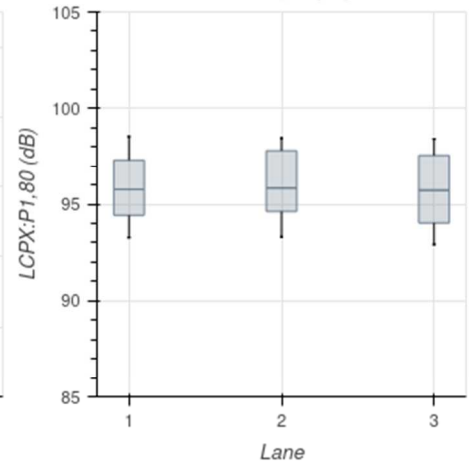
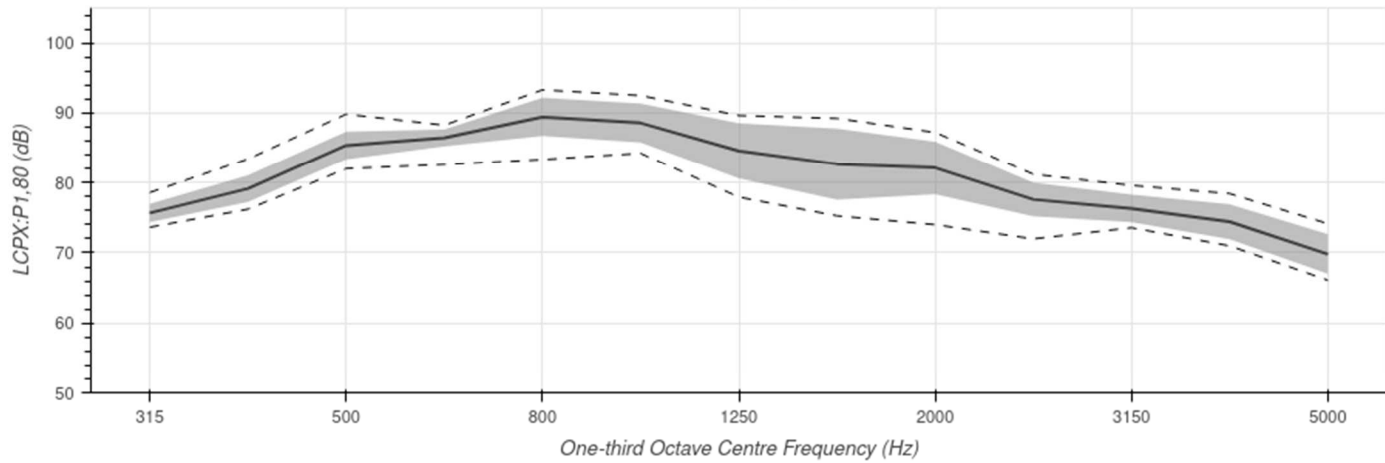
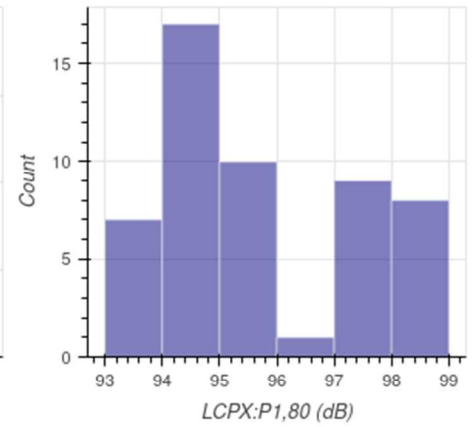
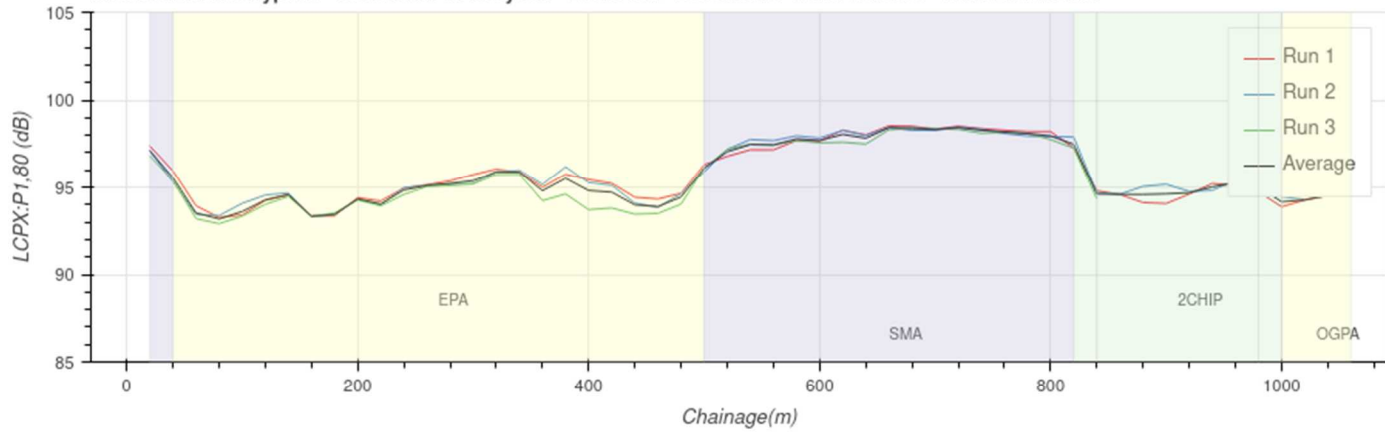
	Average	Run 2	Run 5
Lcpx (dB)	93.7	93.7	93.7
Variation (dB)	2.8	2.8	2.8





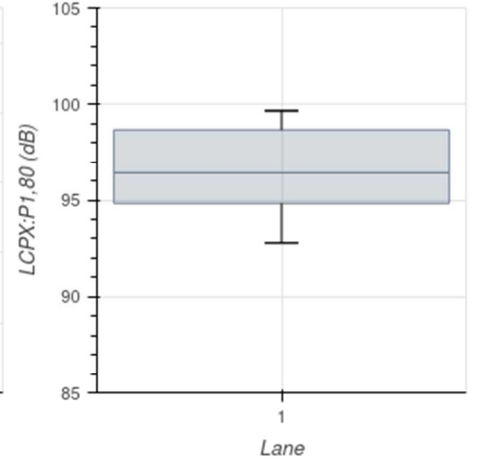
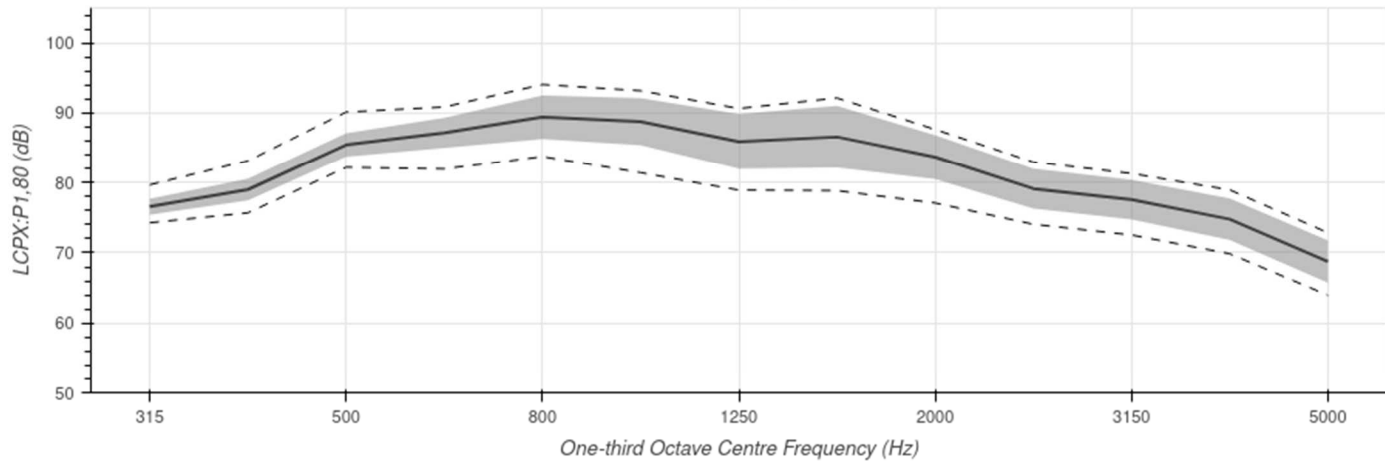
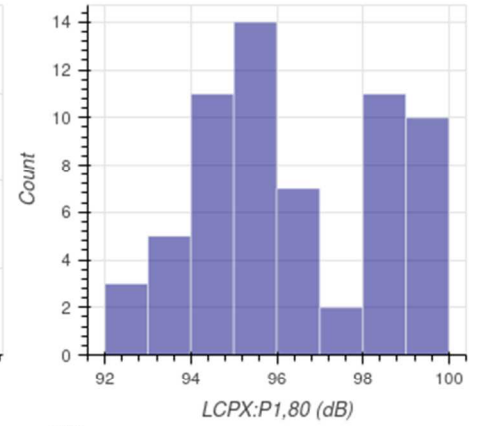
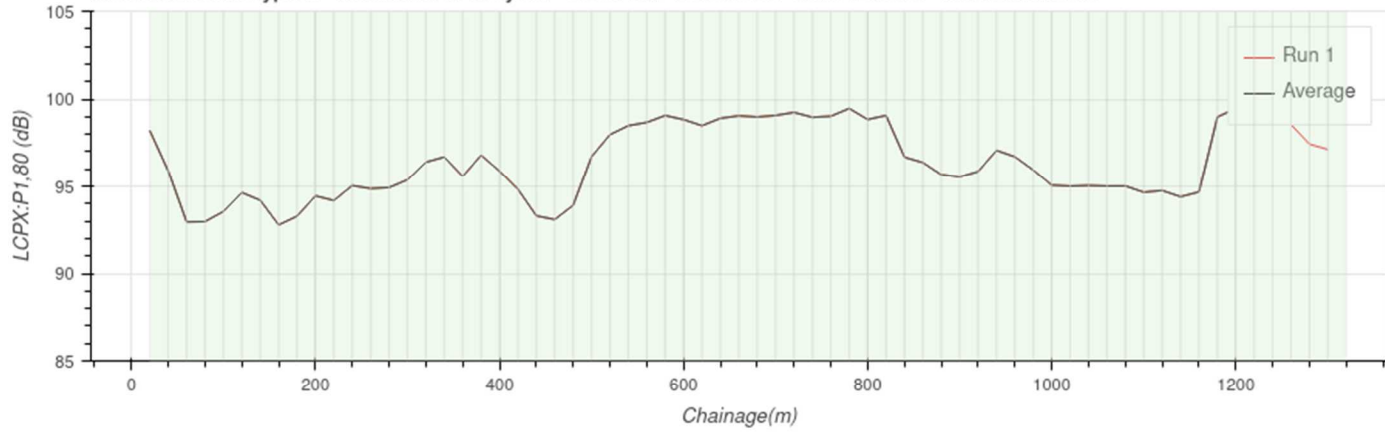
**B.7 SH1 – Western Belfast Bypass – Clearwater to Groynes – Southbound – Left Lane**

Western Belfast Bypass - Clearwater to Groynes - Lane: left - Direction: I - Road ID: 3650 - Date: 01/10/2020

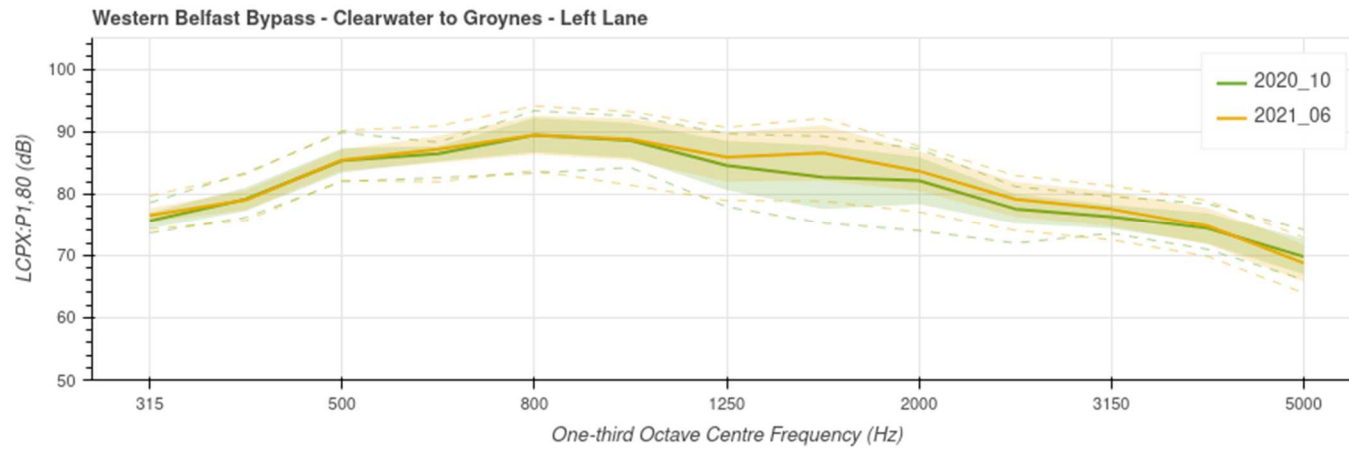
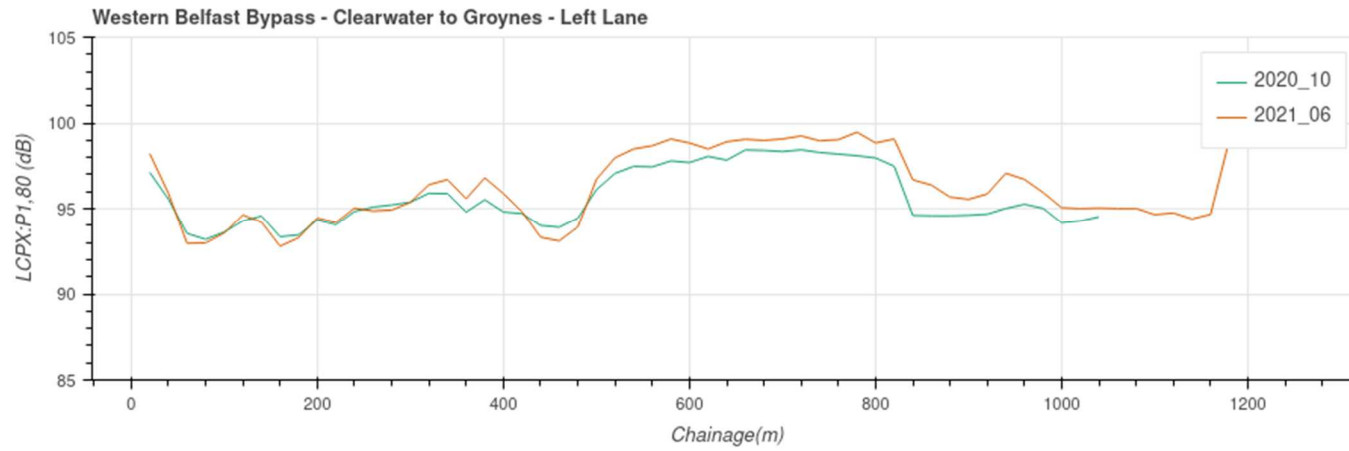


	Average	Run 1	Run 2	Run 3
Lcpx (dB)	95.8	95.8	95.8	95.7
Variation (dB)	1.7	1.7	1.7	1.9

Western Belfast Bypass - Clearwater to Groynes - Lane: left - Direction: I - Road ID: 3650 - Date: 03/06/2021

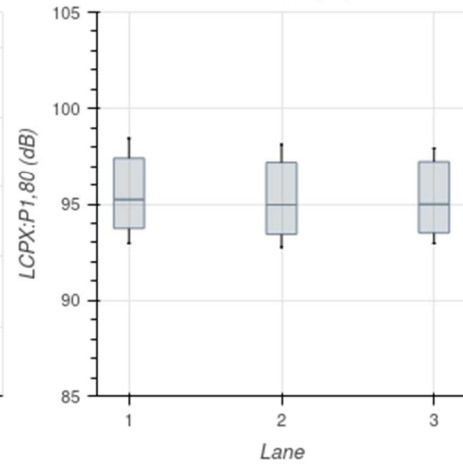
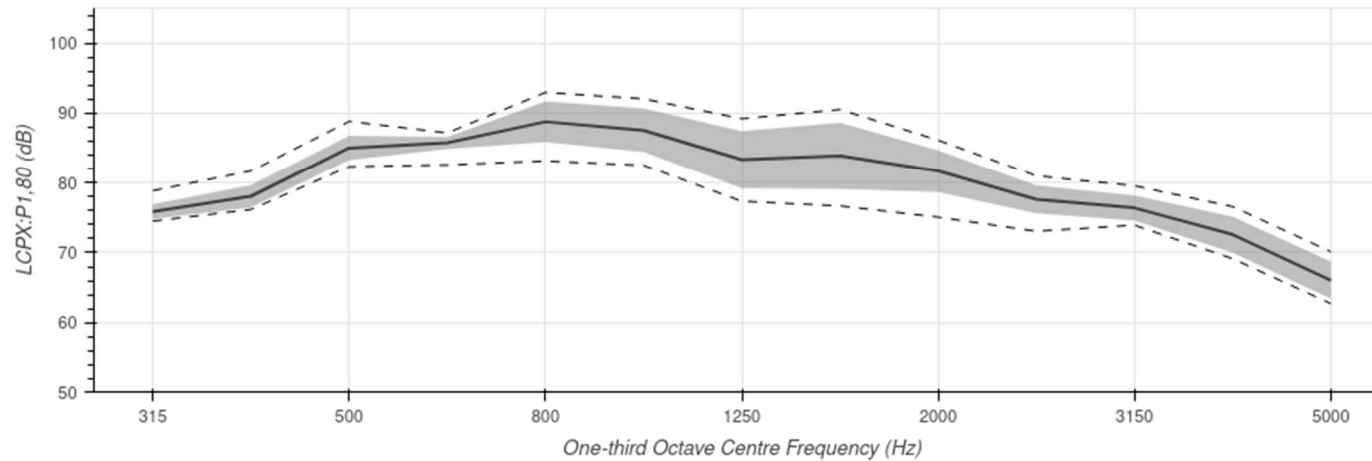
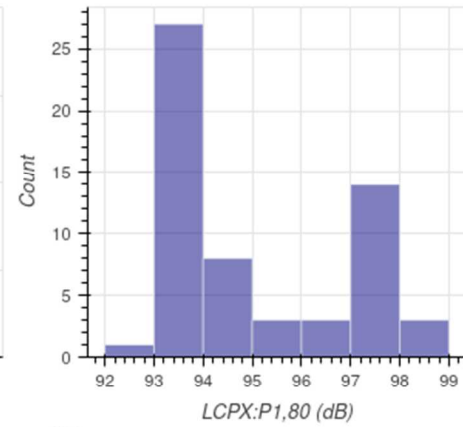
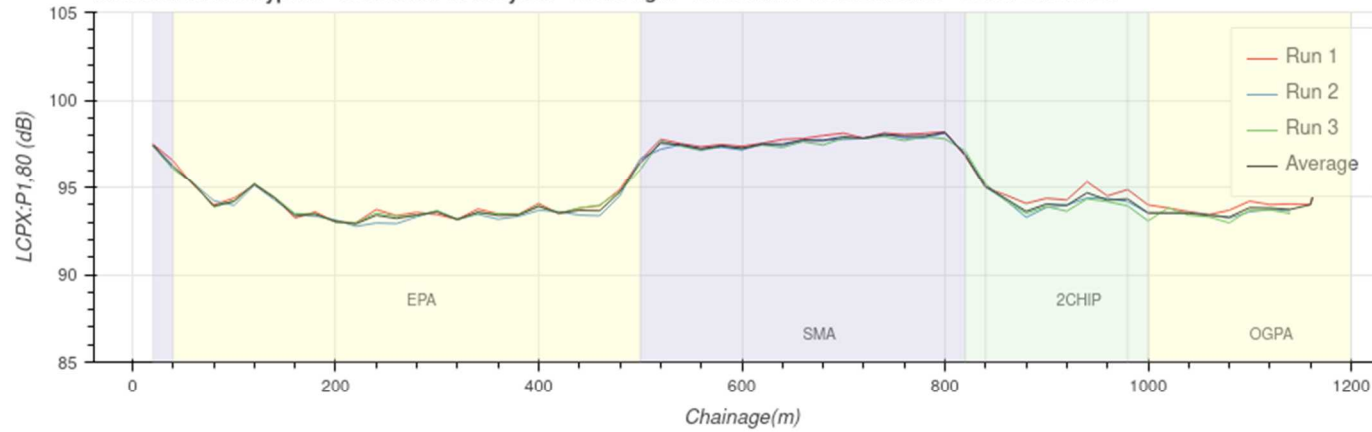


	Average	Run 1
Lcpx (dB)	96.4	96.4
Variation (dB)	2.1	2.1



**B.8 SH1 – Western Belfast Bypass – Clearwater to Groynes – Southbound – Right Lane**

Western Belfast Bypass - Clearwater to Groynes - Lane: right - Direction: I - Road ID: 3650 - Date: 11/10/2020



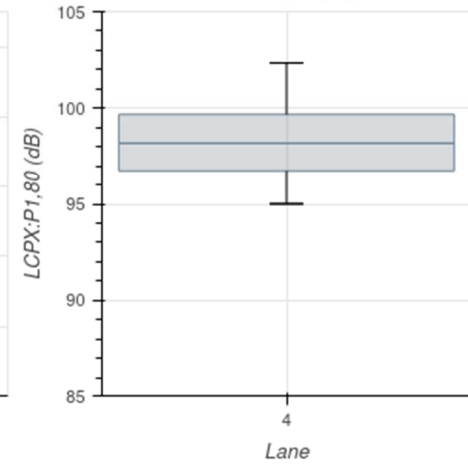
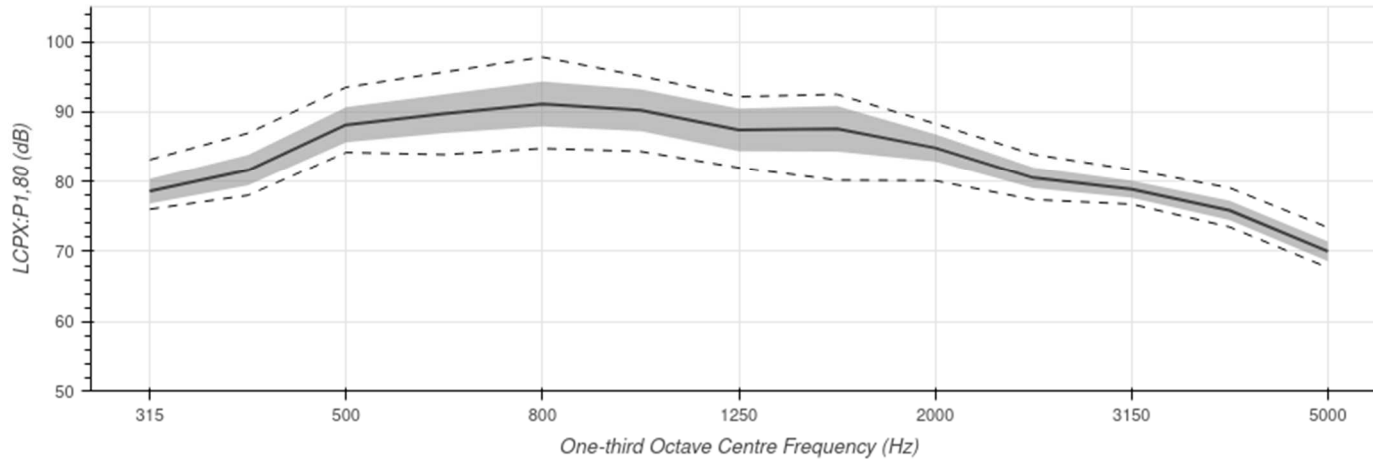
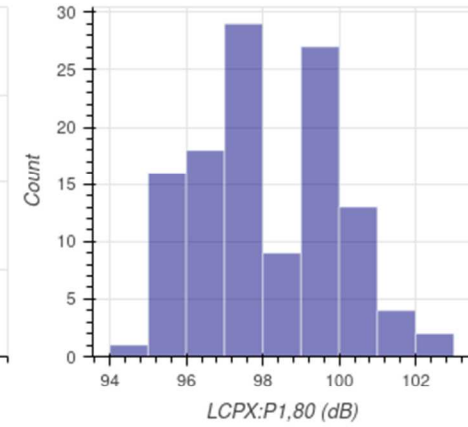
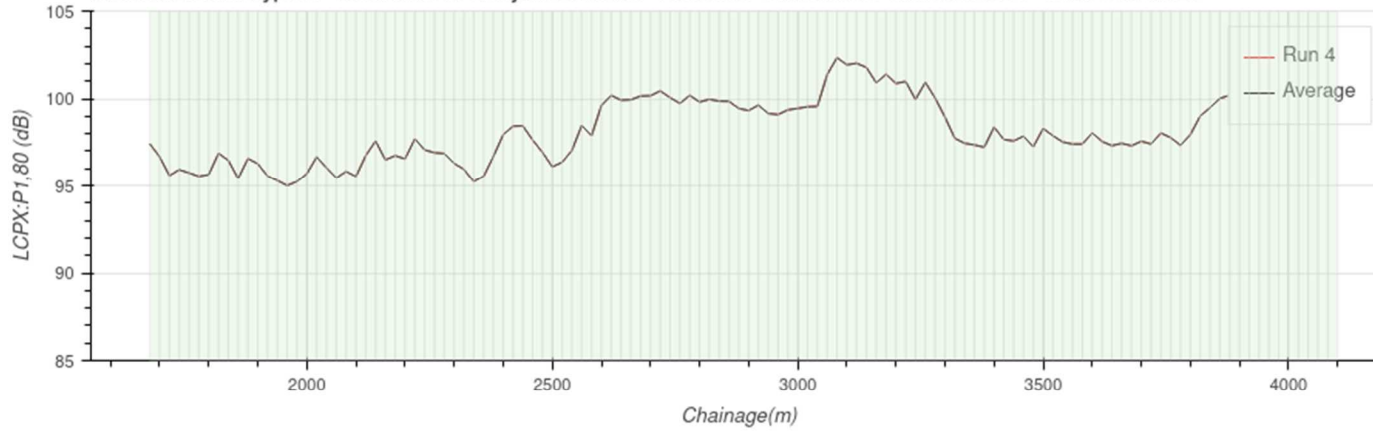
	Average	Run 1	Run 2	Run 3
Lcpx (dB)	95.1	95.2	95	95
Variation (dB)	1.8	1.8	1.9	1.8



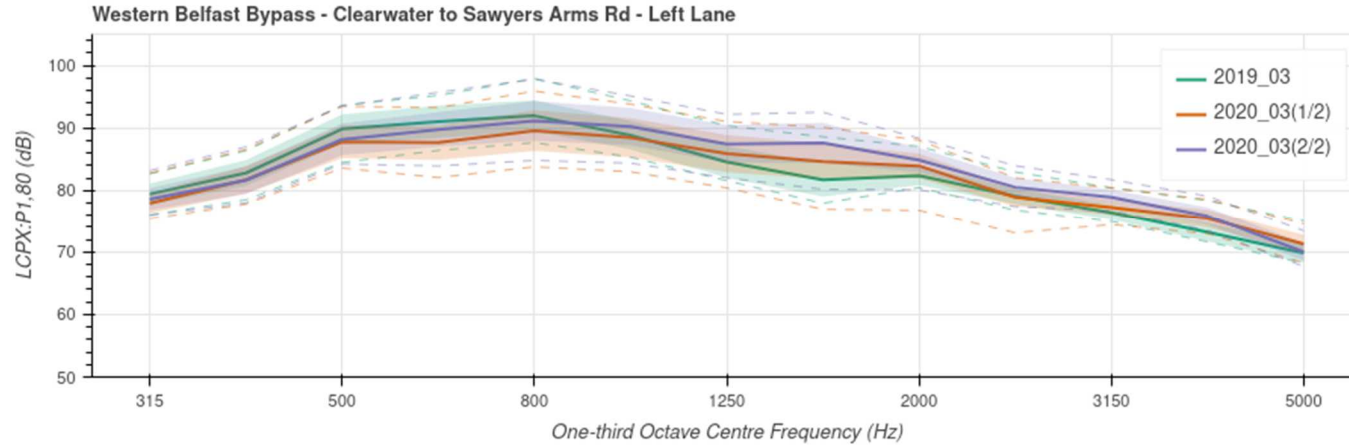
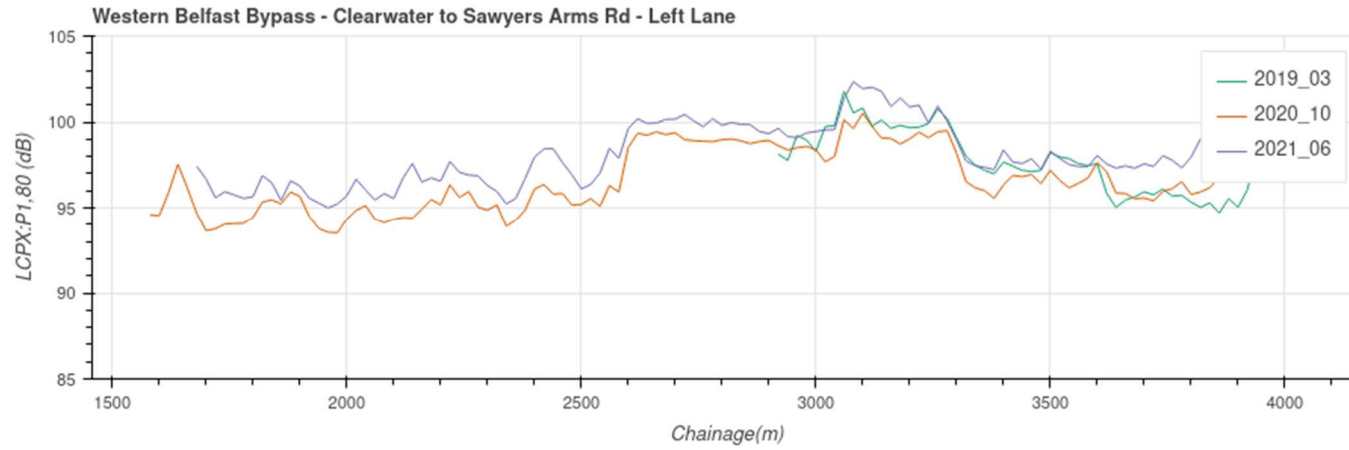
## Appendix C: SH1 – Johns Road and Russley Road

**C.1 SH1 – Johns Rd, Sawyers Arms Rd to Clearwater – Northbound – Left lane**

Western Belfast Bypass - Clearwater to Sawyers Arms Rd - Lane: left - Direction: D -Road ID: 3664 - Date: 03/06/2021

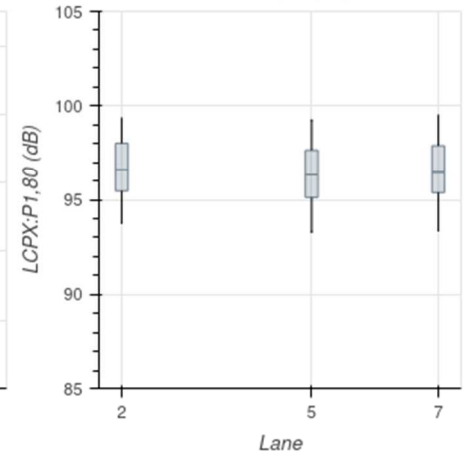
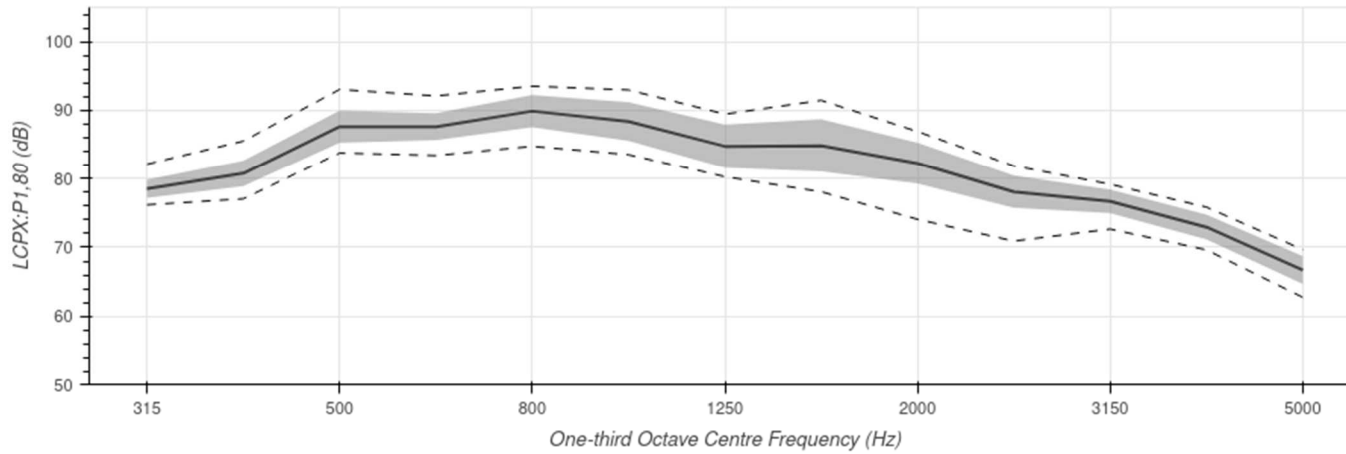
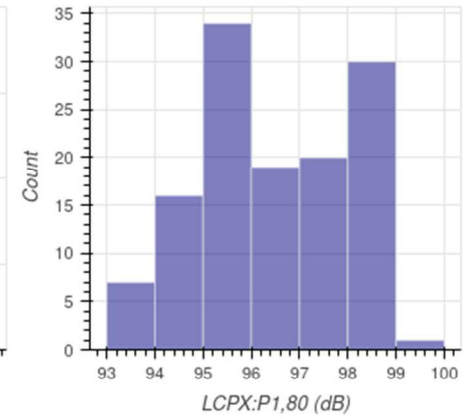
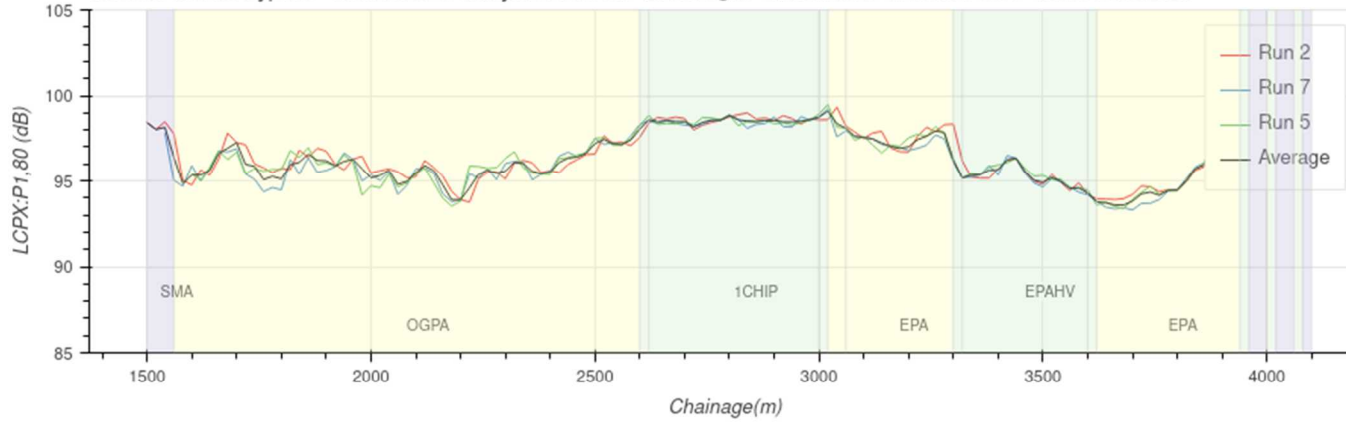


	Average	Run 4
Lcpx (dB)	98.2	98.2
Variation (dB)	1.8	1.8



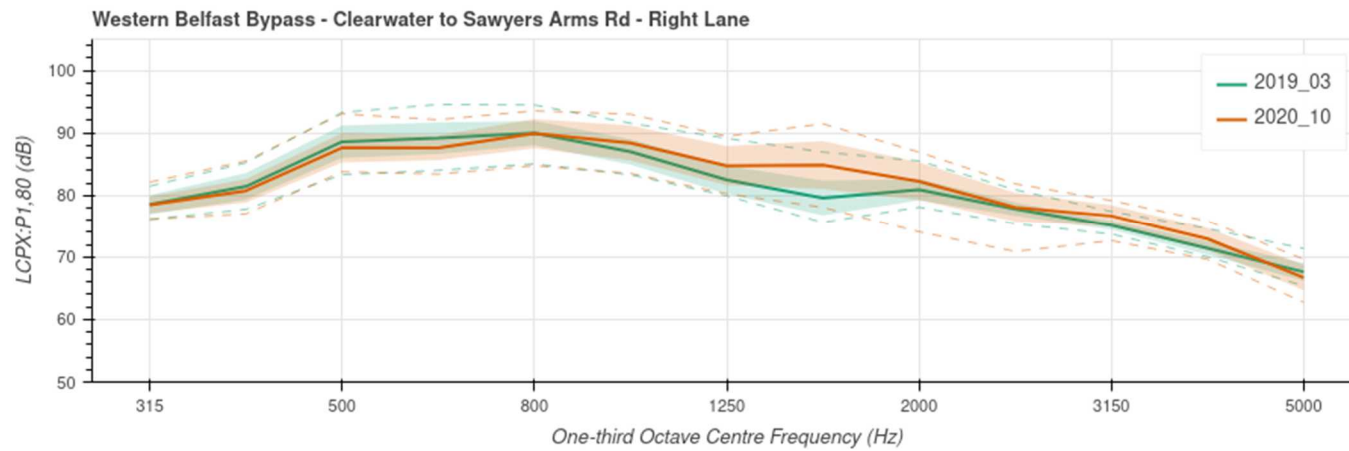
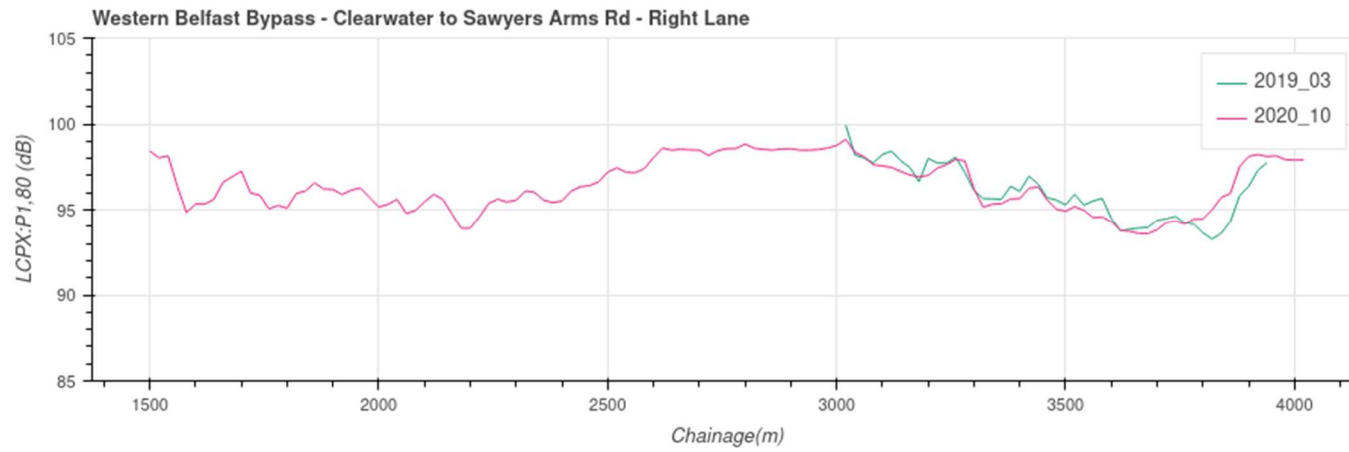
**C.2 SH1 – Johns Rd, Sawyers Arms Rd to Clearwater – Northbound – Right lane**

Western Belfast Bypass - Clearwater to Sawyers Arms Rd - Lane: right - Direction: D - Road ID: 3664 - Date: 11/10/2020



	Average	Run 2	Run 7	Run 5
Lcpx (dB)	96.5	96.6	96.5	96.3
Variation (dB)	1.5	1.5	1.5	1.6

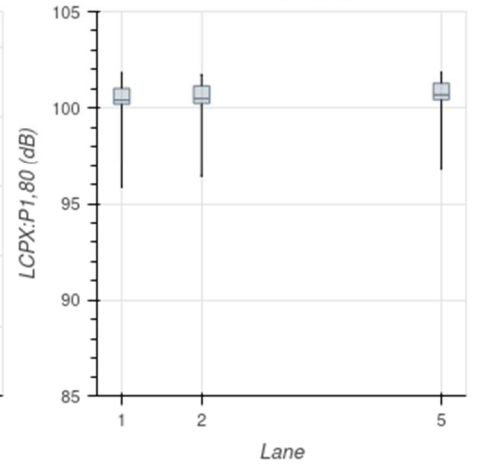
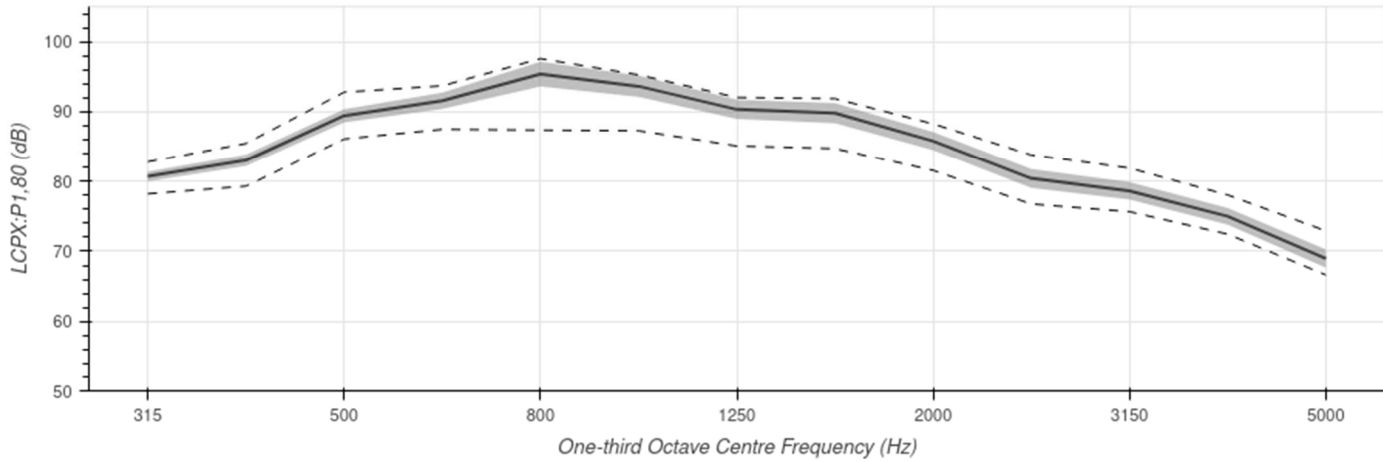
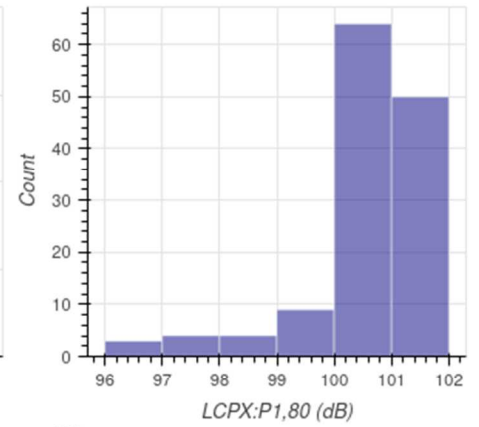
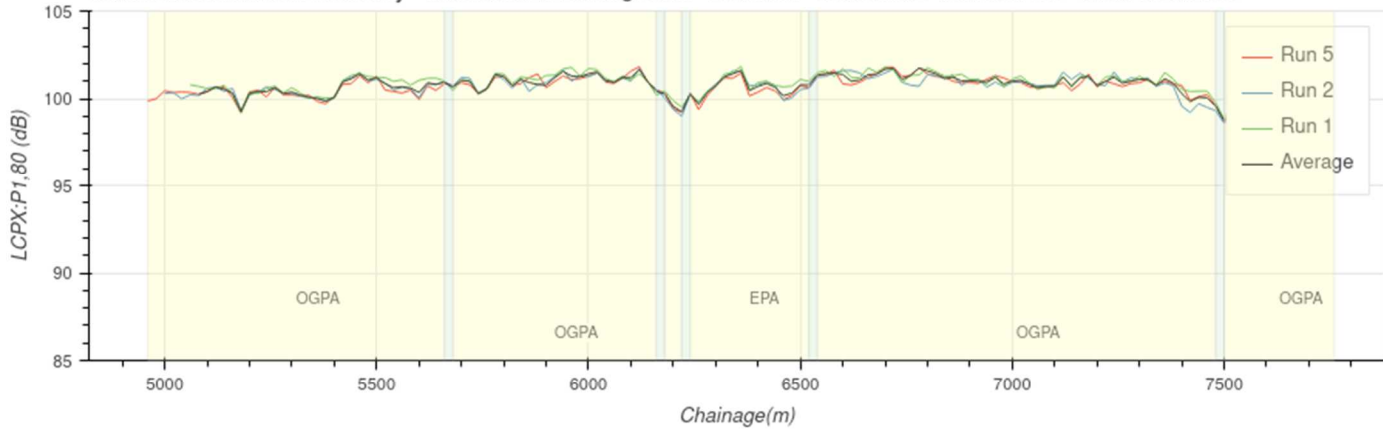




## Appendix D: SH76 – Christchurch Southern Motorway

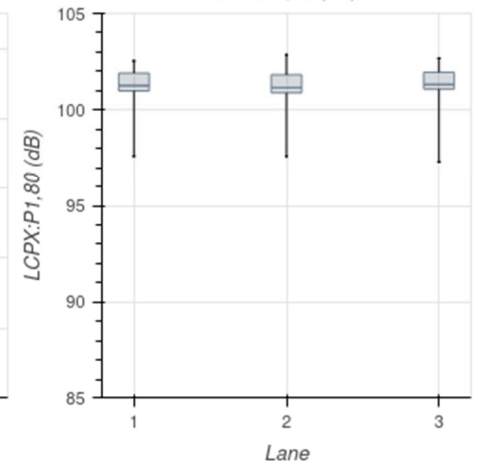
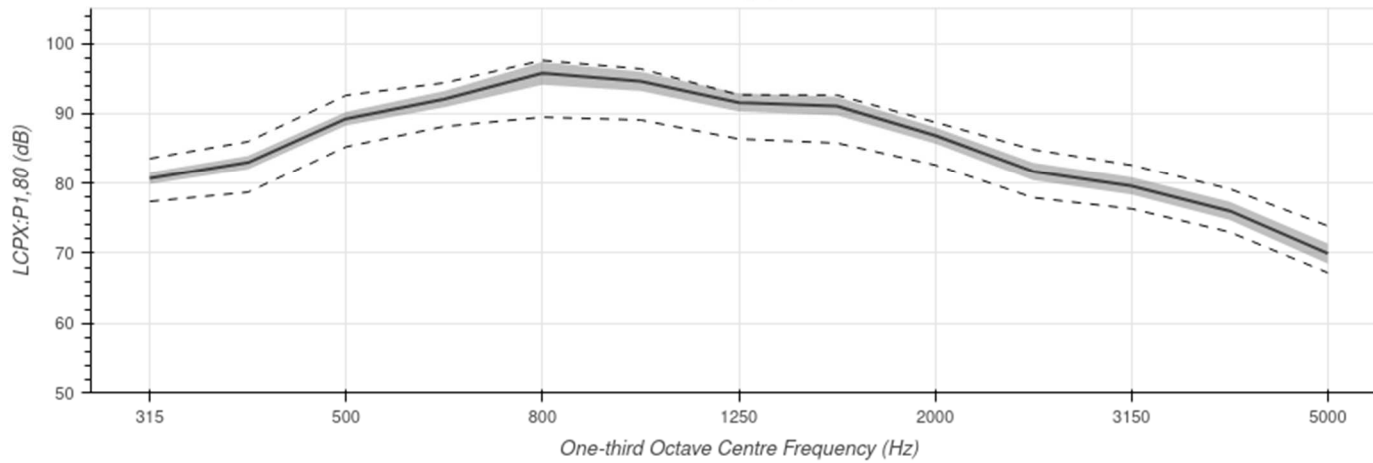
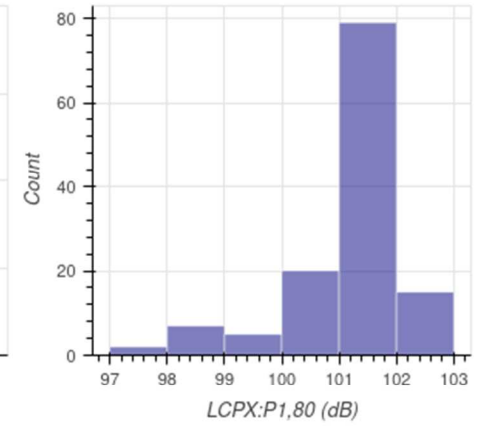
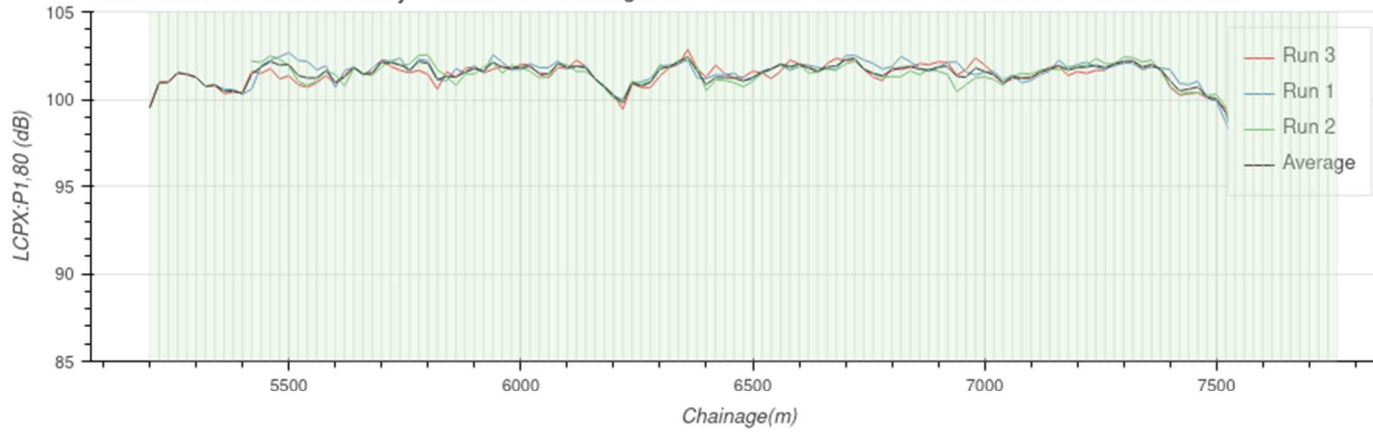
**D.1 SH76 – Christchurch Southern Motorway, Curletts Rd to Barrington St – Northbound – Left lane**

Christchurch Southern Motorway - Curletts Rd to Barrington St - Lane: left - Direction: D -Road ID: 656 - Date: 11/10/2020



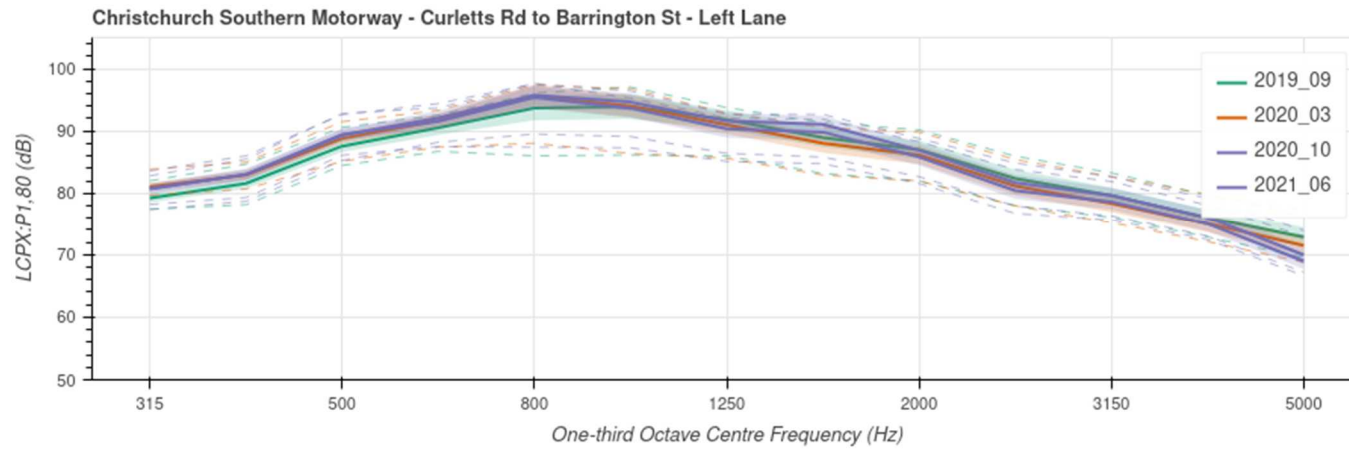
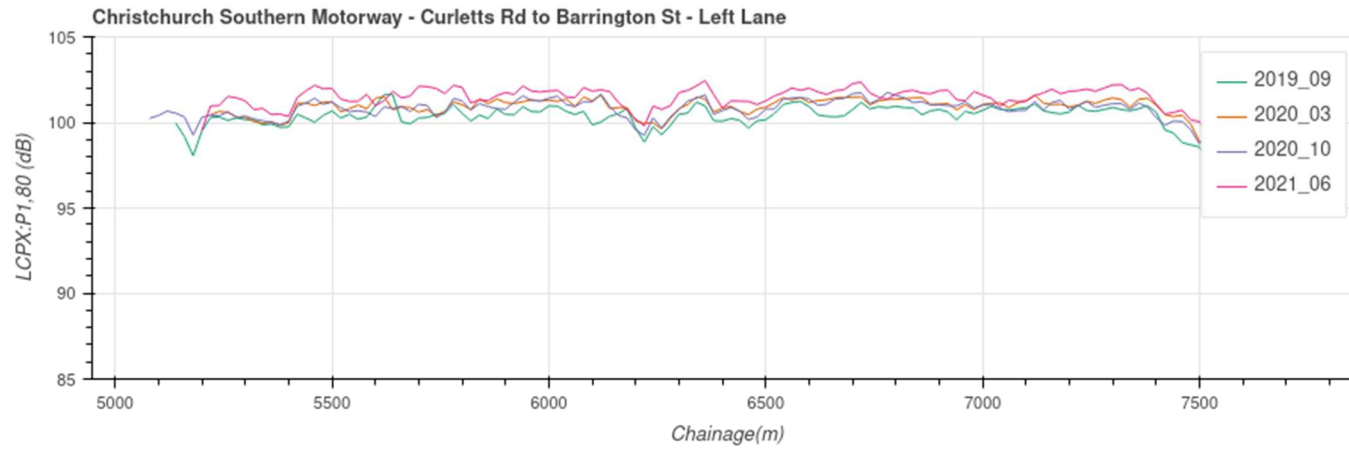
	Average	Run 5	Run 2	Run 1
Lcpx (dB)	100.5	100.7	100.5	100.4
Variation (dB)	1	1	1	1.1

Christchurch Southern Motorway - Curletts Rd to Barrington St - Lane: left - Direction: D - Road ID: 656 - Date: 03/06/2021



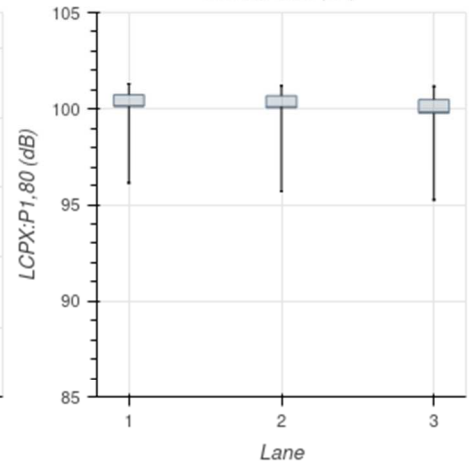
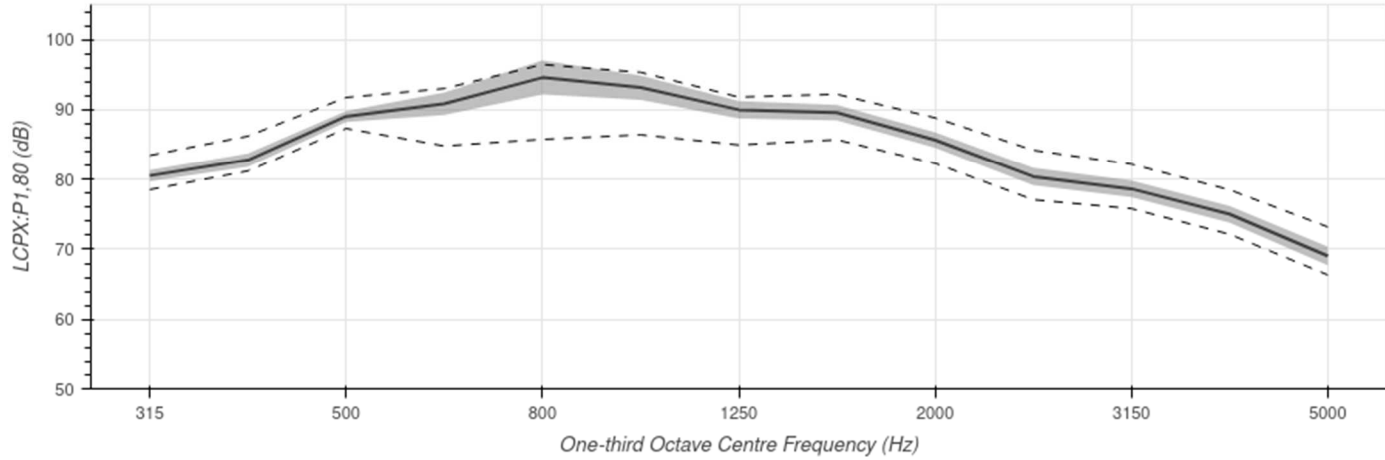
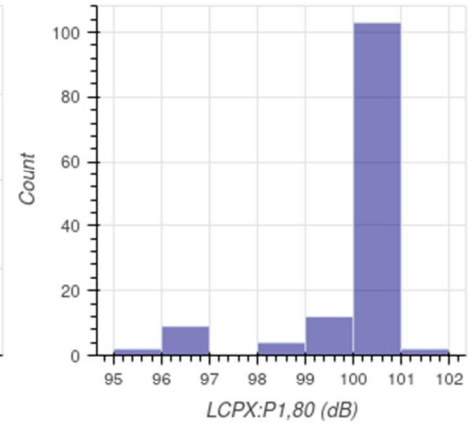
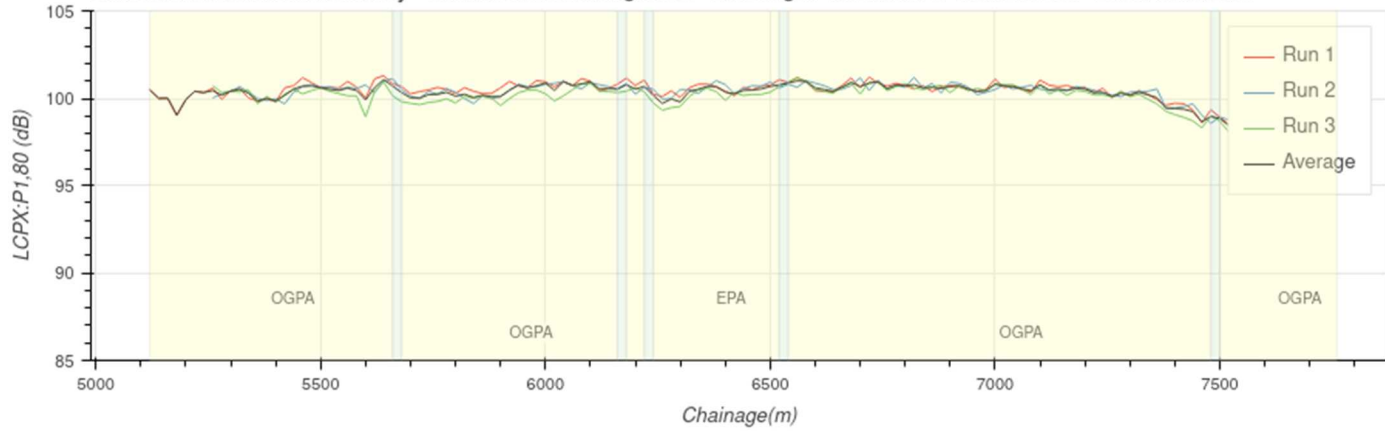
	Average	Run 3	Run 1	Run 2
Lcpx (dB)	101.2	101.3	101.3	101.2
Variation (dB)	1.1	1.1	1	1.1



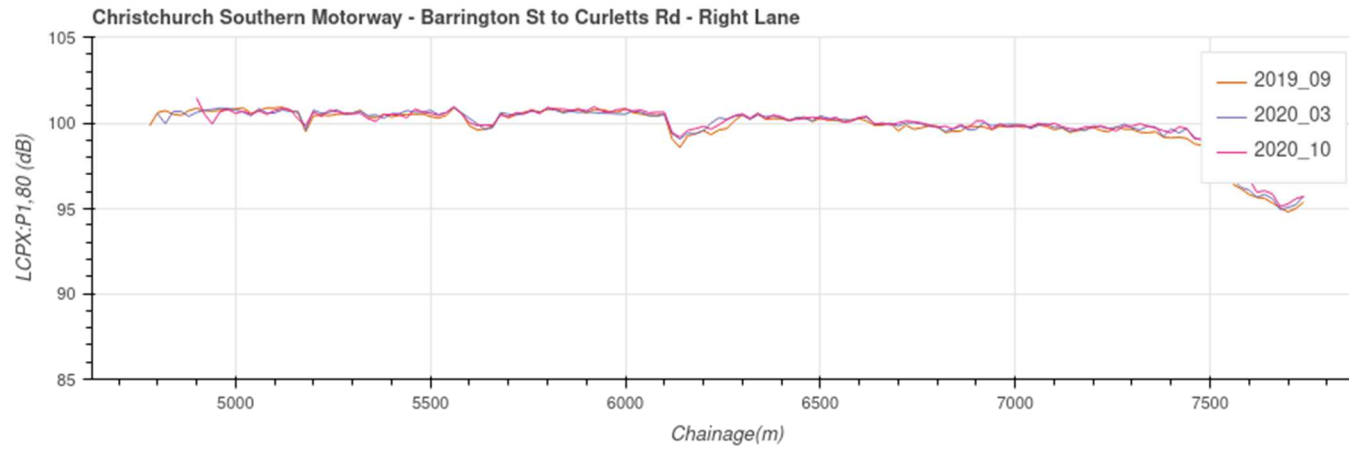
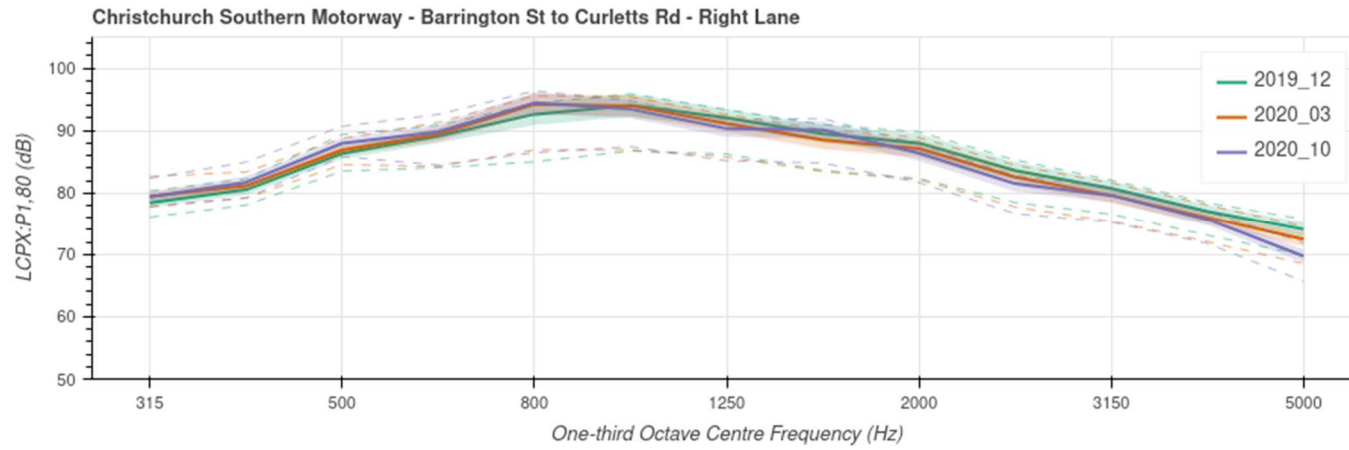


**D.2 SH76 – Christchurch Southern Motorway, Curletts Rd to Barrington St – Northbound – Right lane**

Christchurch Southern Motorway - Curletts Rd to Barrington St - Lane: right - Direction: D -Road ID: 656 - Date: 11/10/2020

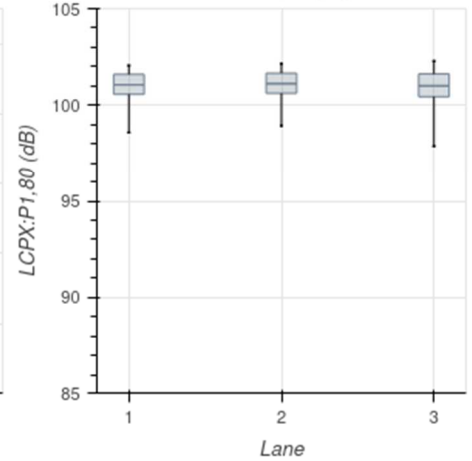
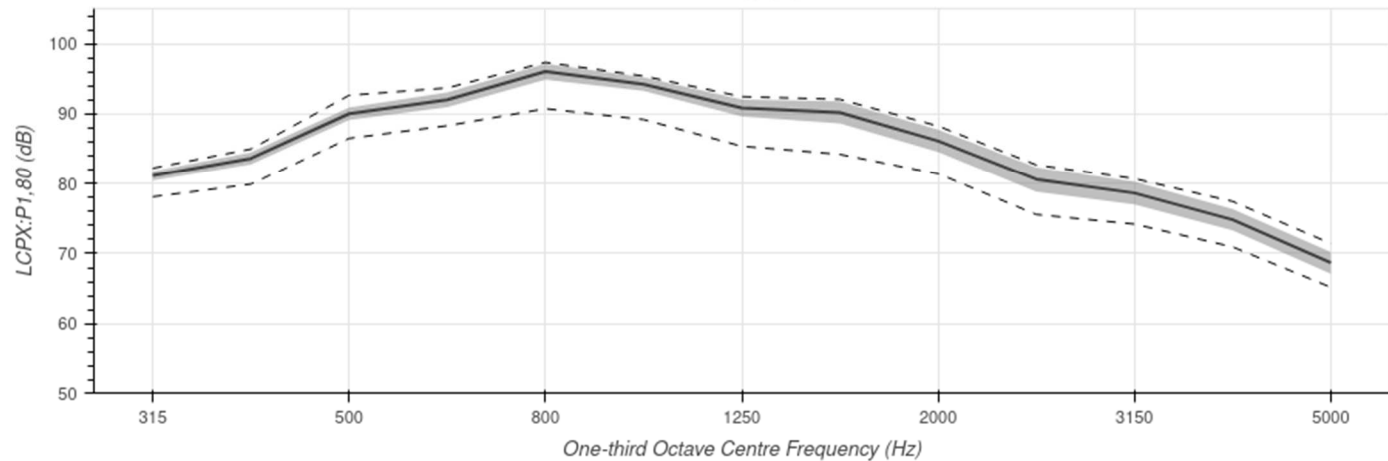
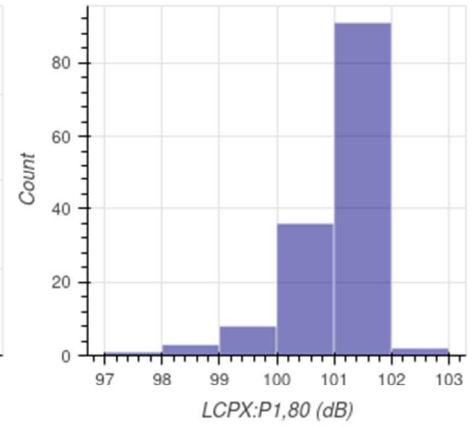
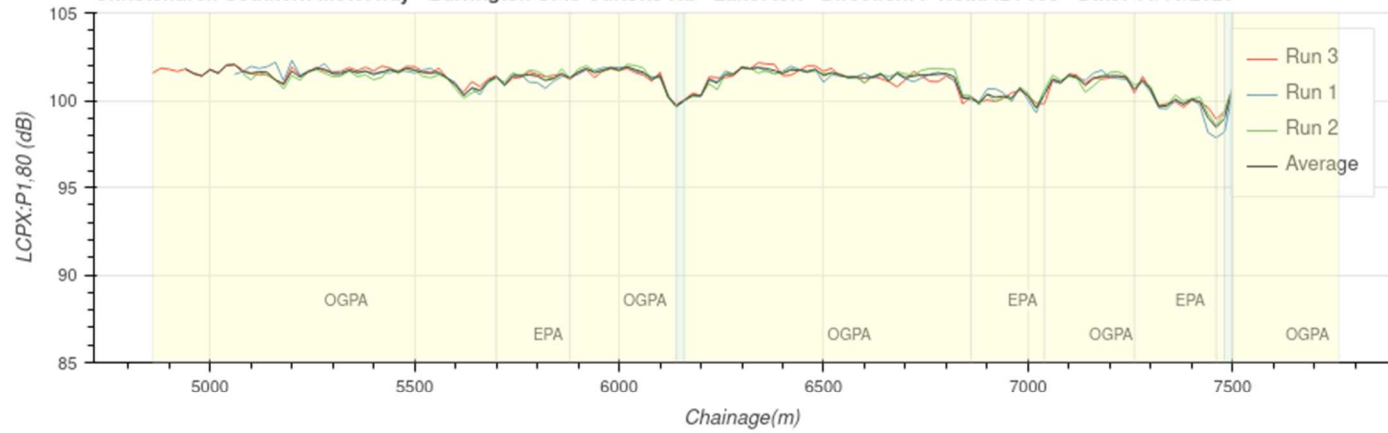


	Average	Run 1	Run 2	Run 3
Lcpx (dB)	100	100.2	100.1	99.9
Variation (dB)	1.2	1.2	1.3	1.3



**D.3 SH76 – Christchurch Southern Motorway, Curletts Rd to Barrington St – Southbound – Left lane**

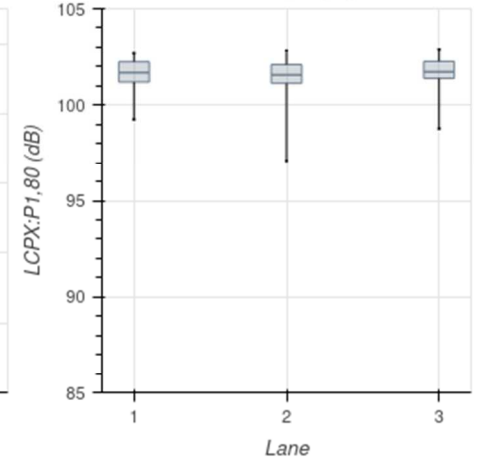
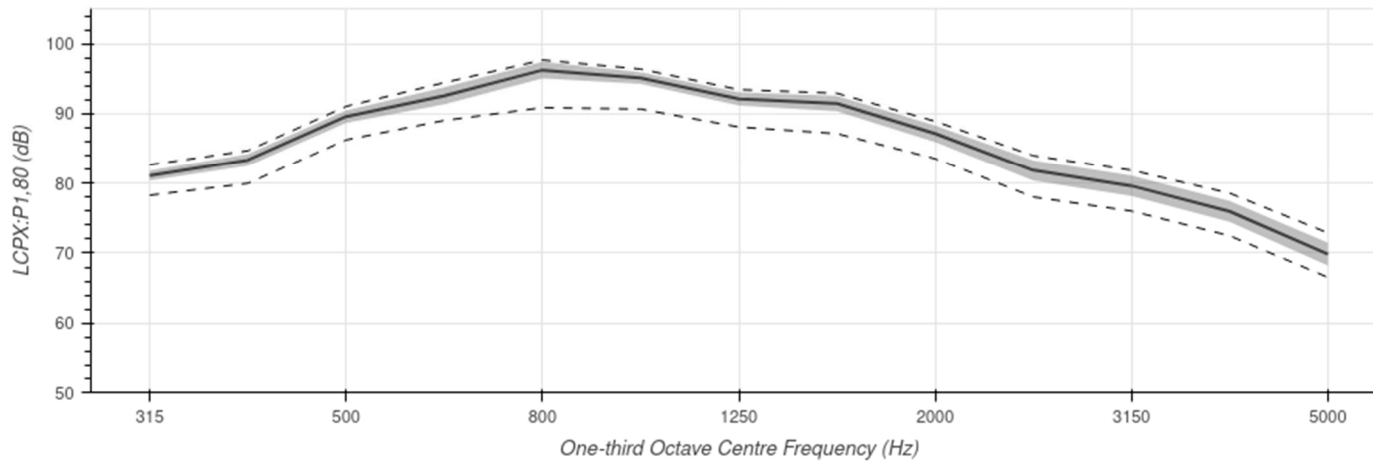
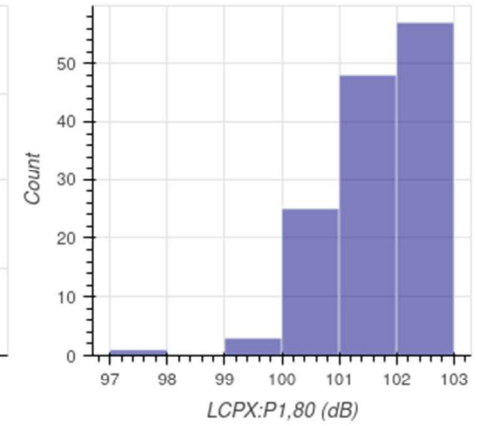
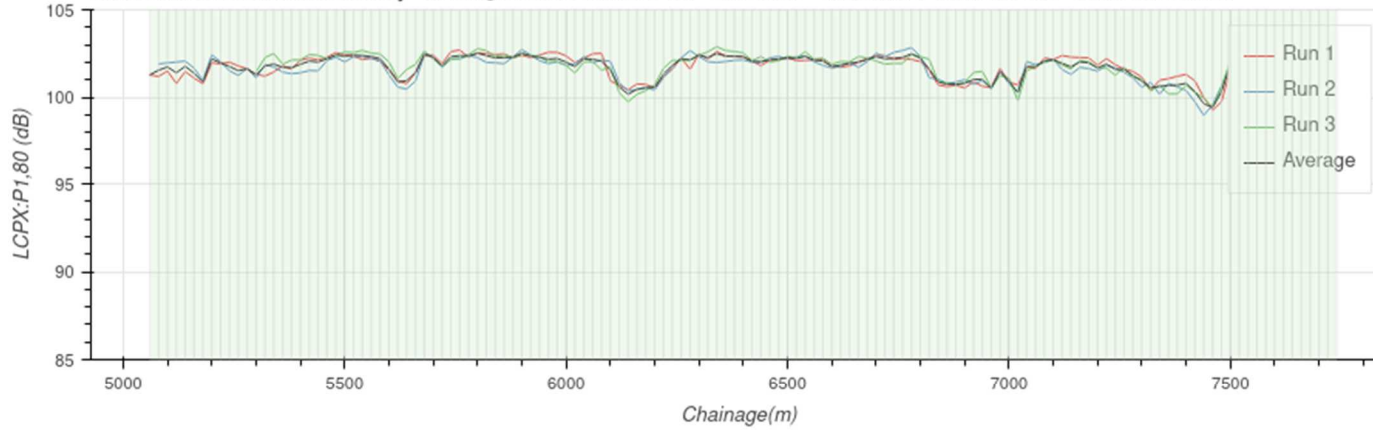
Christchurch Southern Motorway - Barrington St to Curletts Rd - Lane: left - Direction: I - Road ID: 655 - Date: 11/10/2020



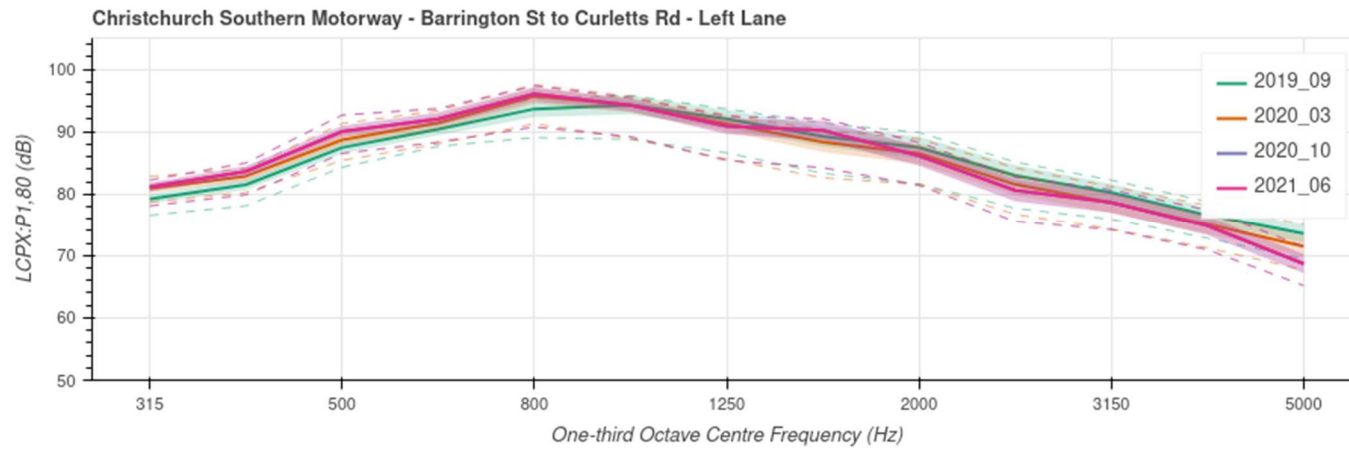
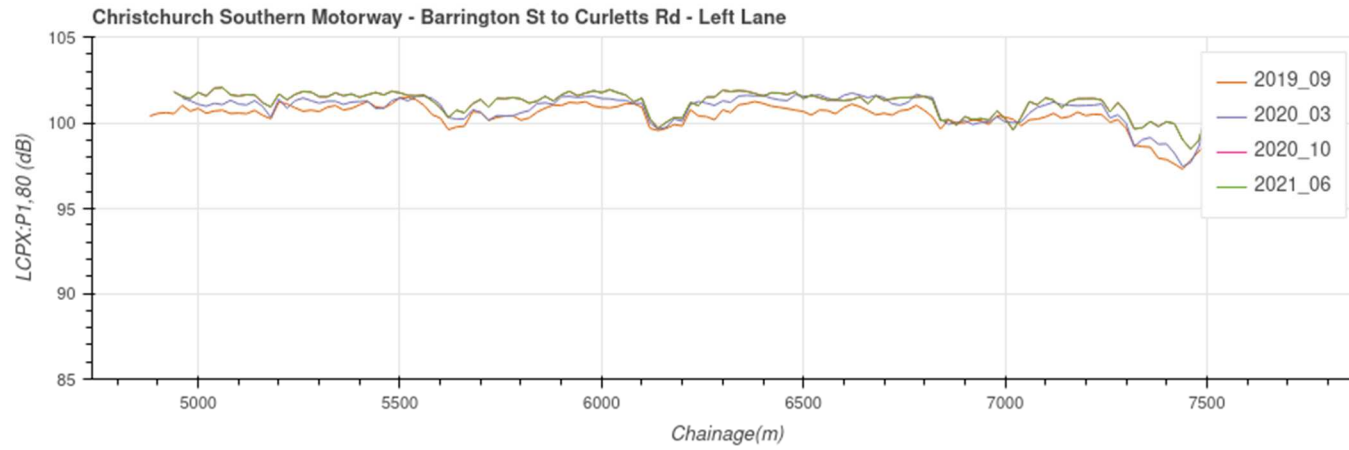
	Average	Run 3	Run 1	Run 2
Lcpx (dB)	101.1	101	101.1	101.1
Variation (dB)	0.8	0.9	0.7	0.7



Christchurch Southern Motorway - Barrington St to Curletts Rd - Lane: left - Direction: I - Road ID: 655 - Date: 03/06/2021

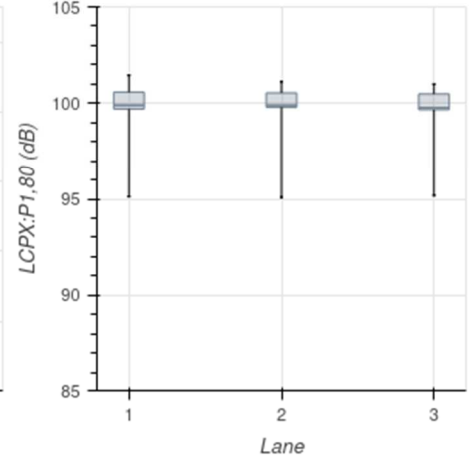
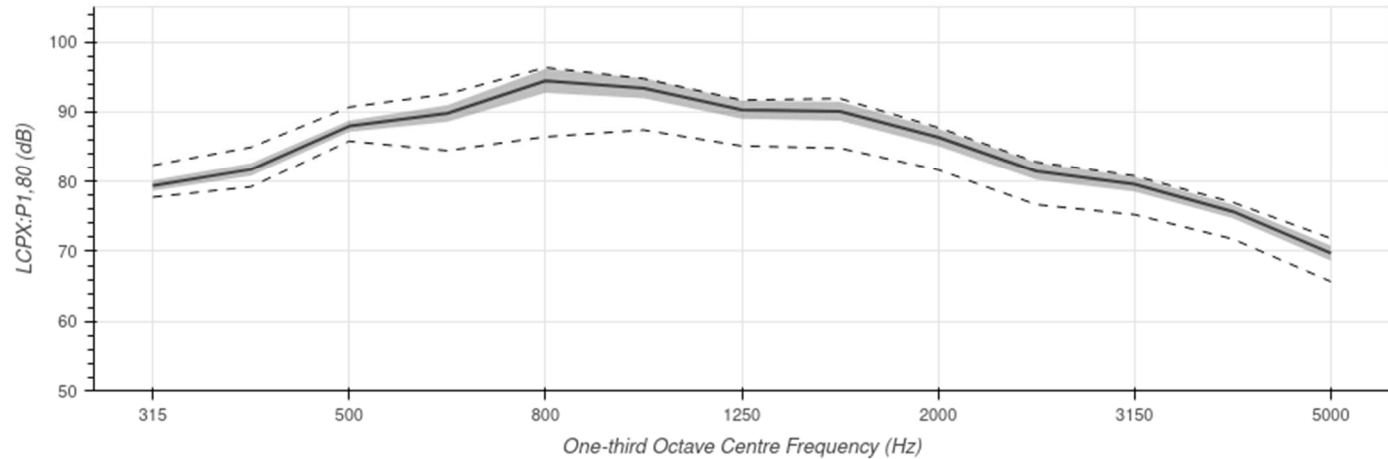
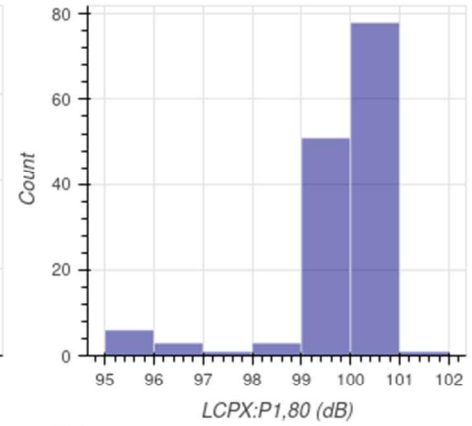
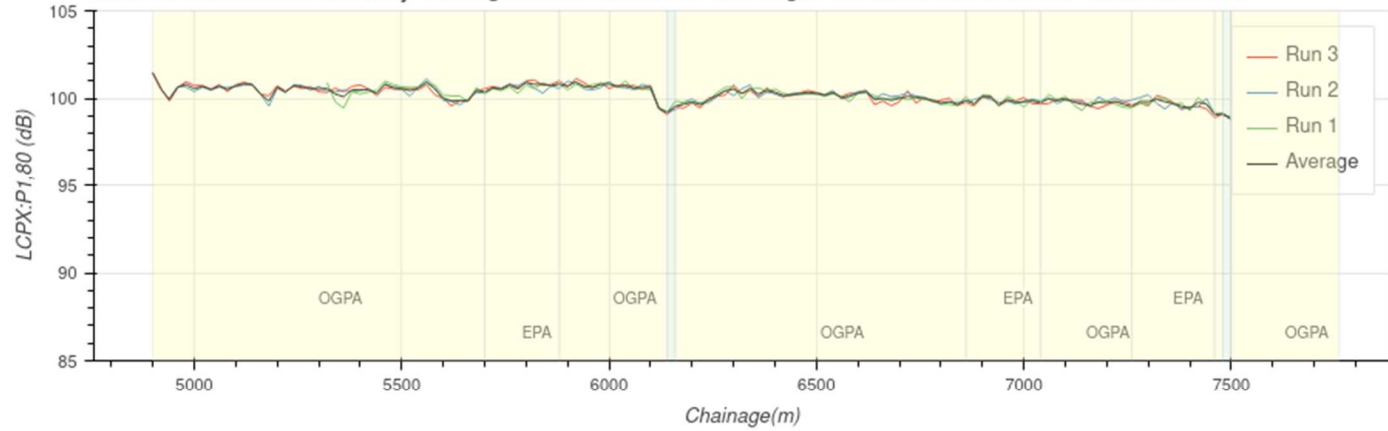


	Average	Run 1	Run 2	Run 3
Lcpx (dB)	101.7	101.7	101.6	101.7
Variation (dB)	0.8	0.7	0.9	0.8

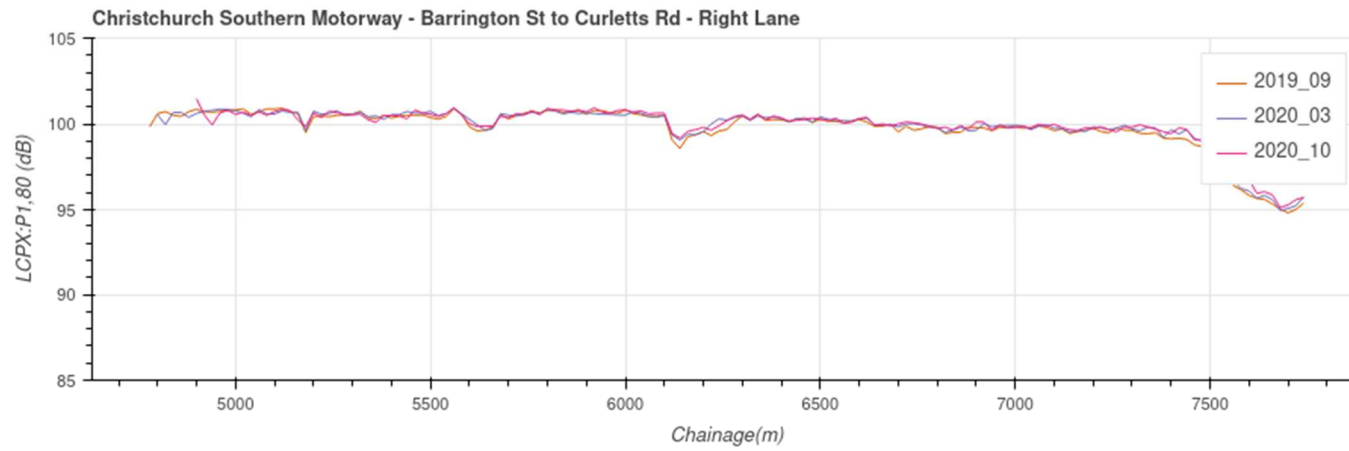
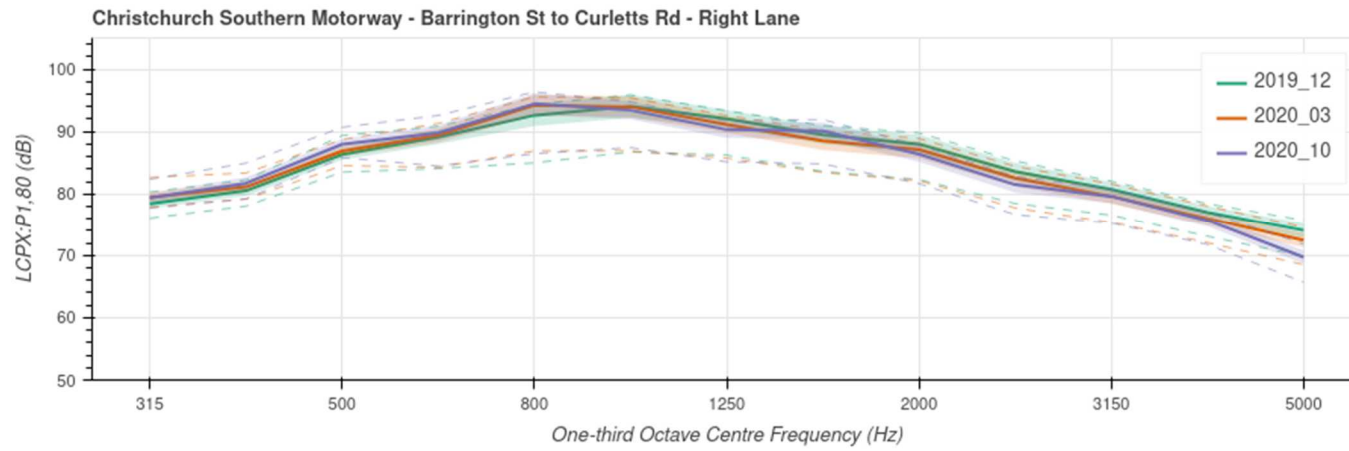


**D.4 SH76 – Christchurch Southern Motorway, Curletts Rd to Barrington St – Southbound – Right lane**

Christchurch Southern Motorway - Barrington St to Curletts Rd - Lane: right - Direction: I -Road ID: 655 - Date: 11/10/2020

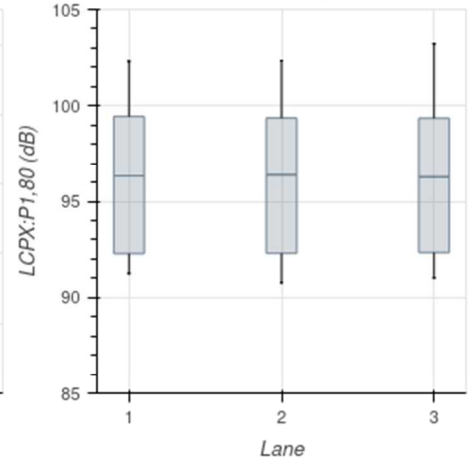
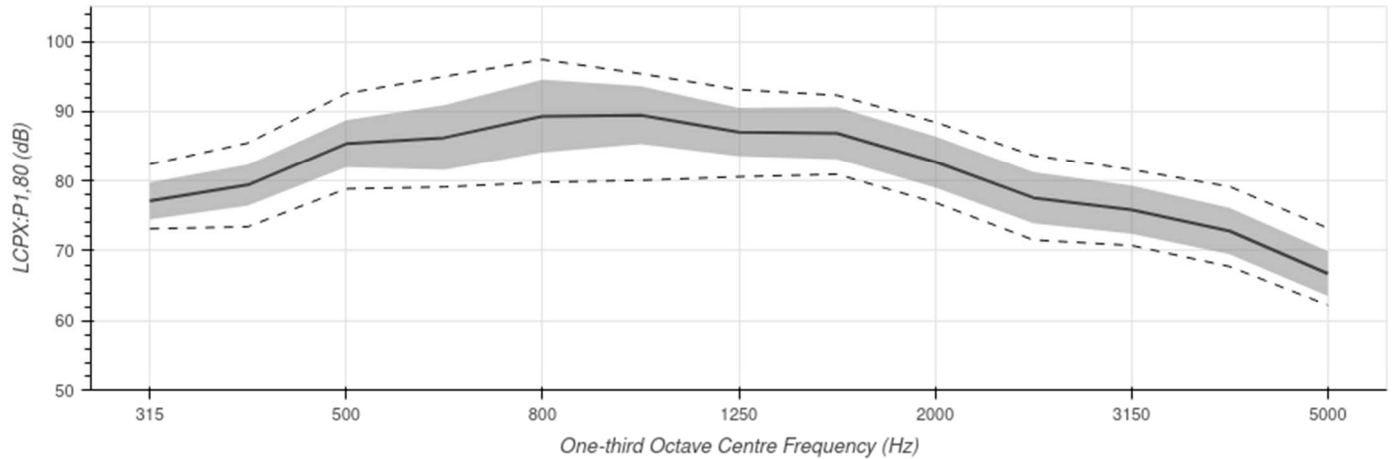
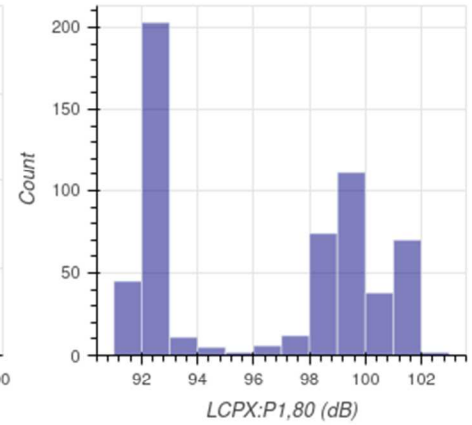
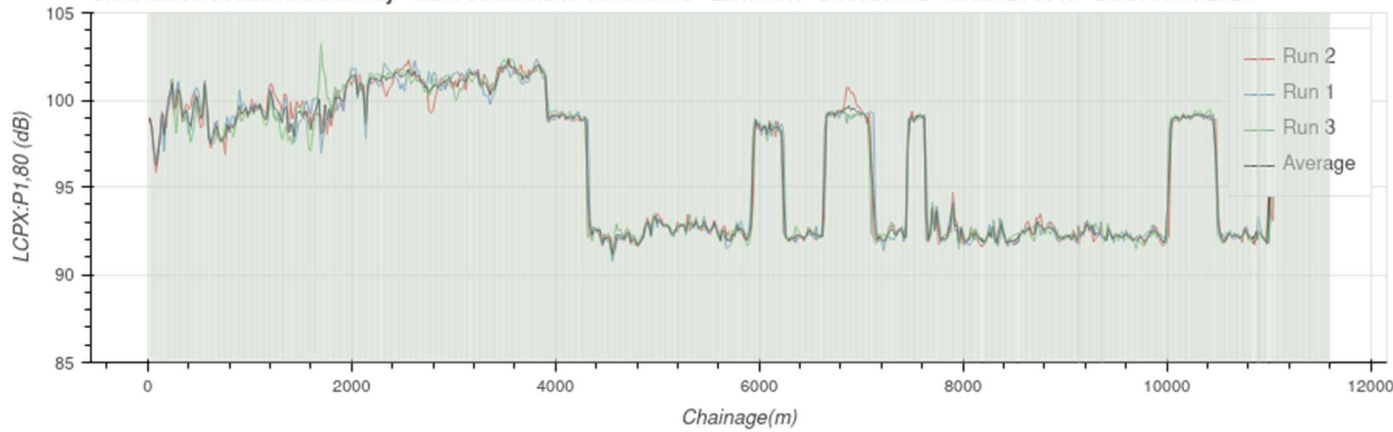


	Average	Run 3	Run 2	Run 1
Lcpx (dB)	99.9	99.8	99.9	99.9
Variation (dB)	1.2	1.2	1.2	1.2



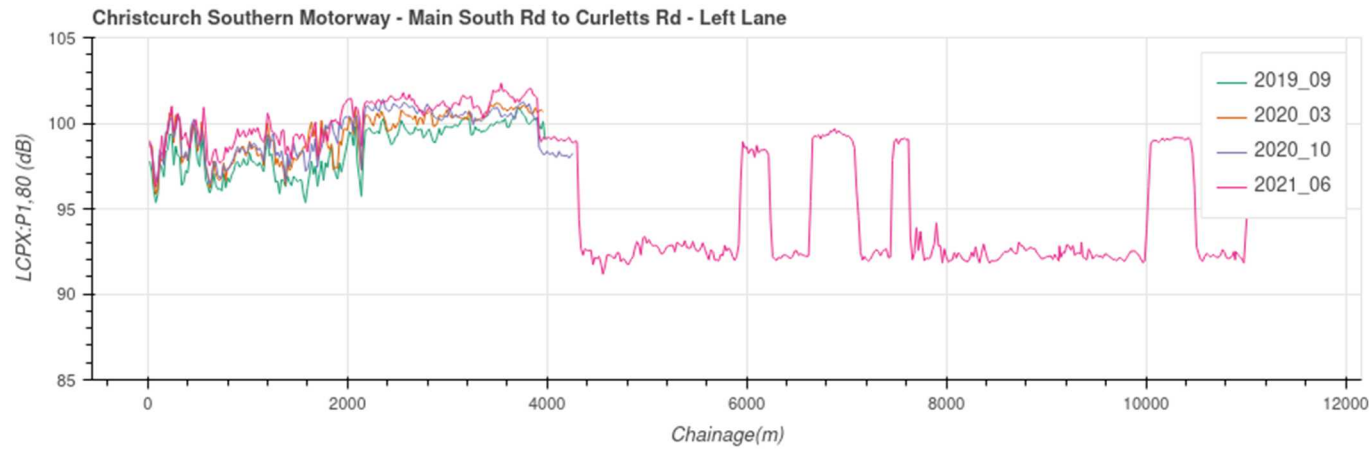
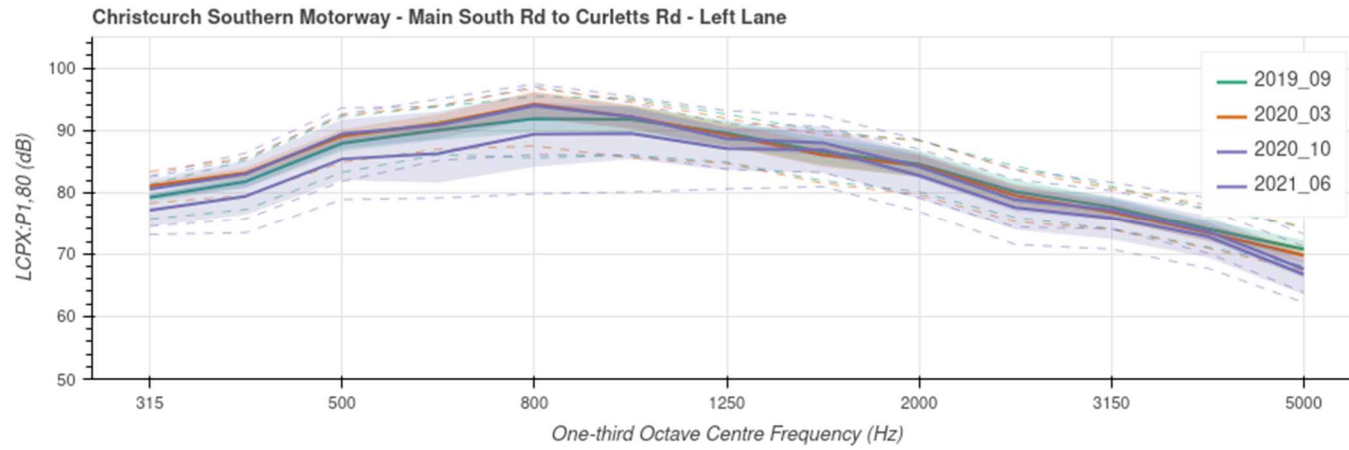
**D.5 SH76 – Christchurch Southern Motorway, Main South Road to Curletts Road – Northbound – Left lane**

Christchurch Southern Motorway - Main South Rd to Curletts Rd - Lane: left - Direction: D -Road ID: 3319 - Date: 03/06/2021



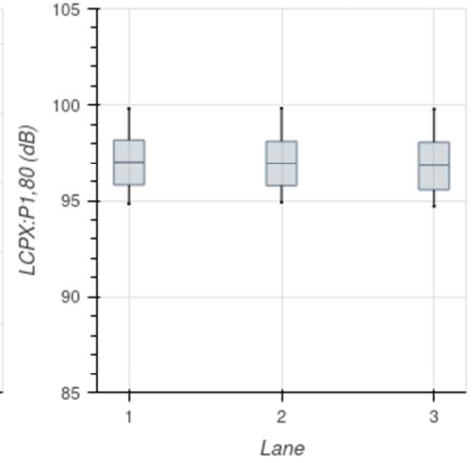
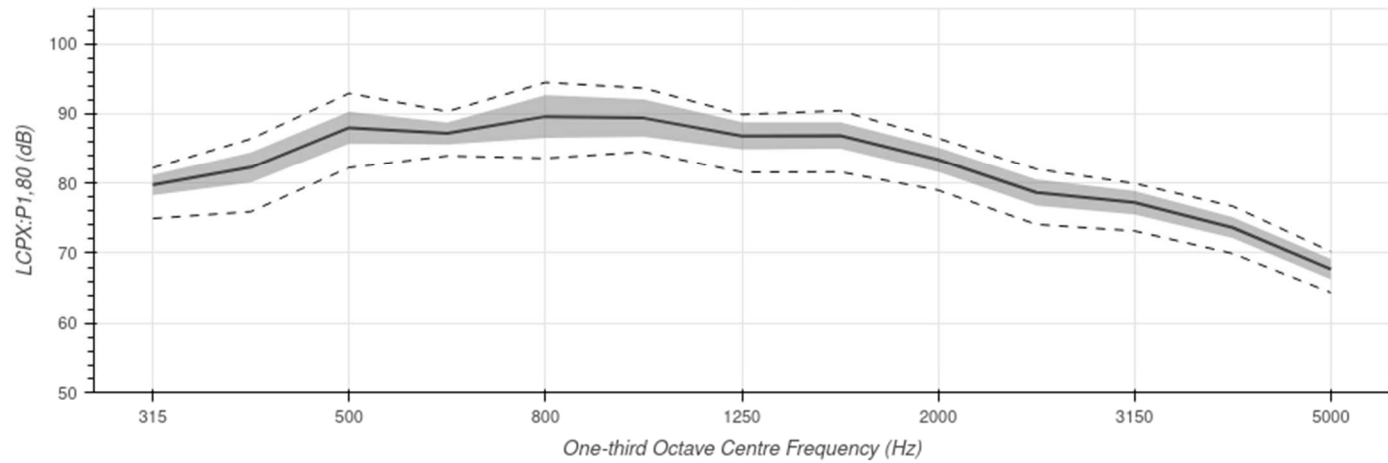
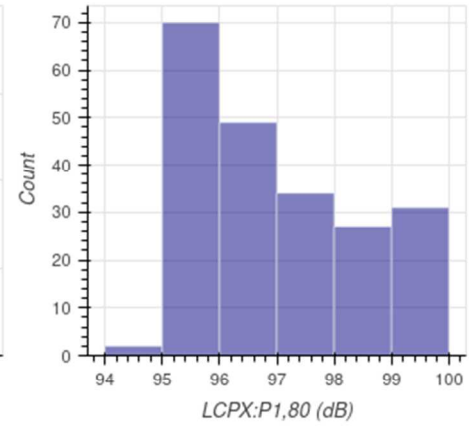
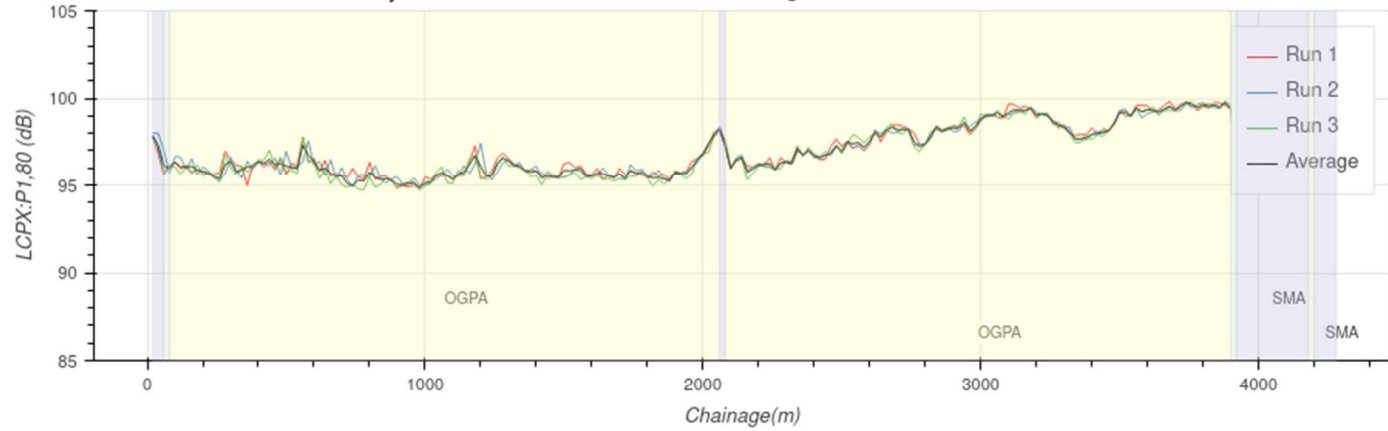
	Average	Run 2	Run 1	Run 3
Lcpx (dB)	96.3	96.4	96.3	96.3
Variation (dB)	3.8	3.8	3.8	3.8



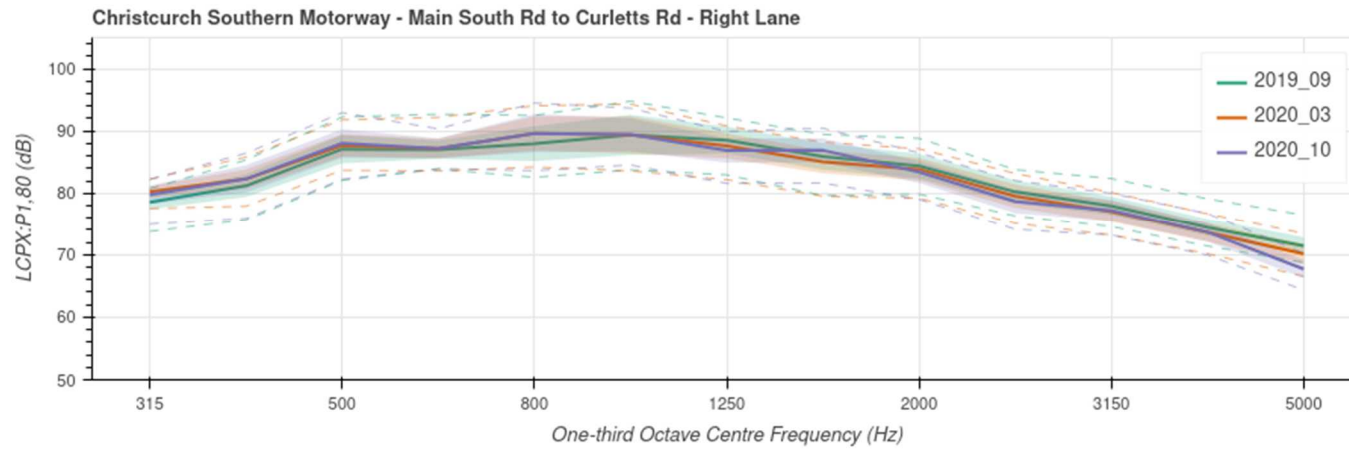
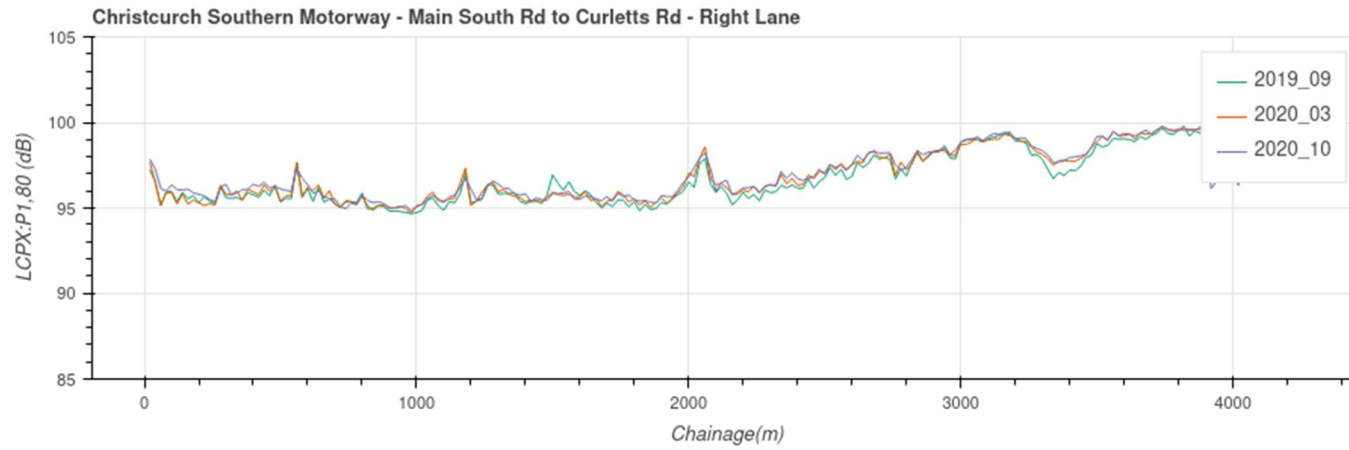


**D.6 SH76 – Christchurch Southern Motorway, Main South Road to Curletts Road – Northbound – Right lane**

Christchurch Southern Motorway - Main South Rd to Curletts Rd - Lane: right - Direction: D -Road ID: 3319 - Date: 11/10/2020

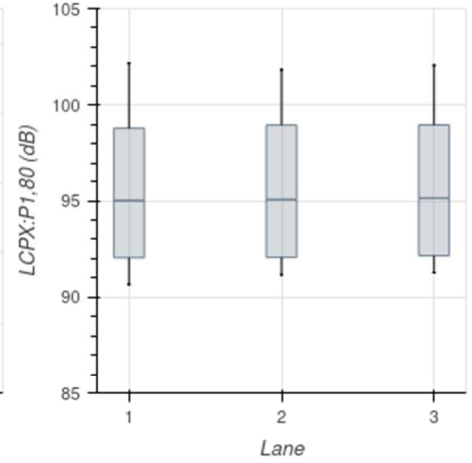
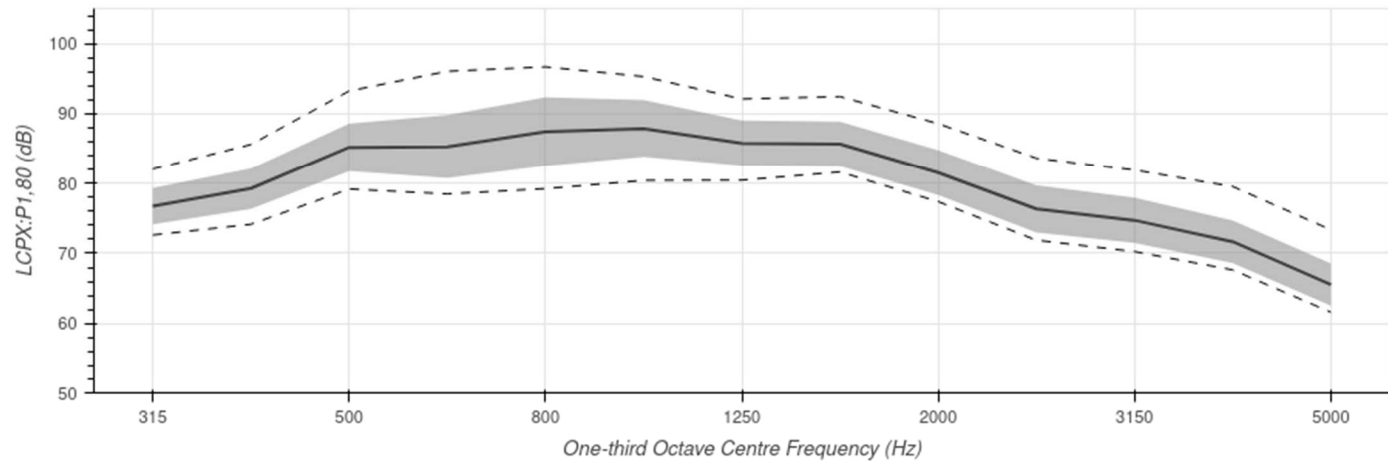
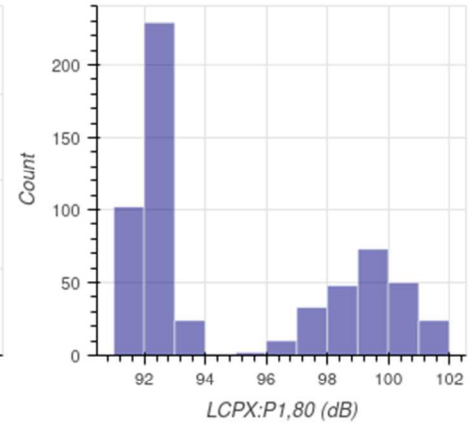
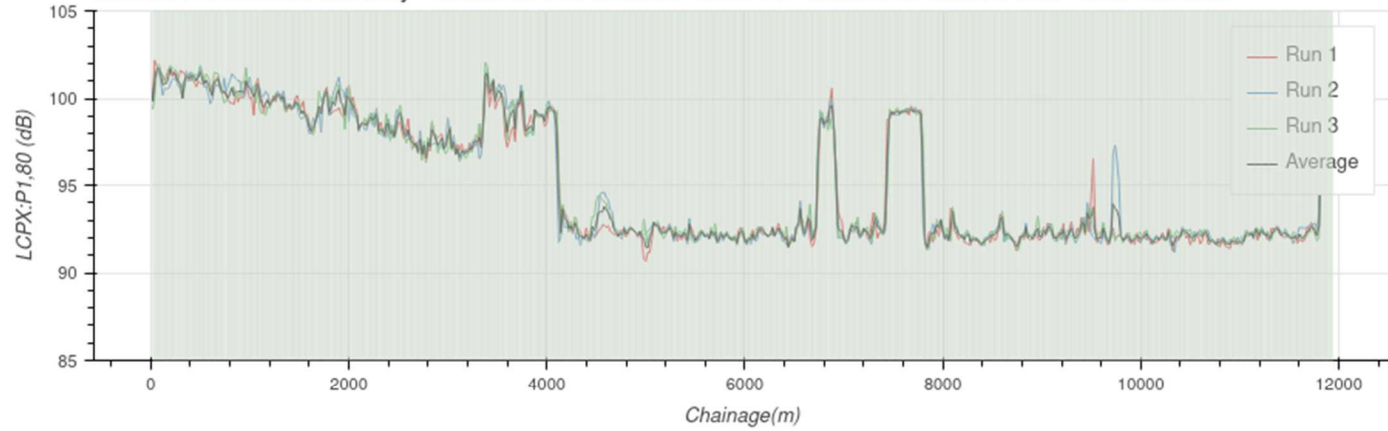


	Average	Run 1	Run 2	Run 3
Lcpx (dB)	96.9	97	97	96.9
Variation (dB)	1.4	1.4	1.4	1.5

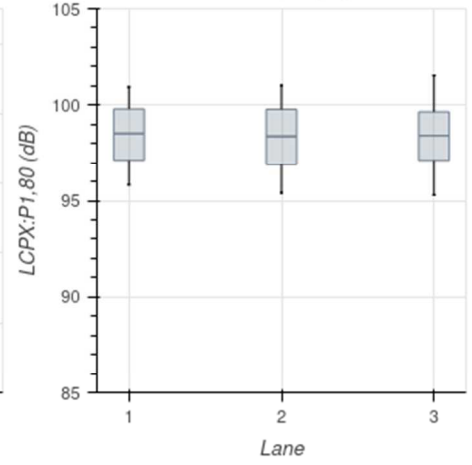
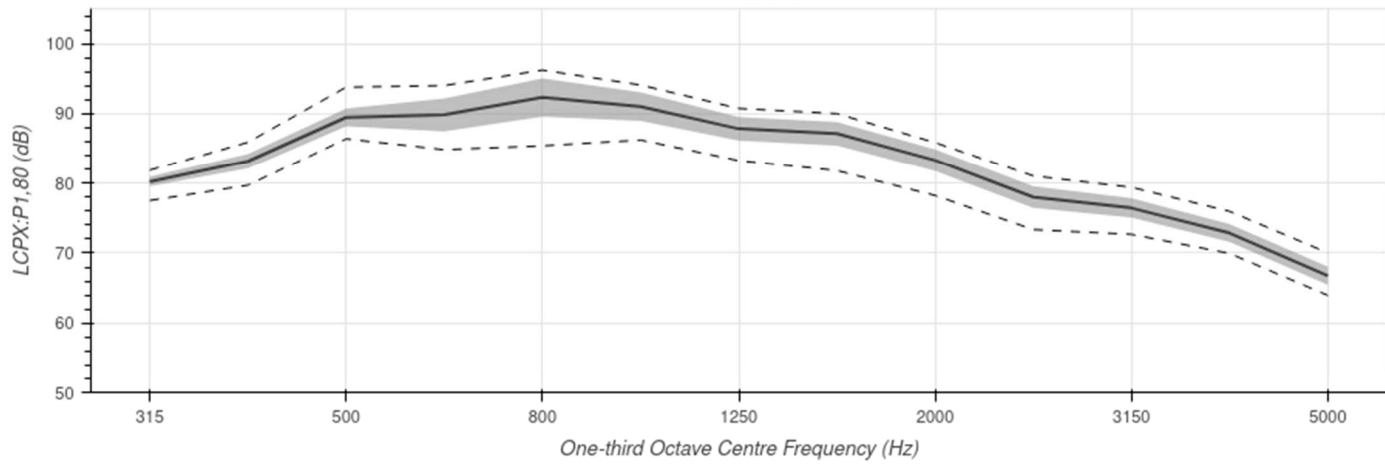
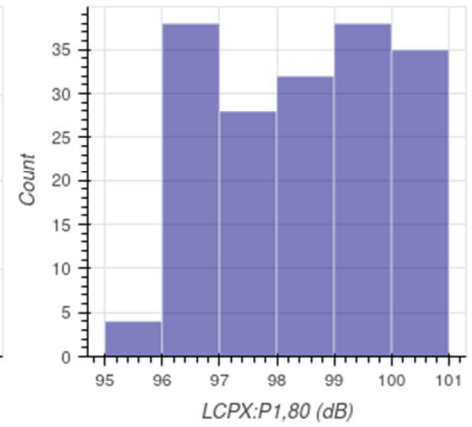
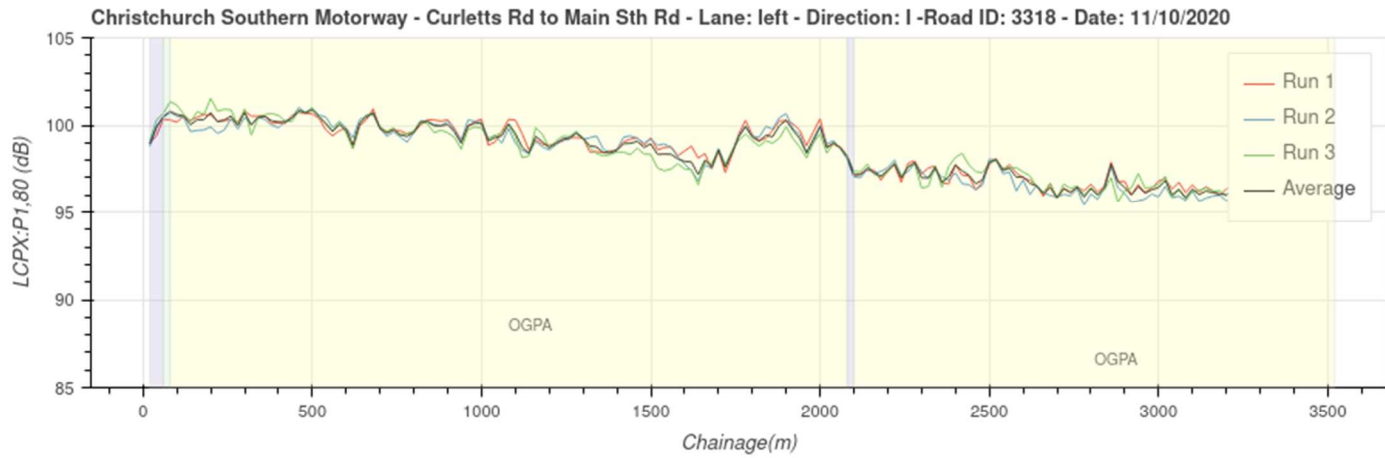


**D.7 SH76 – Christchurch Southern Motorway, Main South Road to Curletts Road – Southbound – Left lane**

Christchurch Southern Motorway - Curletts Rd to Main Sth Rd - Lane: left - Direction: I - Road ID: 3318 - Date: 03/06/2021

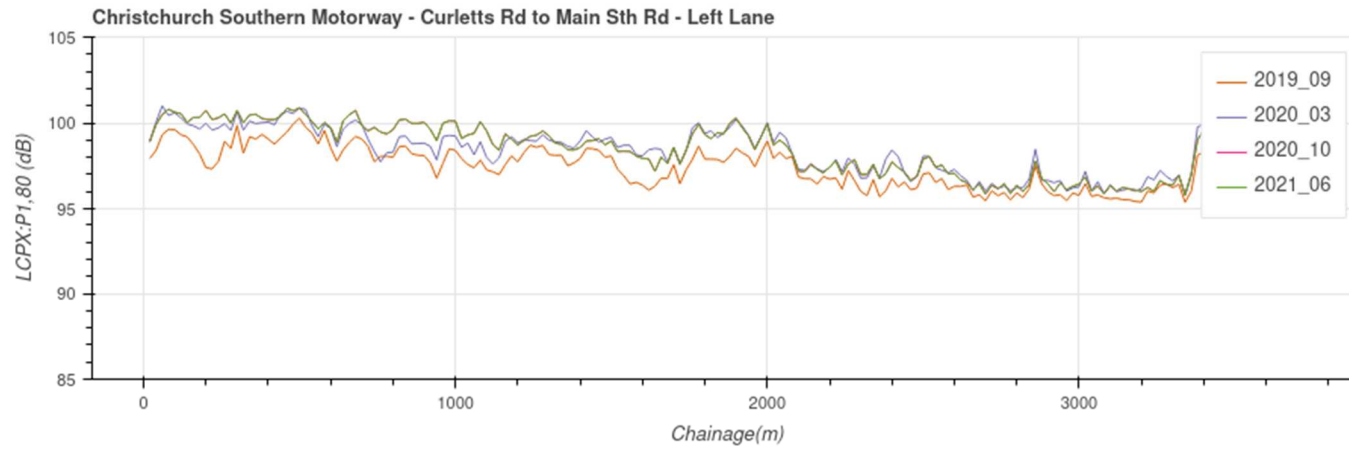
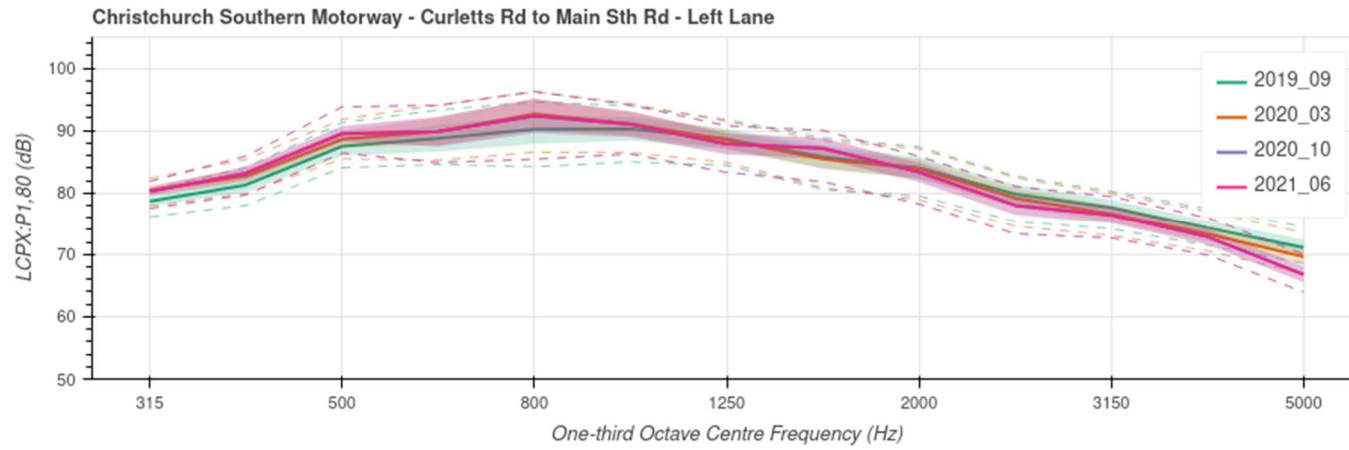


	Average	Run 1	Run 2	Run 3
Lcpx (dB)	95.1	95	95.1	95.1
Variation (dB)	3.6	3.6	3.6	3.5



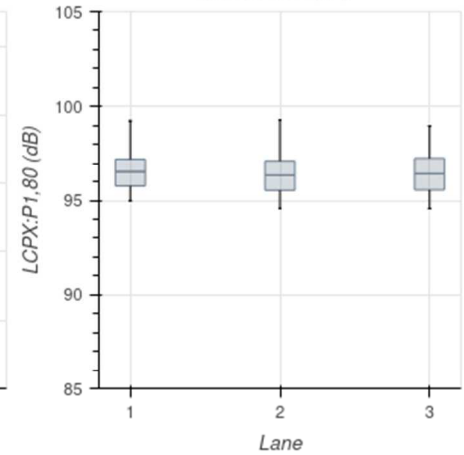
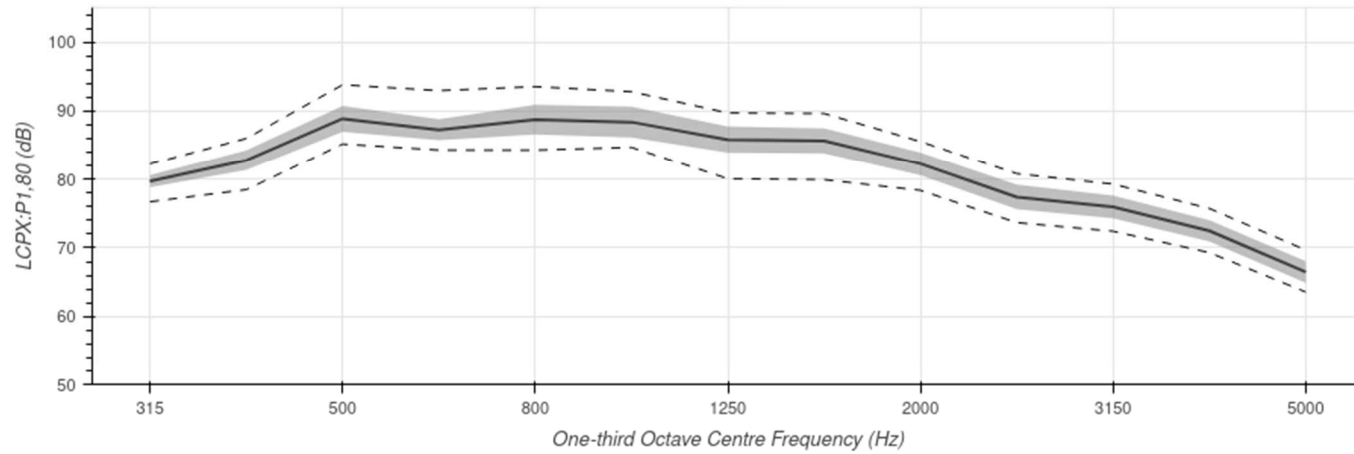
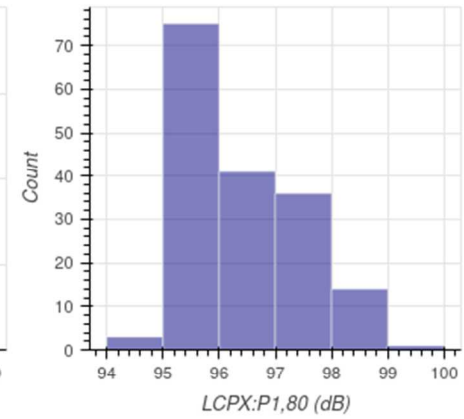
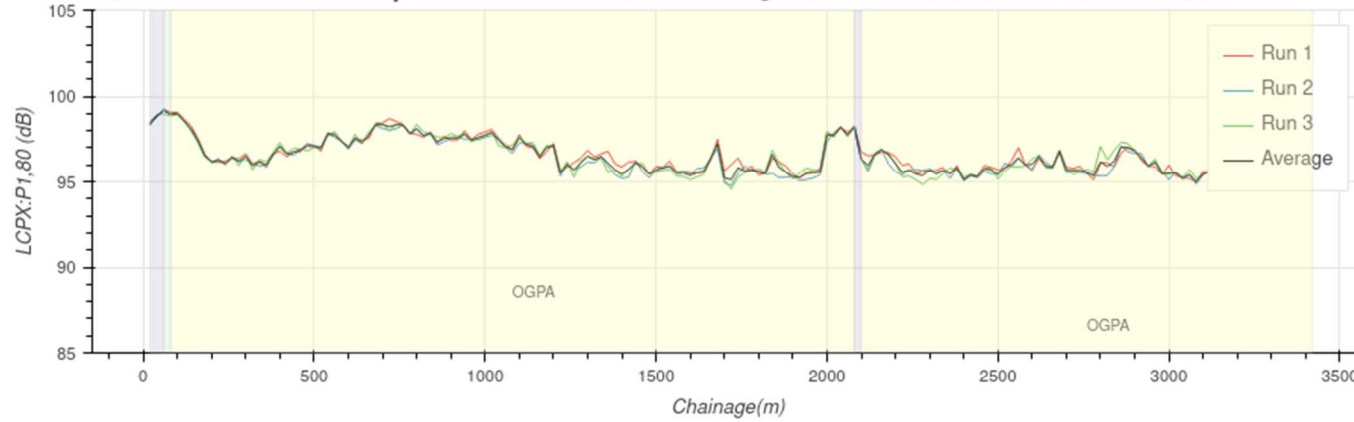
	Average	Run 1	Run 2	Run 3
Lcpx (dB)	98.4	98.5	98.4	98.4
Variation (dB)	1.6	1.5	1.6	1.6



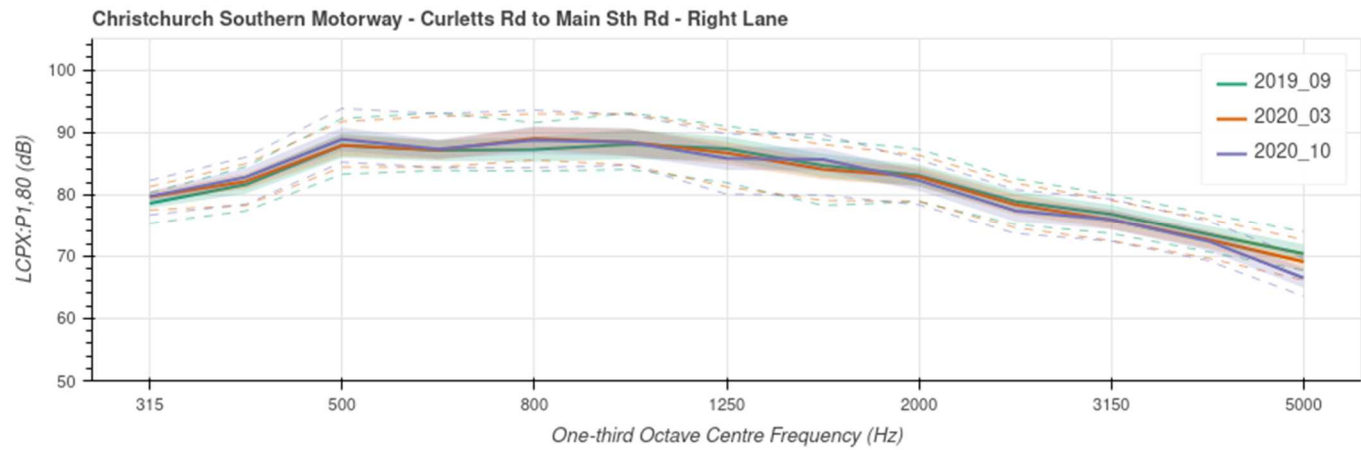
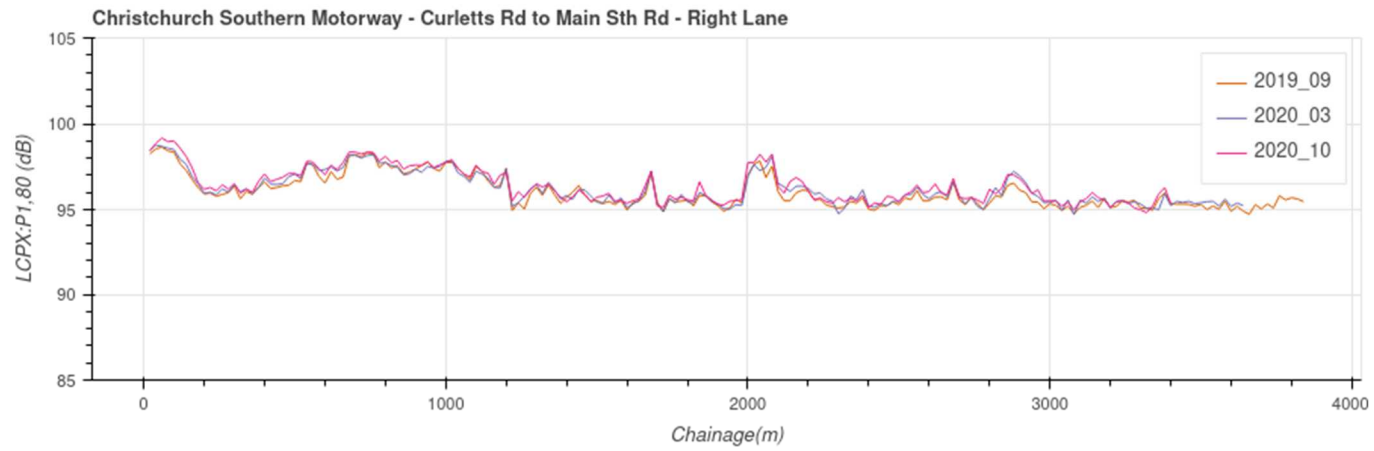


**D.8 SH76 – Christchurch Southern Motorway, Main South Road to Curletts Road – Southbound – Right lane**

Christchurch Southern Motorway - Curletts Rd to Main Sth Rd - Lane: right - Direction: I - Road ID: 3318 - Date: 11/10/2020

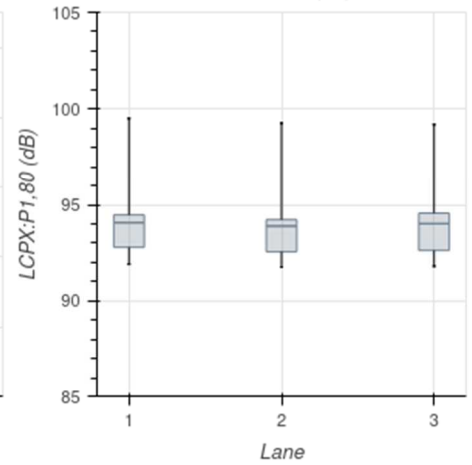
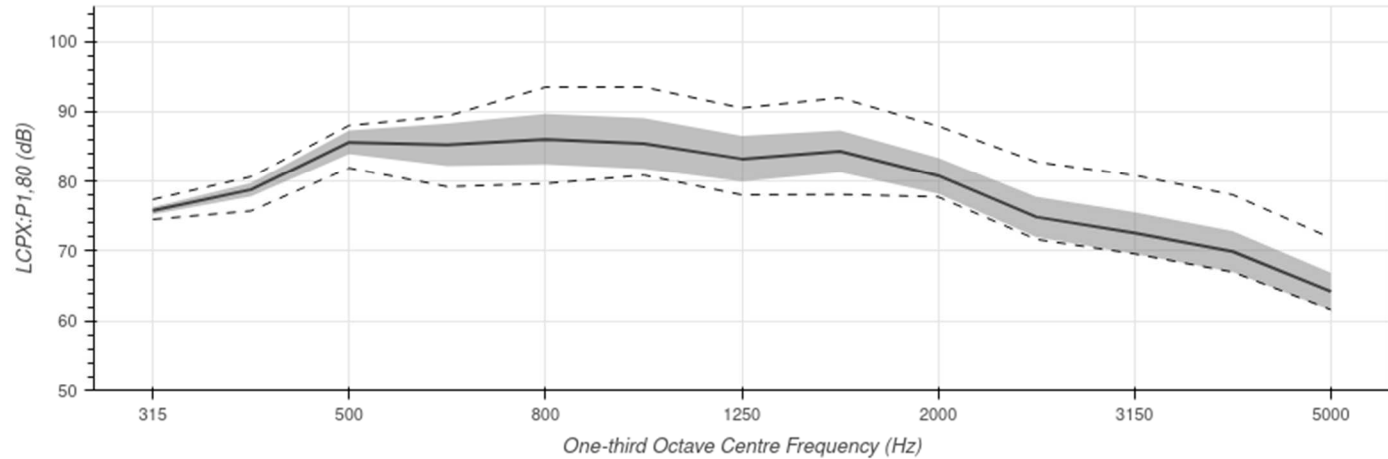
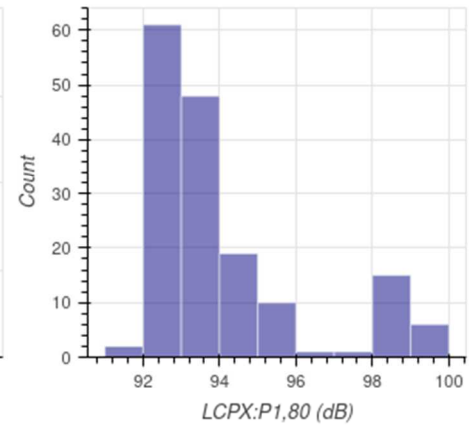
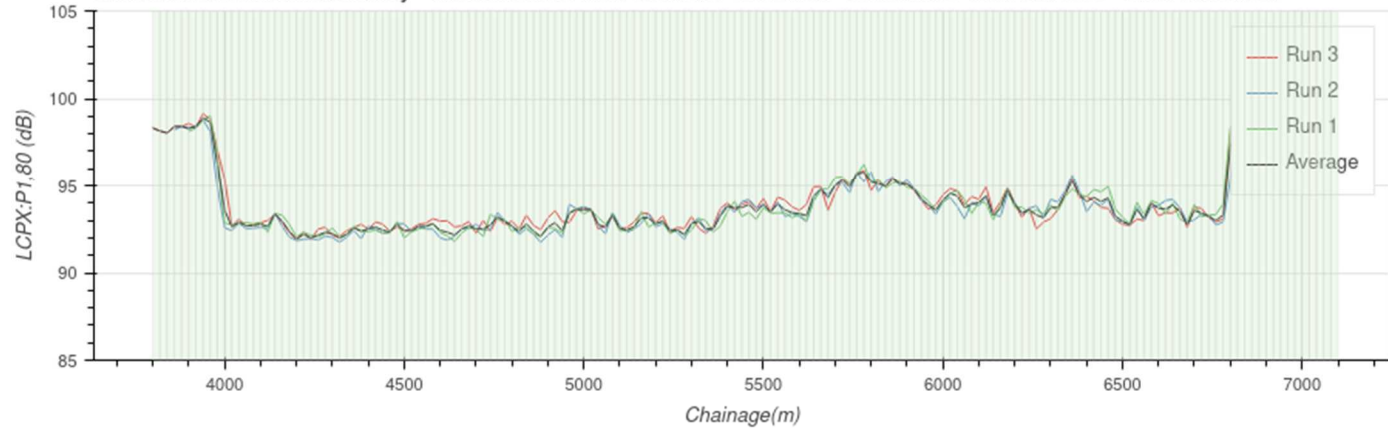


	Average	Run 1	Run 2	Run 3
Lcpx (dB)	96.4	96.5	96.3	96.4
Variation (dB)	1	1	1	1.1



**D.9 SH1 – Christchurch Southern Motorway, Weedons-Ross Road to Main South Road – Northbound – Left lane**

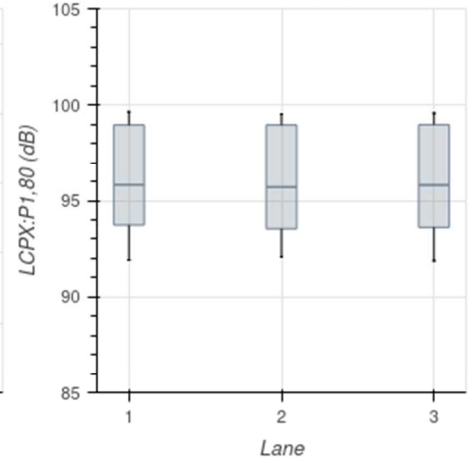
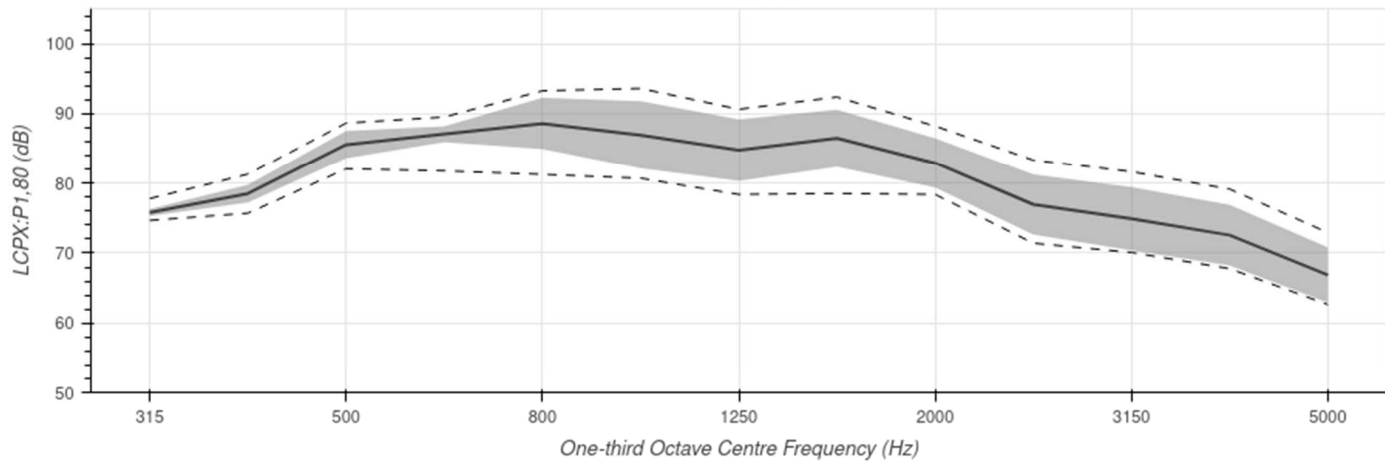
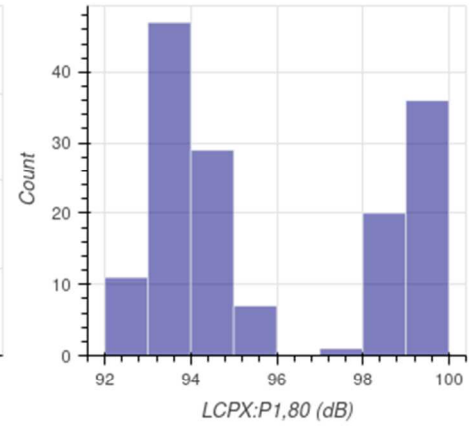
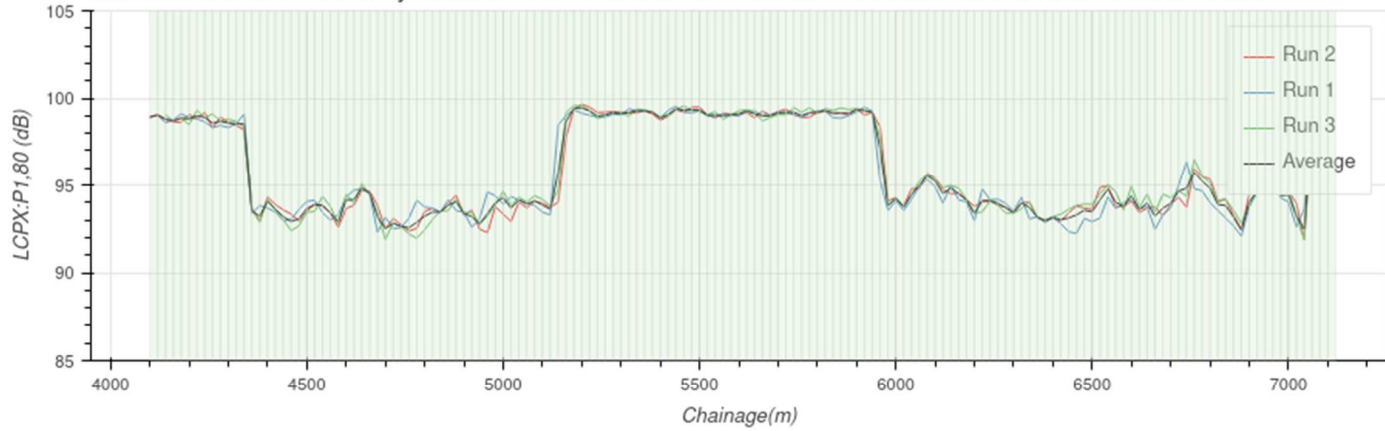
Christchurch Southern Motorway - Weedons Rd to Main South Rd - Lane: left - Direction: D - Road ID: 3902 - Date: 03/06/2021



	Average	Run 3	Run 2	Run 1
Lcpx (dB)	94	94	93.9	94.1
Variation (dB)	2	2	1.9	1.9

**D.10 SH1 – Christchurch Southern Motorway, Weedons-Ross Road to Main South Road – Southbound – Left lane**

Christchurch Southern Motorway - Main South Rd to Weedons Rd - Lane: left - Direction: I -Road ID: 3903 - Date: 03/06/2021



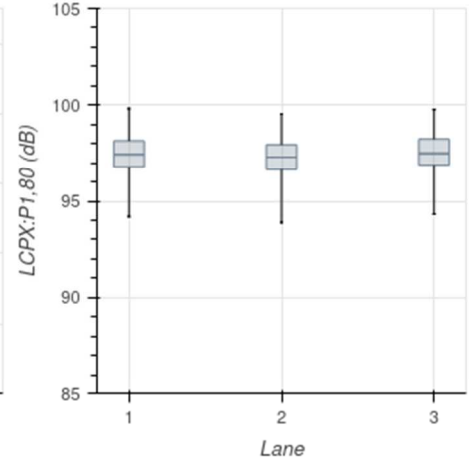
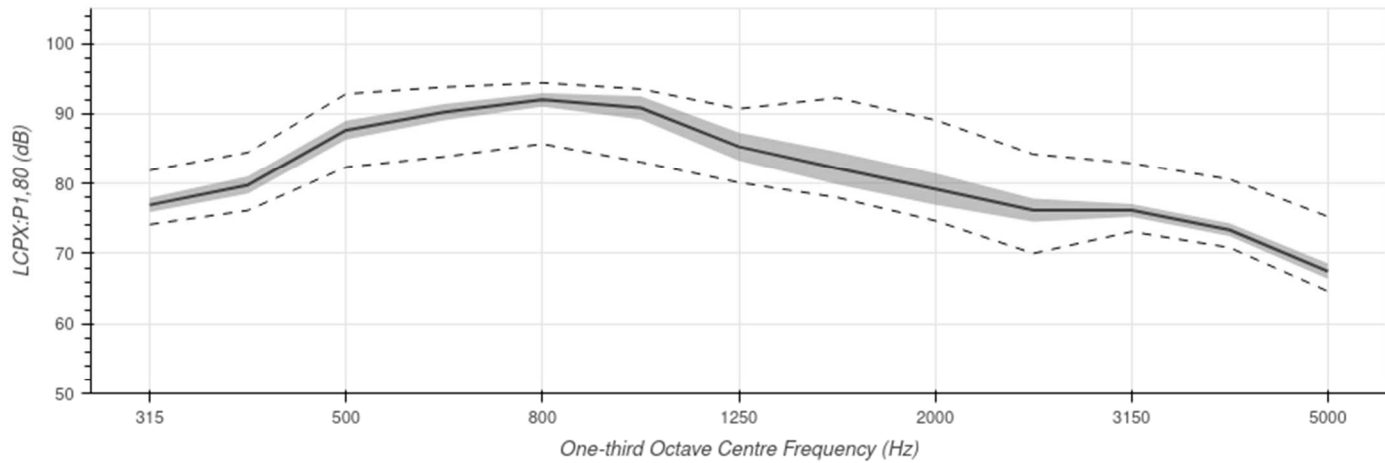
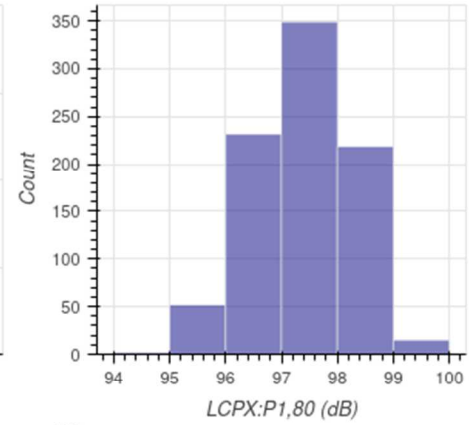
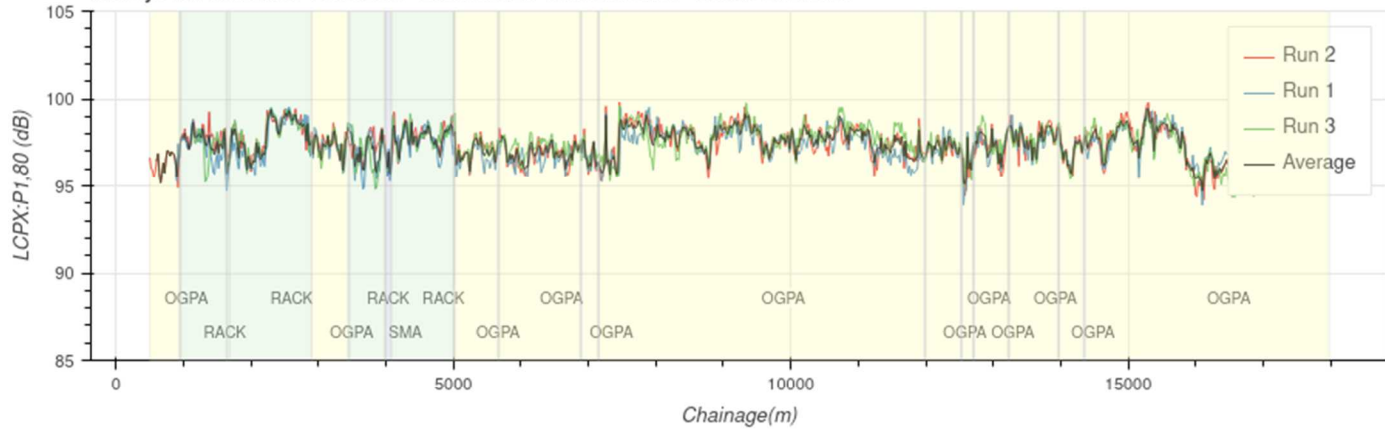
	Average	Run 2	Run 1	Run 3
Lcpx (dB)	95.8	95.7	95.8	95.8
Variation (dB)	2.6	2.6	2.6	2.6



## Appendix E: SH1 – McKays to Peka Peka

**E.1 SH1 – McKays to Peka Peka – Northbound – Left lane**

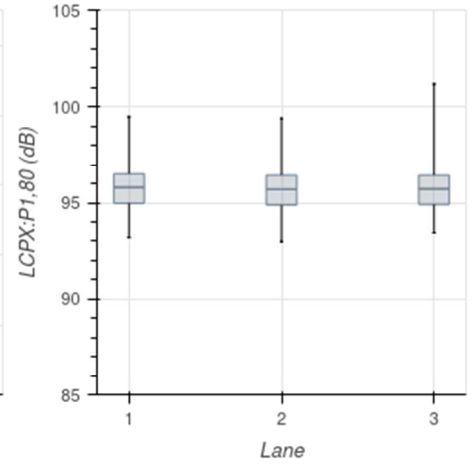
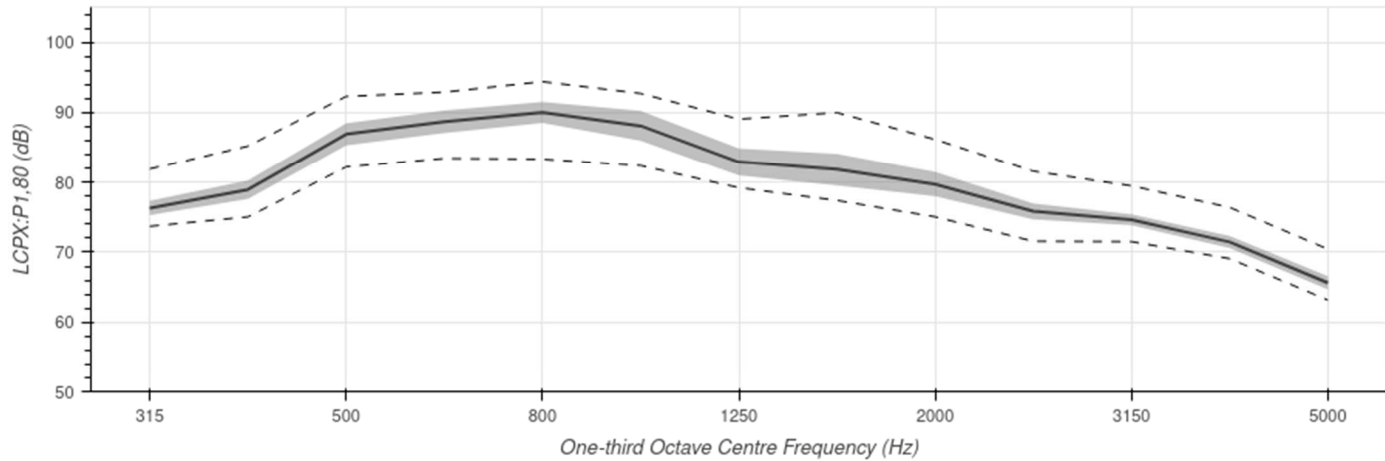
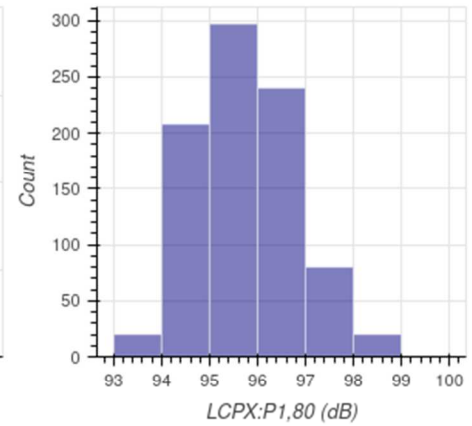
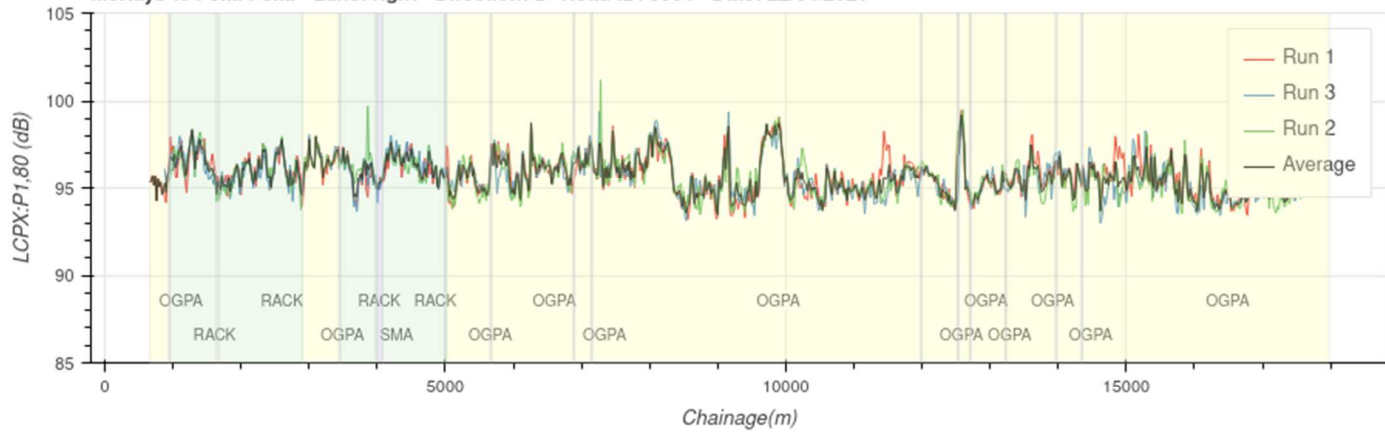
McKays to Peka Peka - Lane: left - Direction: D -Road ID: 3564 - Date: 22/04/2021



	Average	Run 2	Run 1	Run 3
Lcpx (dB)	97.4	97.3	97.4	97.5
Variation (dB)	1	0.9	1	1

**E.2 SH1 – McKays to Peka Peka – Northbound – Right lane**

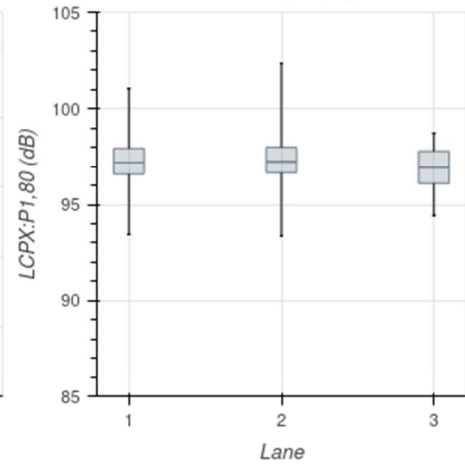
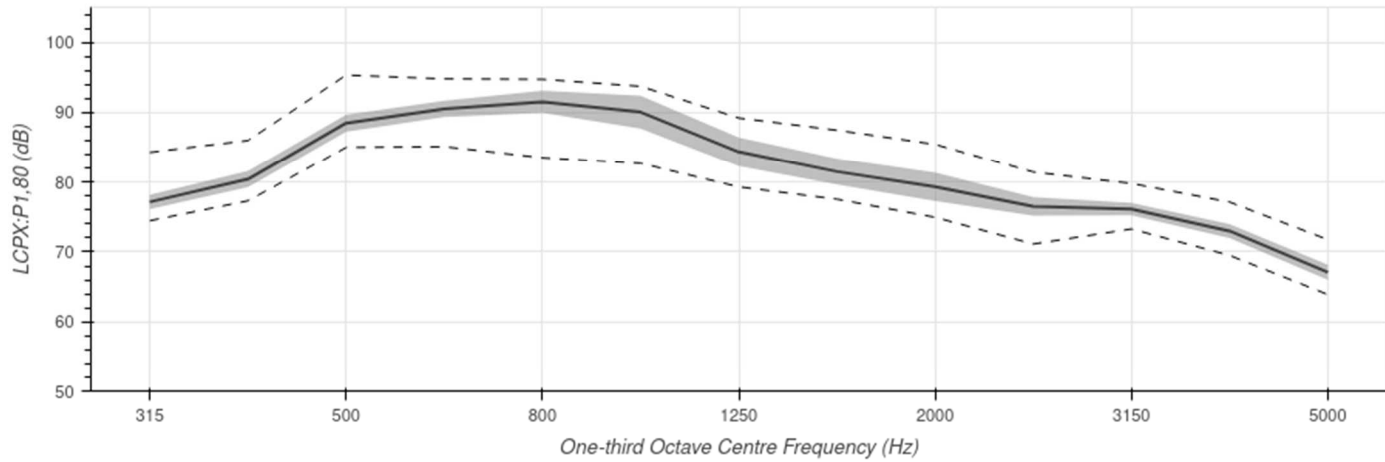
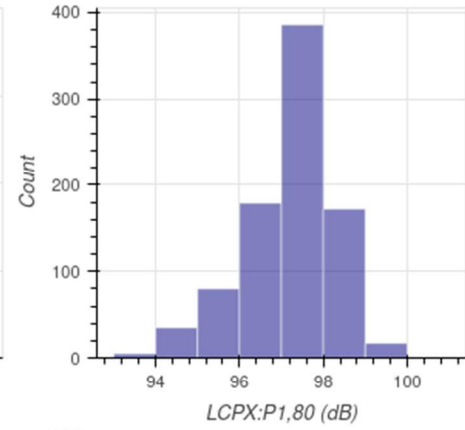
McKays to Peka Peka - Lane: right - Direction: D - Road ID: 3564 - Date: 22/04/2021



	Average	Run 1	Run 3	Run 2
Lcpx (dB)	95.7	95.8	95.7	95.7
Variation (dB)	1.1	1.1	1.1	1.1

**E.3 SH1 – McKays to Peka Peka – Southbound – Left lane**

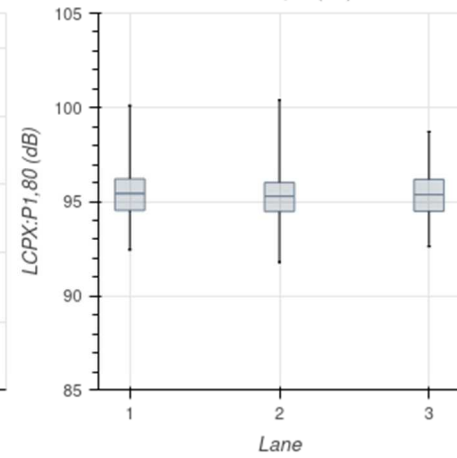
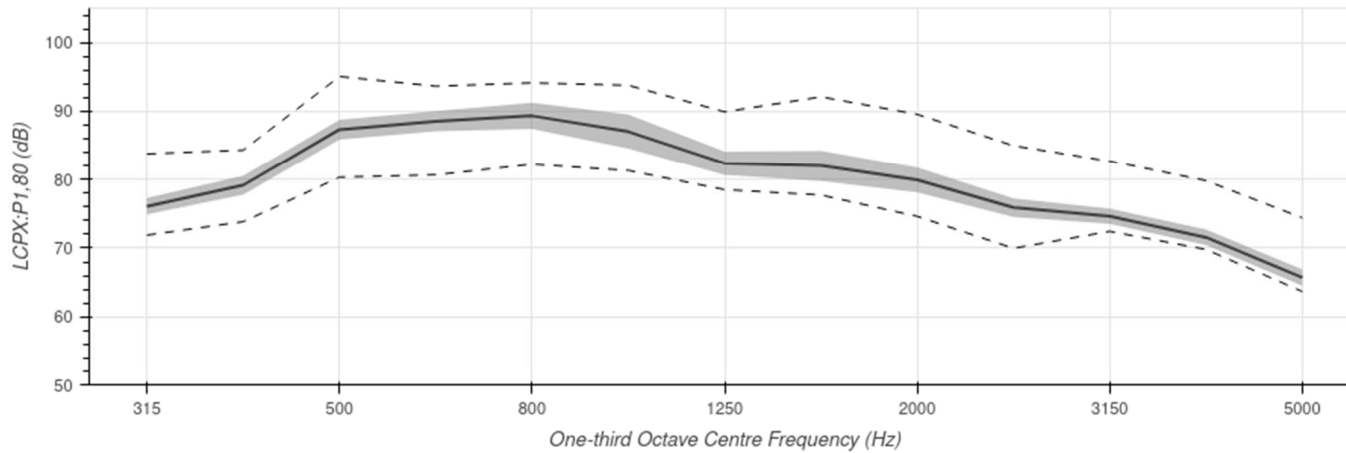
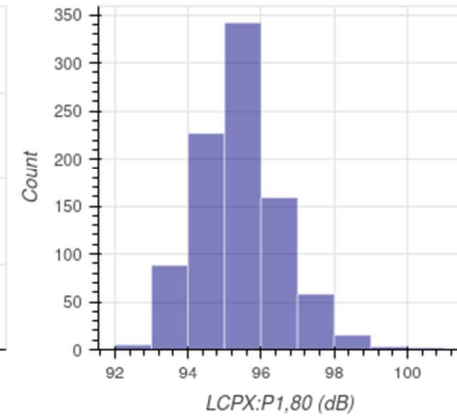
McKays to Peka Peka - Lane: left - Direction: I - Road ID: 3563 - Date: 22/04/2021



	Average	Run 3	Run 2	Run 1
Lcpx (dB)	97.1	96.9	97.3	97.2
Variation (dB)	1.1	1.1	1.2	1.1

**E.4 SH1 – McKays to Peka Peka – Southbound – Right lane**

McKays to Peka Peka - Lane: right - Direction: I - Road ID: 3563 - Date: 22/04/2021



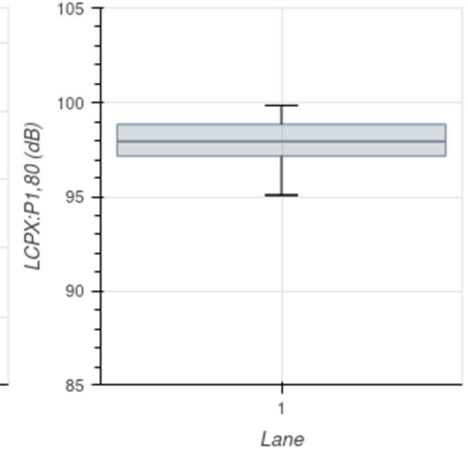
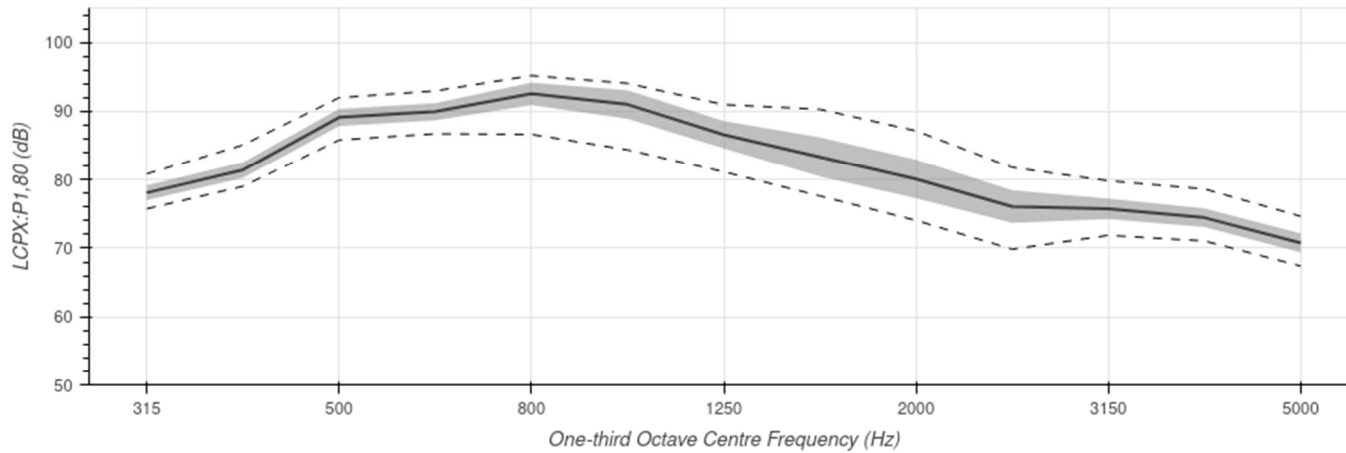
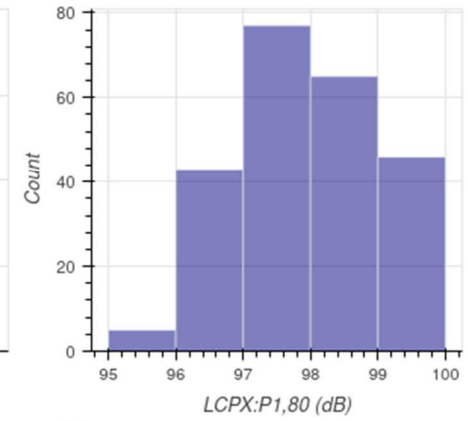
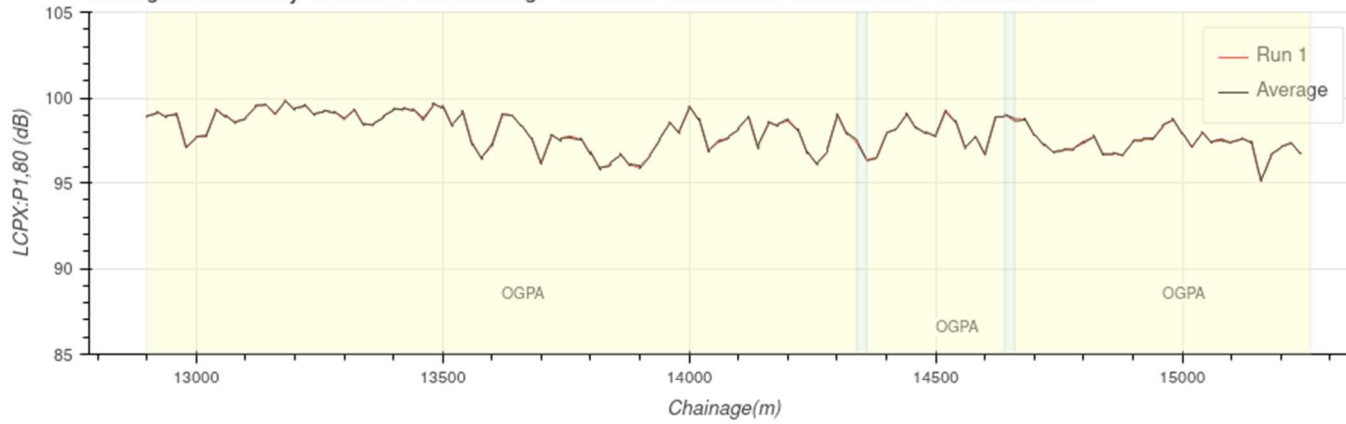
	Average	Run 1	Run 2	Run 3
LcpX (dB)	95.4	95.4	95.3	95.4
Variation (dB)	1.2	1.2	1.2	1.1



## Appendix F: SH1 – Wellington Urban Motorway

**F.1 SH1 – Wellington Urban Motorway – Northbound – Left**

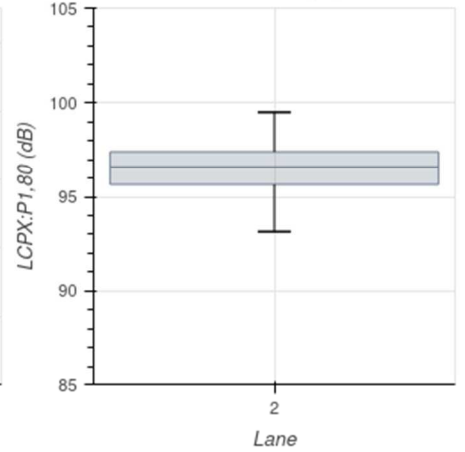
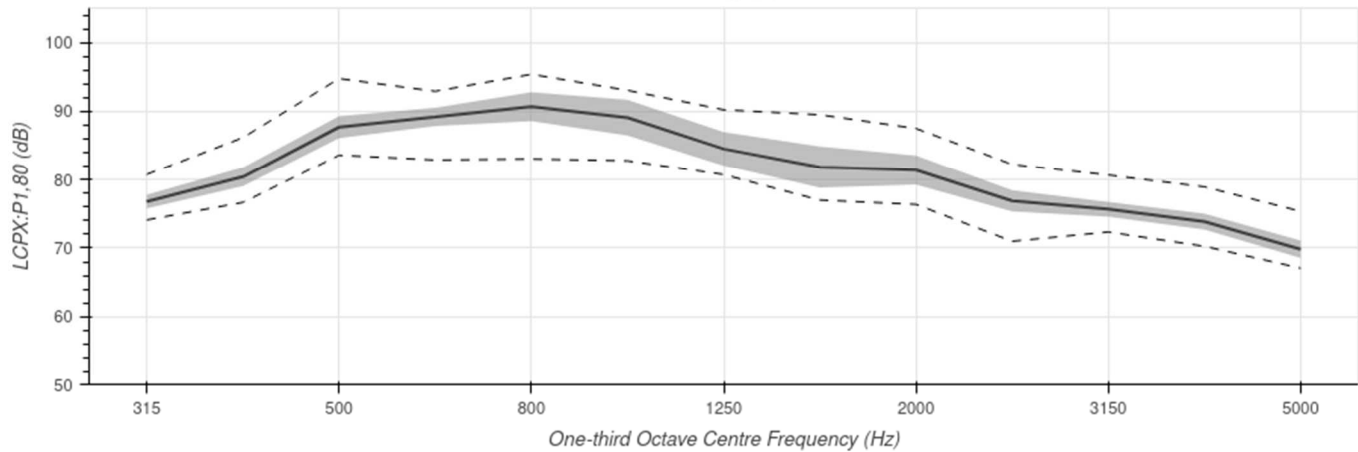
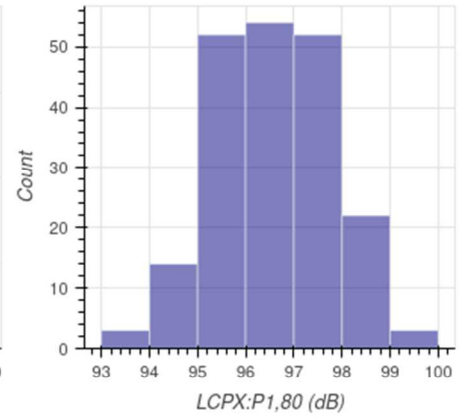
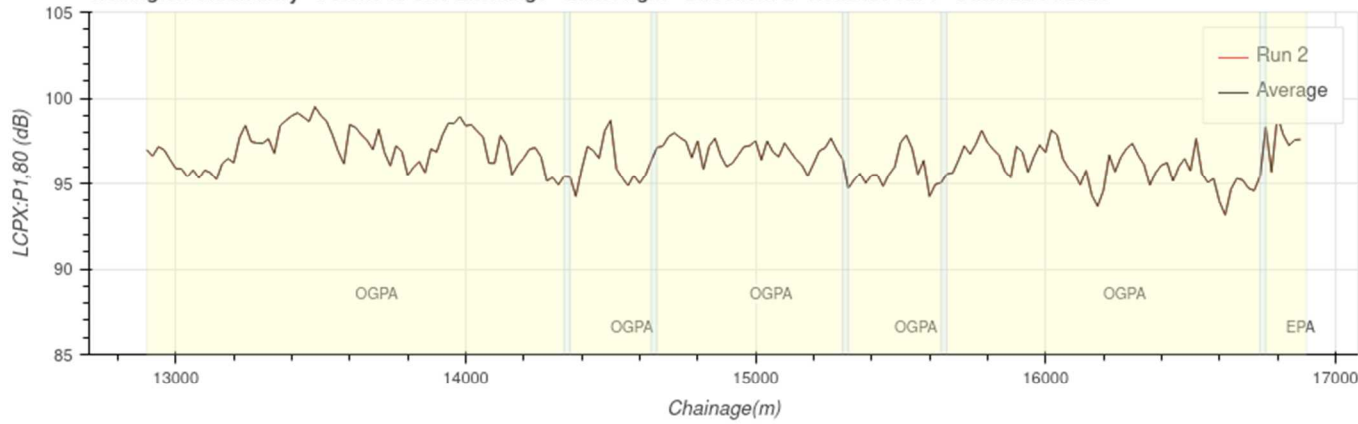
Wellington Urban Mwy - Petone to SH1 Exchange - Lane: left - Direction: D -Road ID: 3271 - Date: 22/04/2021



	Average	Run 1
LcpX (dB)	98	98
Variation (dB)	1	1

**F.2 SH1 – Wellington Urban Motorway – Northbound - Right**

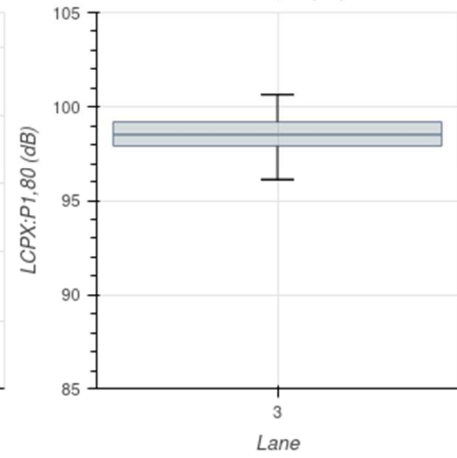
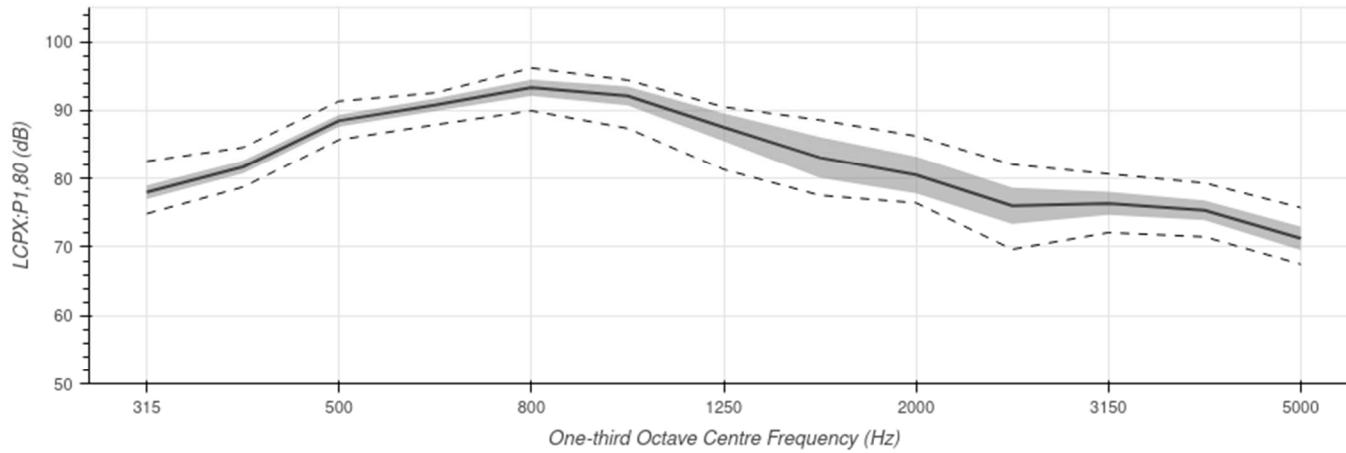
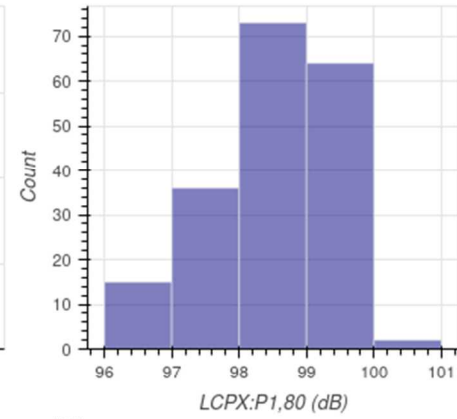
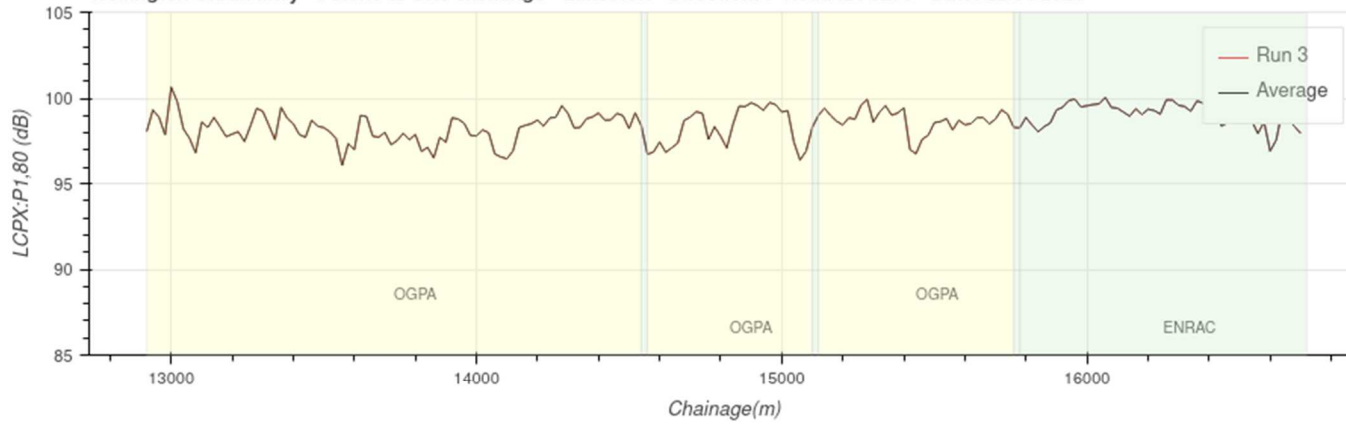
Wellington Urban Mwy - Petone to SH1 Exchange - Lane: right - Direction: D -Road ID: 3271 - Date: 22/04/2021



	Average	Run 2
Lcp <sub>x</sub> (dB)	96.6	96.6
Variation (dB)	1.2	1.2

**F.3 SH1 – Wellington Urban Motorway – Southbound - Left**

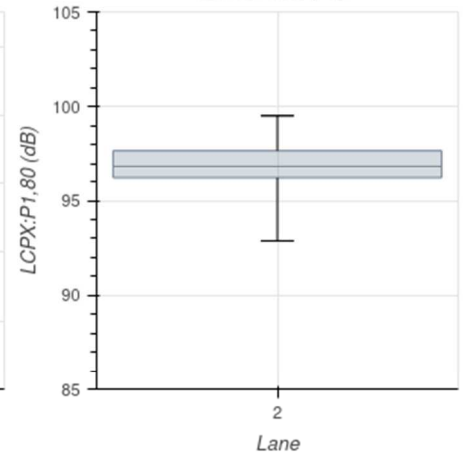
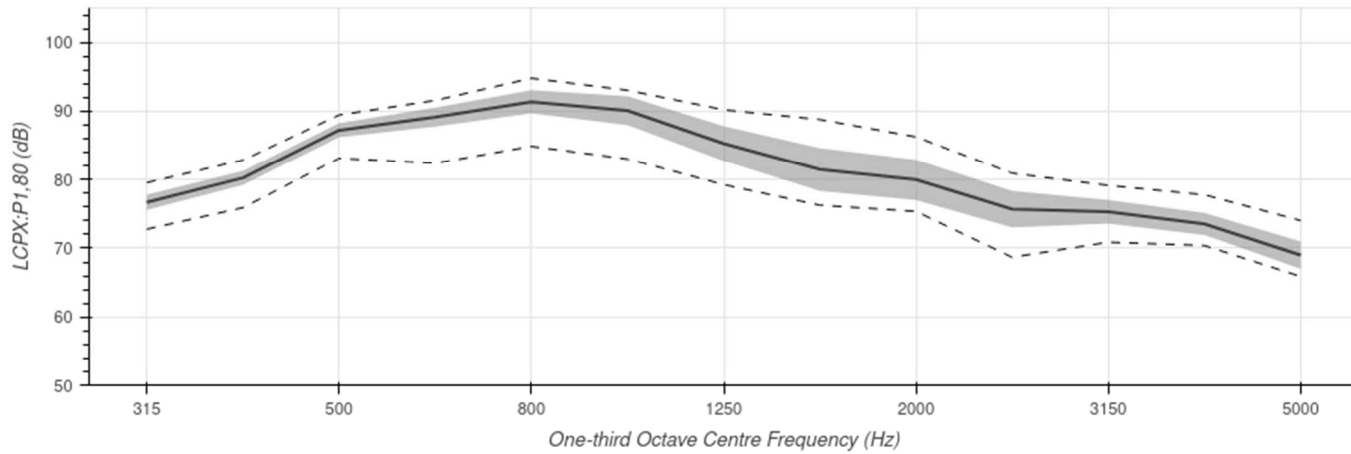
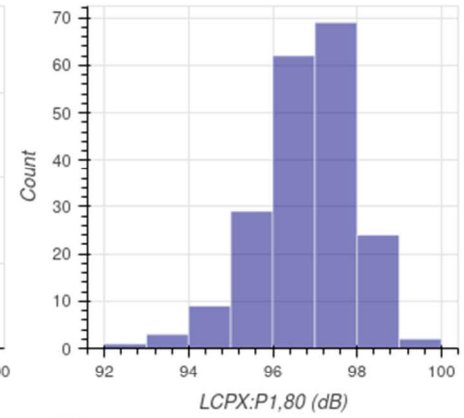
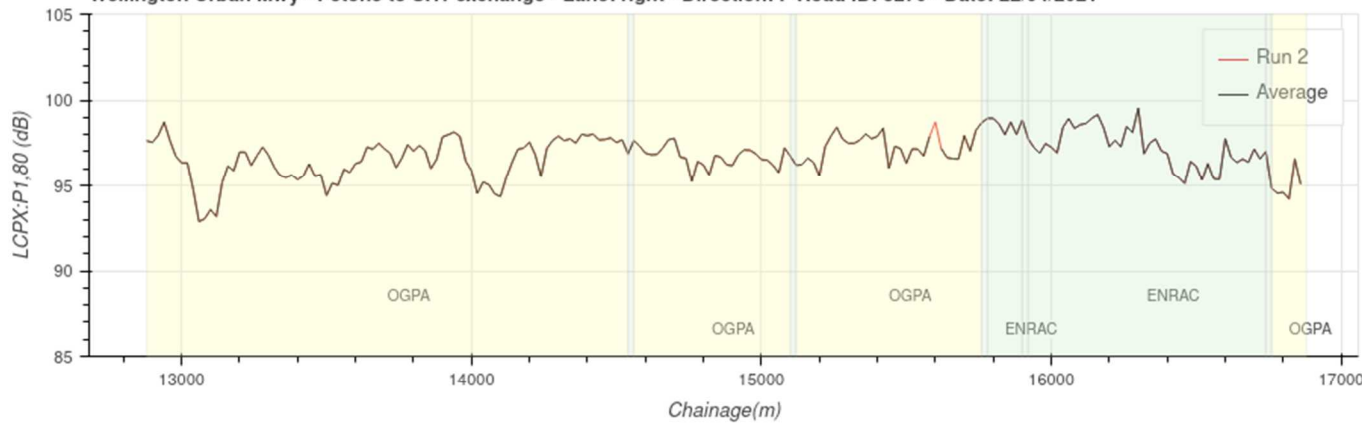
Wellington Urban Mwy - Petone to SH1 exchange - Lane: left - Direction: I - Road ID: 3270 - Date: 22/04/2021



	Average	Run 3
LcpX (dB)	98.5	98.5
Variation (dB)	0.9	0.9

**F.4 SH1 – Wellington Urban Motorway – Southbound - Right**

Wellington Urban Mwy - Petone to SH1 exchange - Lane: right - Direction: I -Road ID: 3270 - Date: 22/04/2021



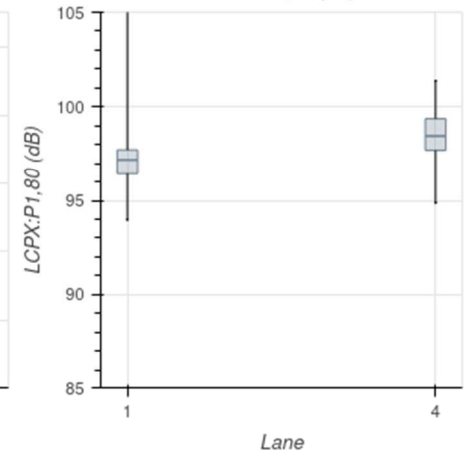
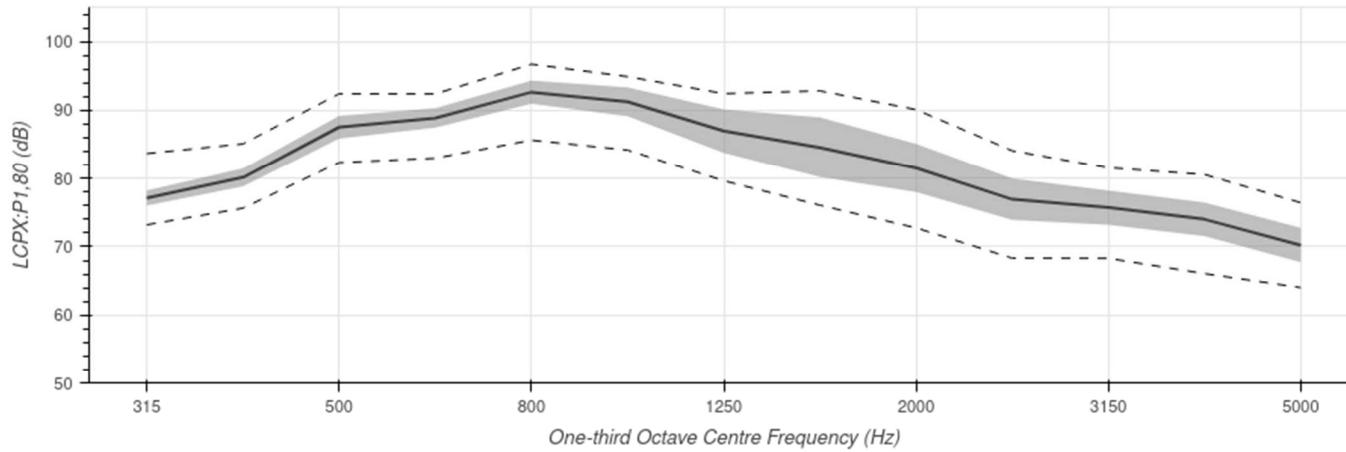
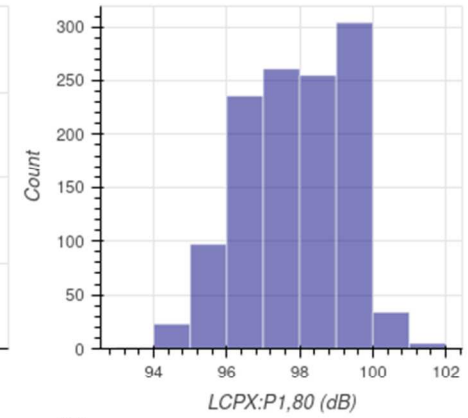
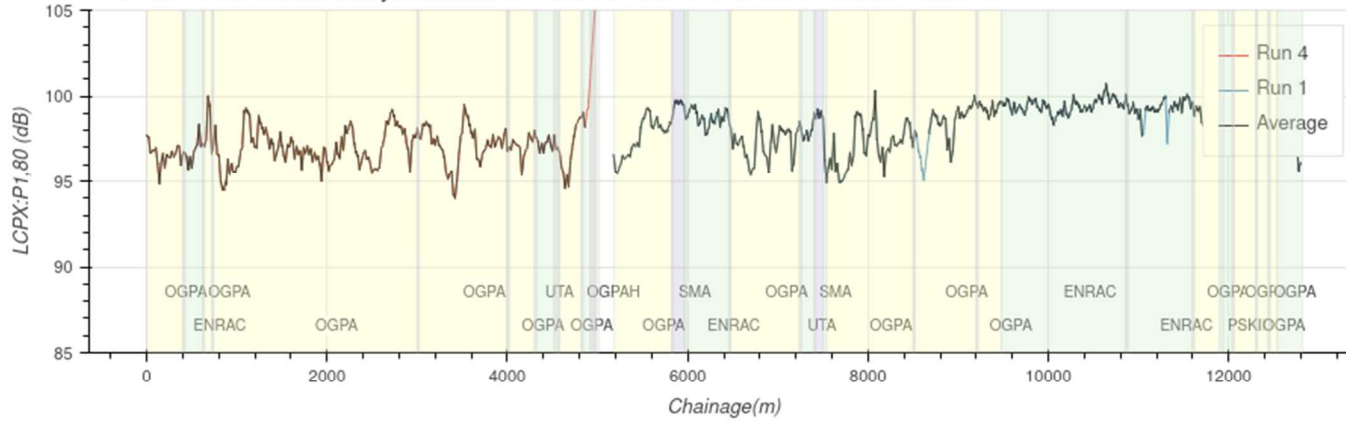
	Average	Run 2
LcpX (dB)	96.8	96.8
Variation (dB)	1.2	1.2

## Appendix G: SH2 – Western Hutt Valley Motorway



**G.1 SH2 – Western Hutt Valley Motorway – Northbound - Left**

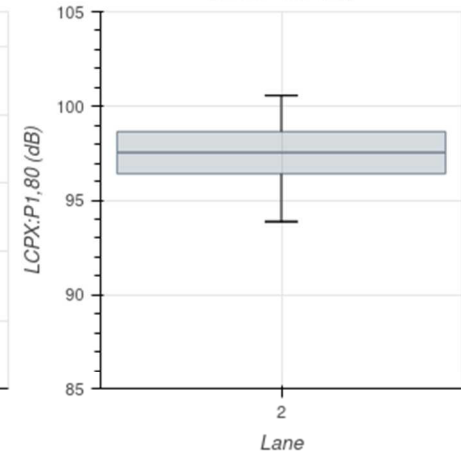
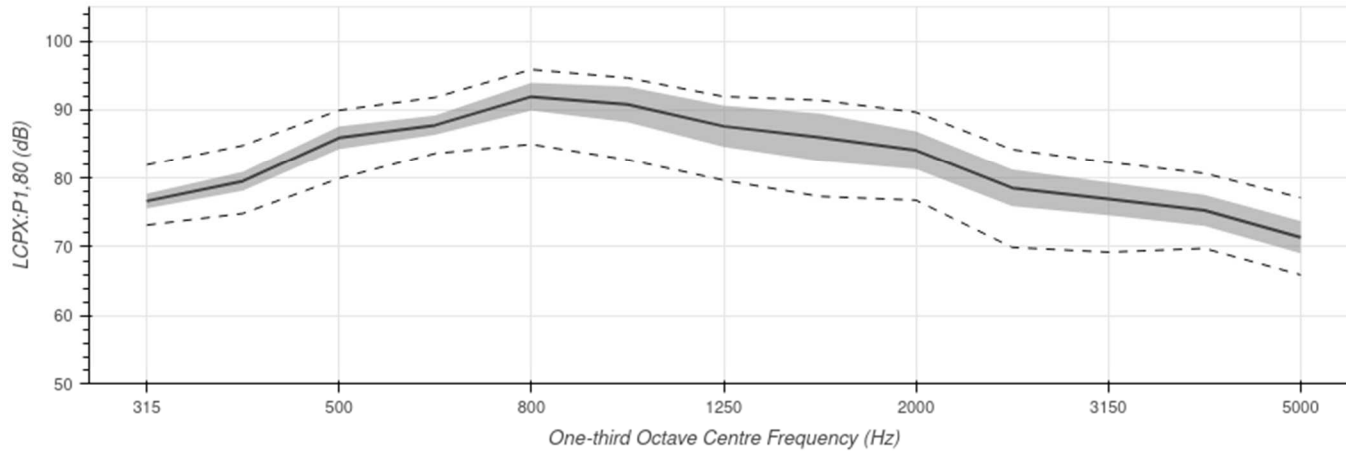
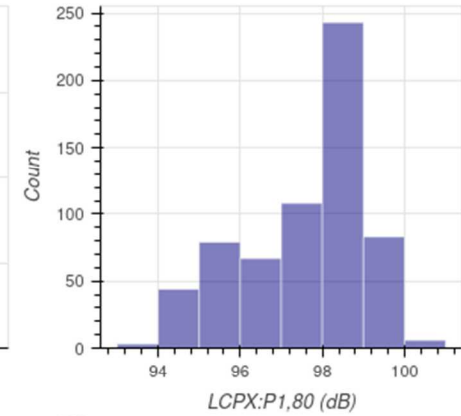
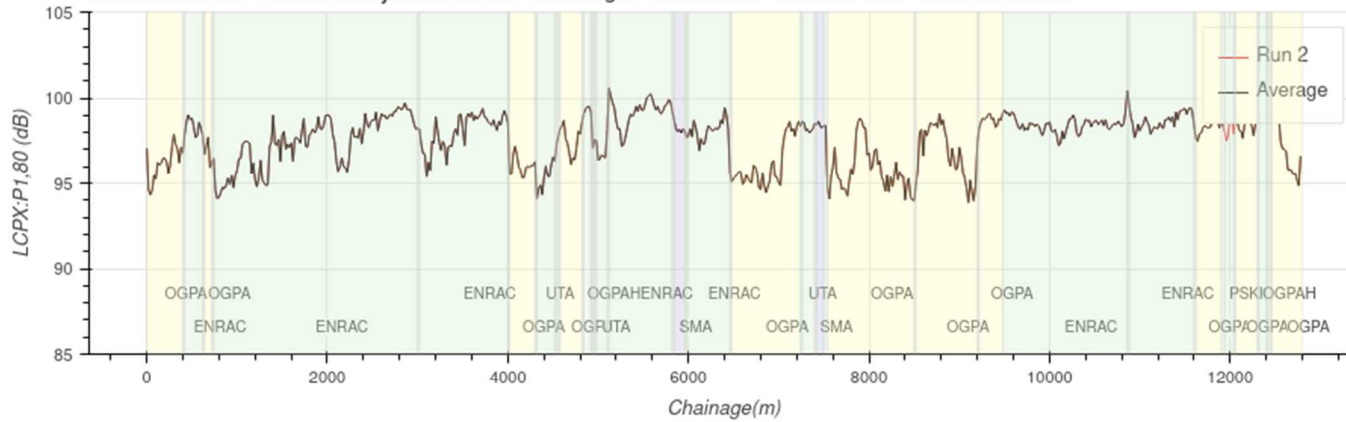
Western Hutt Rd - Petone to Haywards Hill Rd - Lane: left - Direction: D - Road ID: 1203 - Date: 22/04/2021



	Average	Run 4	Run 1
Lcpx (dB)	97.8	98.5	97.2
Variation (dB)	1.4	1.3	1.6

### G.2 SH2 – Western Hutt Valley Motorway – Northbound - Right

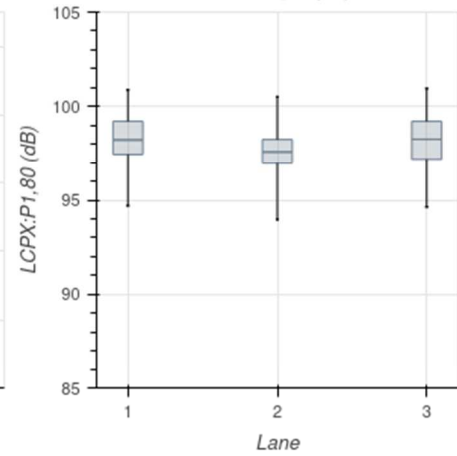
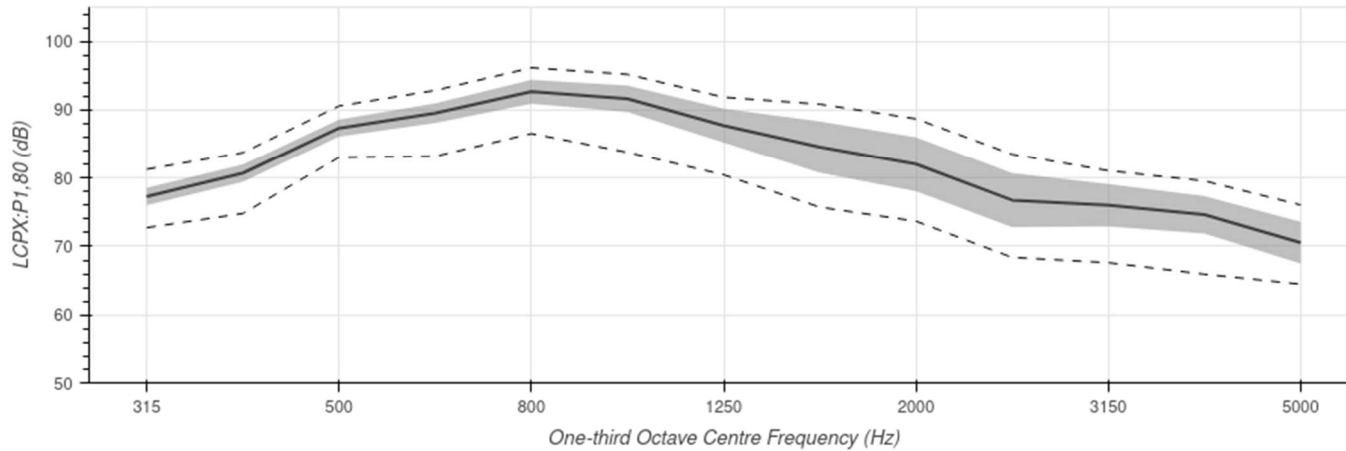
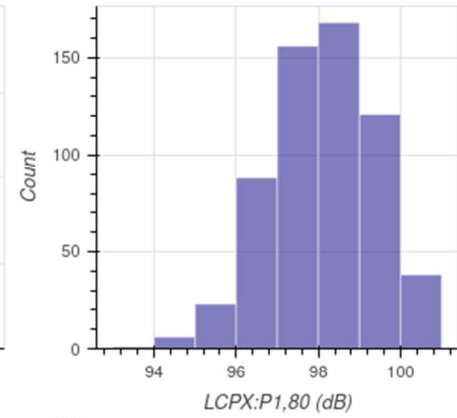
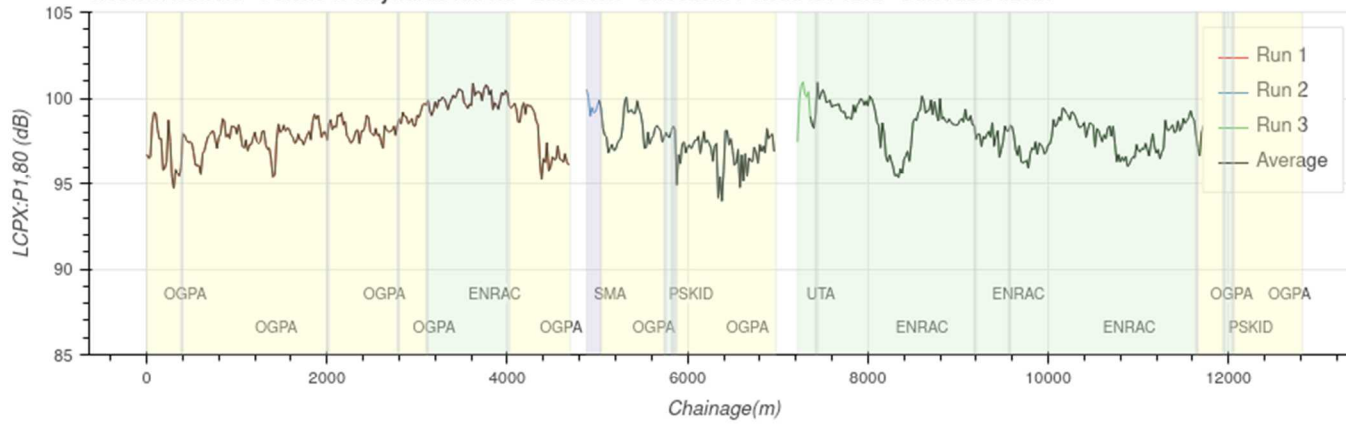
Western Hutt Rd - Petone to Haywards Hill Rd - Lane: right - Direction: D - Road ID: 1203 - Date: 22/04/2021



	Average	Run 2
Lcpx (dB)	97.6	97.6
Variation (dB)	1.5	1.5

**G.3 SH2 – Western Hutt Valley Motorway – Southbound - Left**

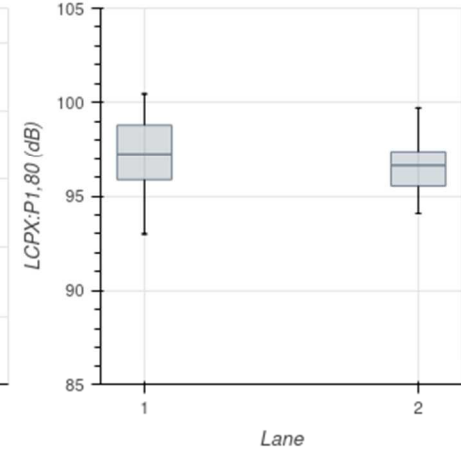
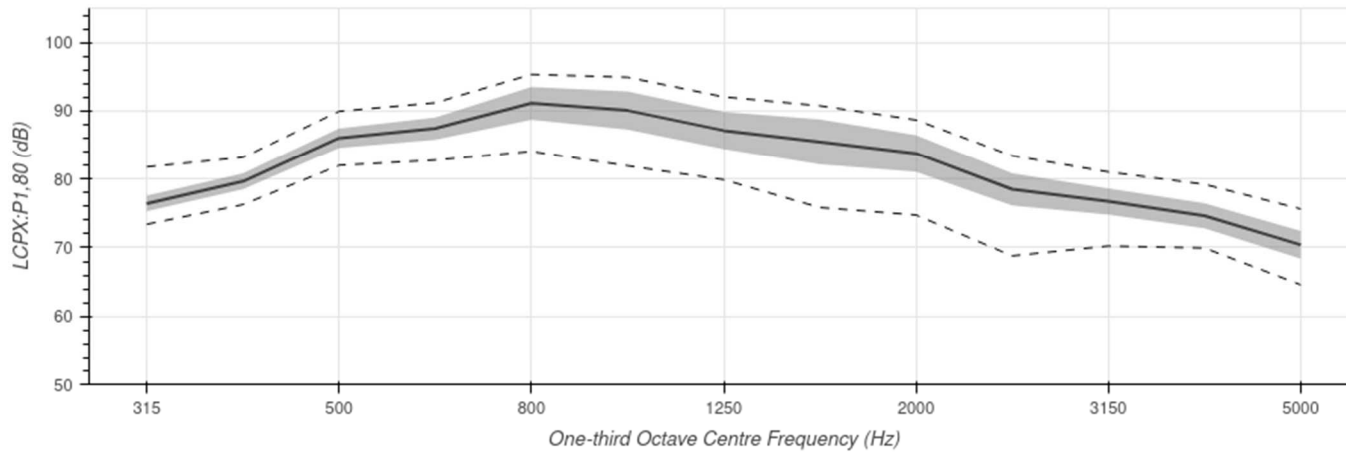
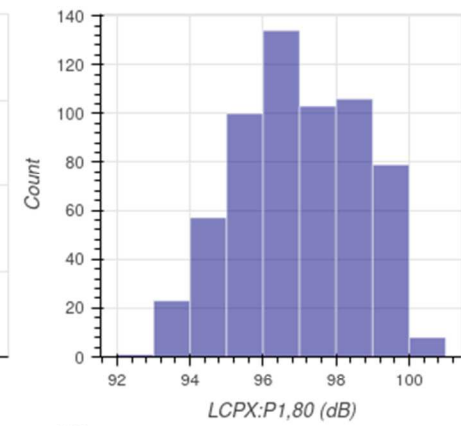
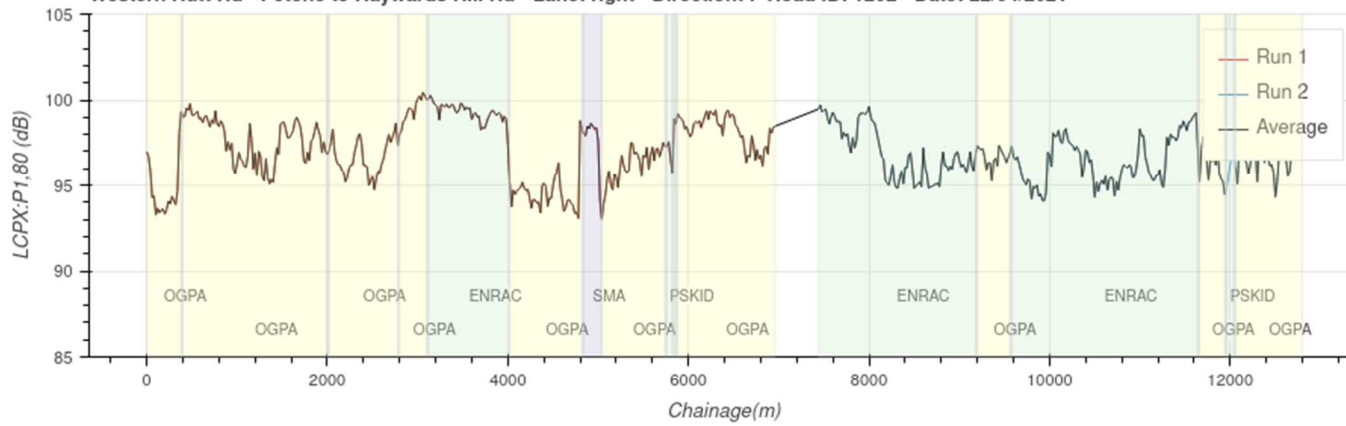
Western Hutt Rd - Petone to Haywards Hill Rd - Lane: left - Direction: I - Road ID: 1202 - Date: 22/04/2021



	Average	Run 1	Run 2	Run 3
Lcpx (dB)	98	98.2	97.6	98.3
Variation (dB)	1.3	1.3	1.2	1.3

**G.4 SH2 – Western Hutt Valley Motorway – Southbound - Right**

Western Hutt Rd - Petone to Haywards Hill Rd - Lane: right - Direction: I -Road ID: 1202 - Date: 22/04/2021

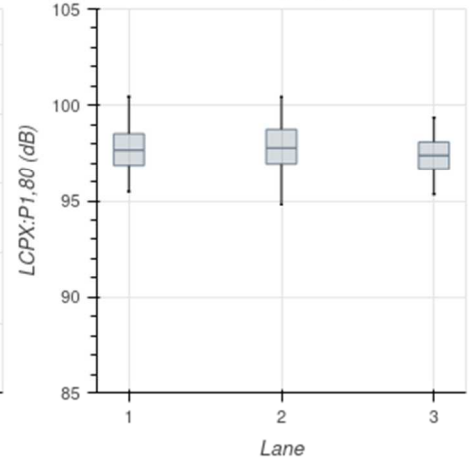
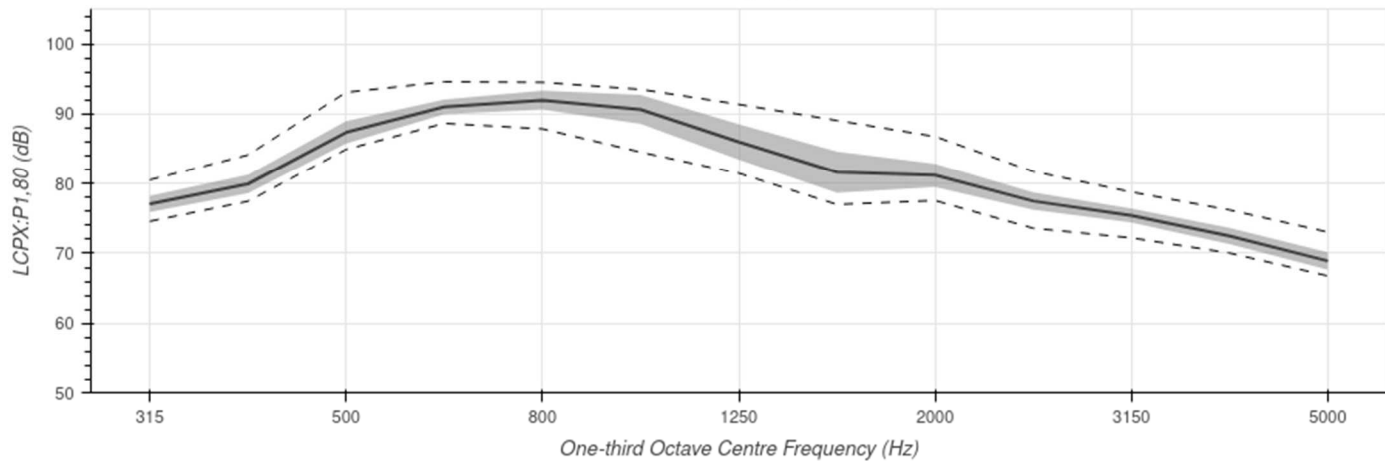
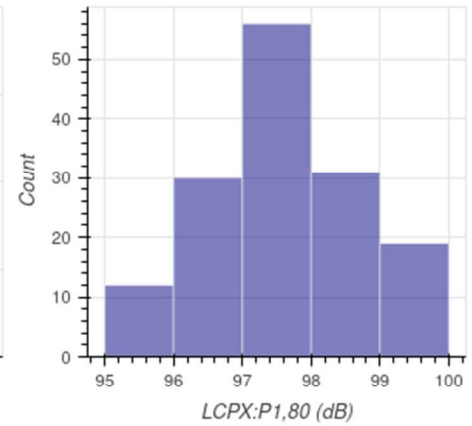
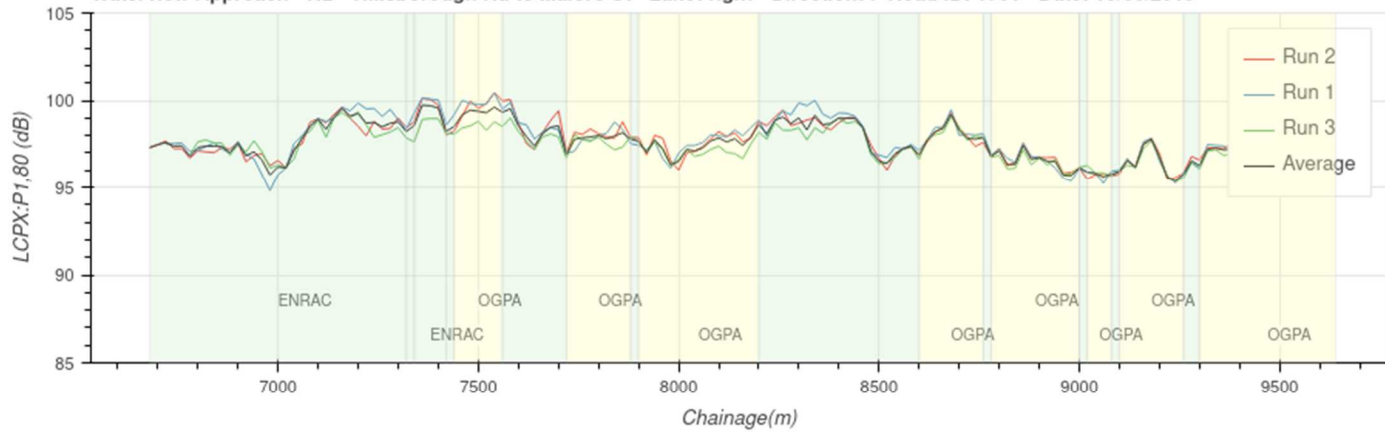


	Average	Run 1	Run 2
LcpX (dB)	96.9	97.2	96.6
Variation (dB)	1.6	1.9	1.3

## Appendix H: SH20 – Waterview Approach

### H.1 SH20 – Waterview Approach – Hillsborough to Maioro Street – Southbound – Right

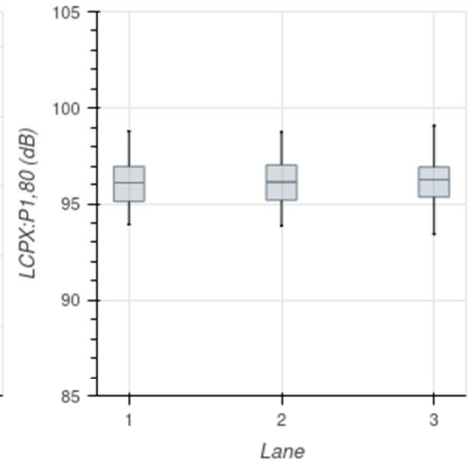
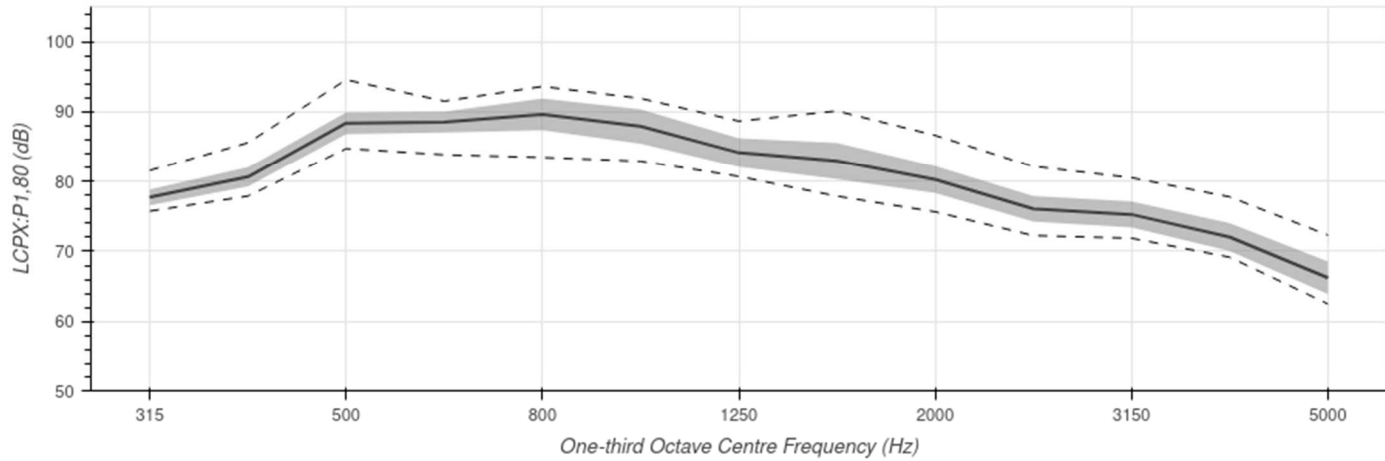
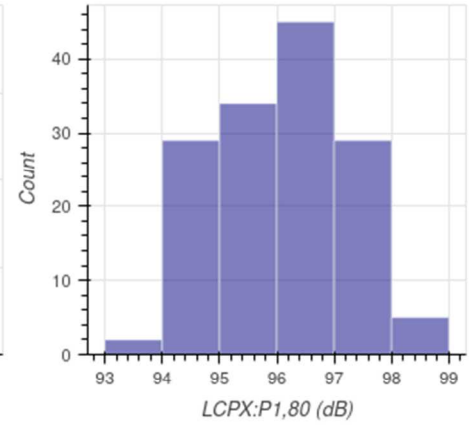
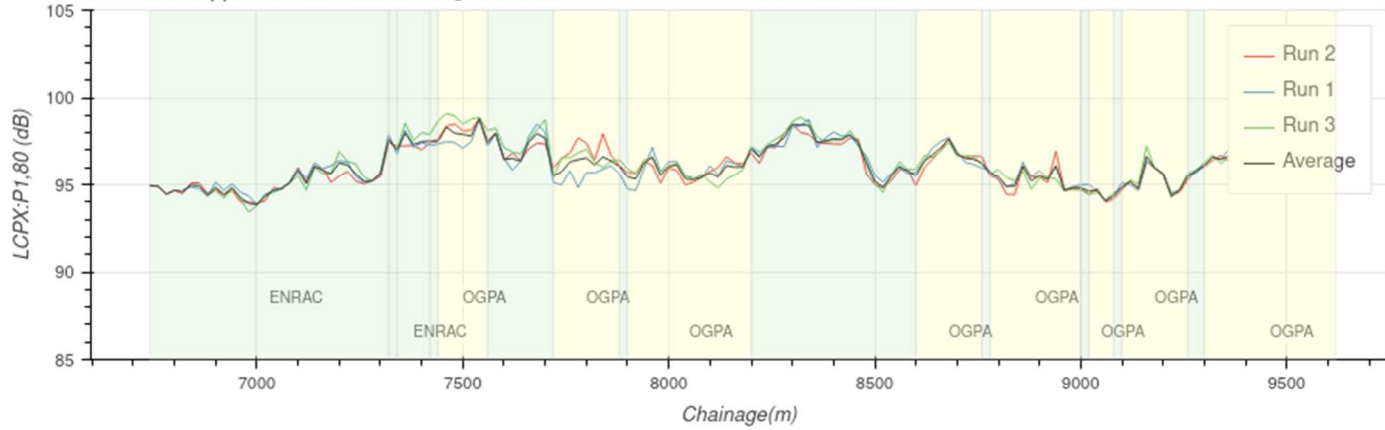
Waterview Approach - NB - Hillsborough Rd to Maioro St - Lane: right - Direction: I - Road ID: 1761 - Date: 18/06/2019



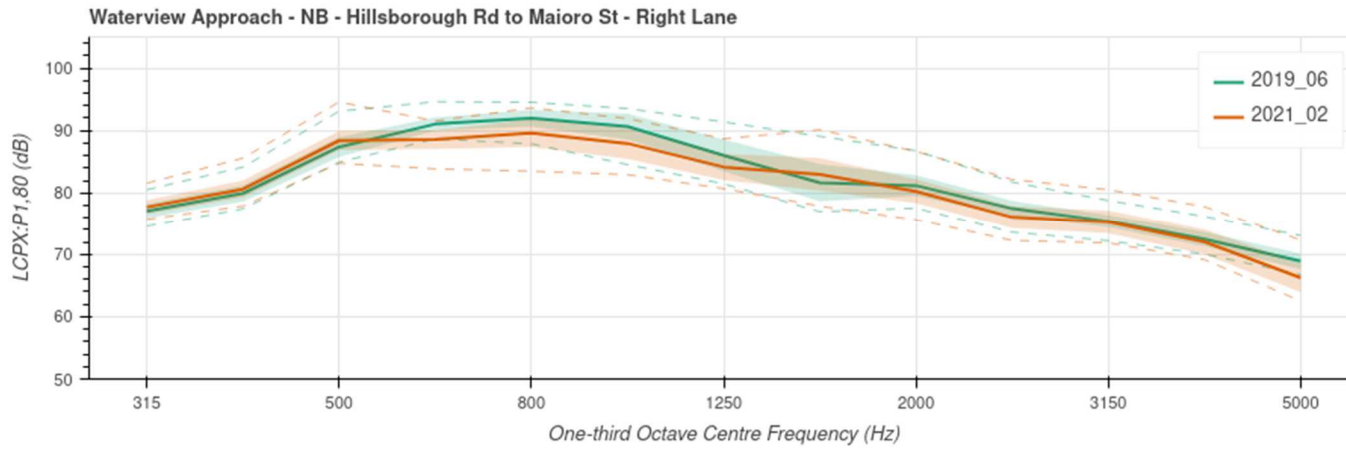
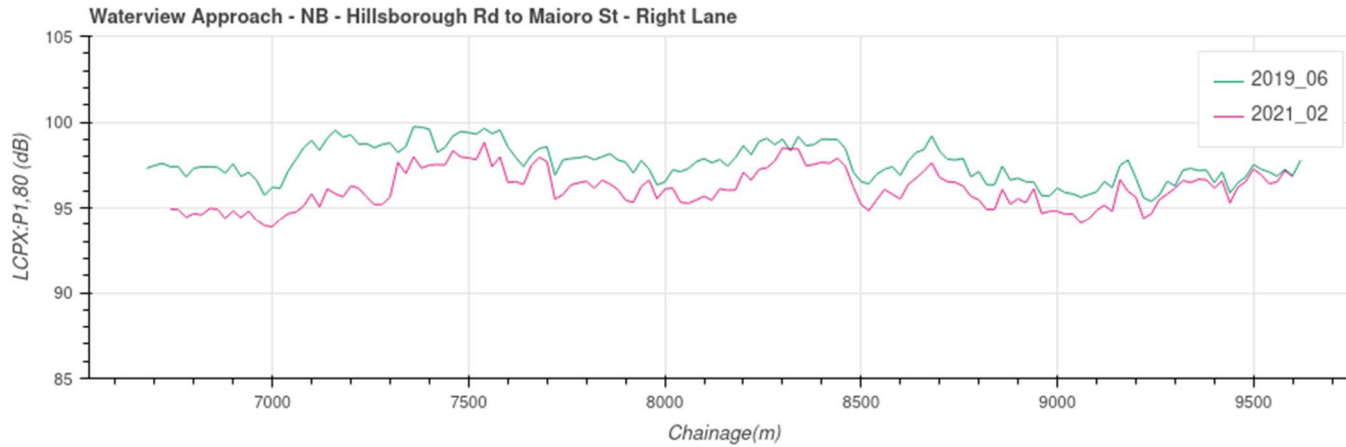
	Average	Run 2	Run 1	Run 3
Lcpx (dB)	97.6	97.8	97.7	97.4
Variation (dB)	1.1	1.3	1.1	1



Waterview Approach - NB - Hillsborough Rd to Maioro St - Lane: 1 - Direction: I - Road ID: 1761 - Date: 03/02/2021

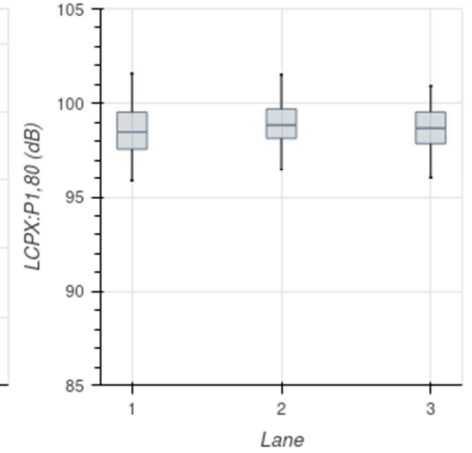
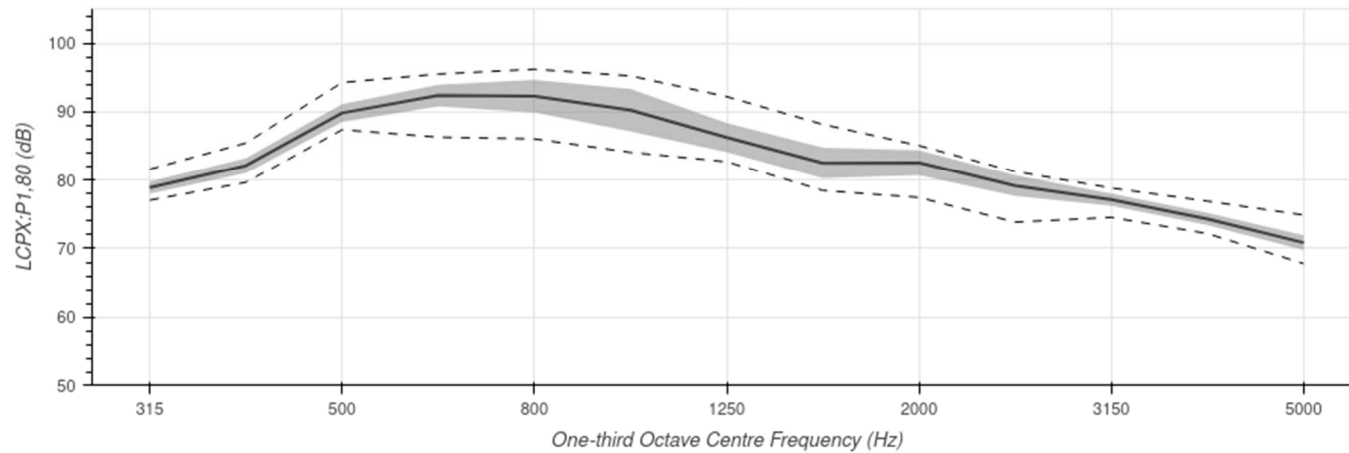
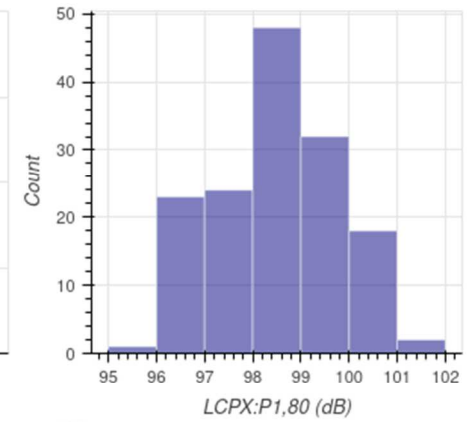
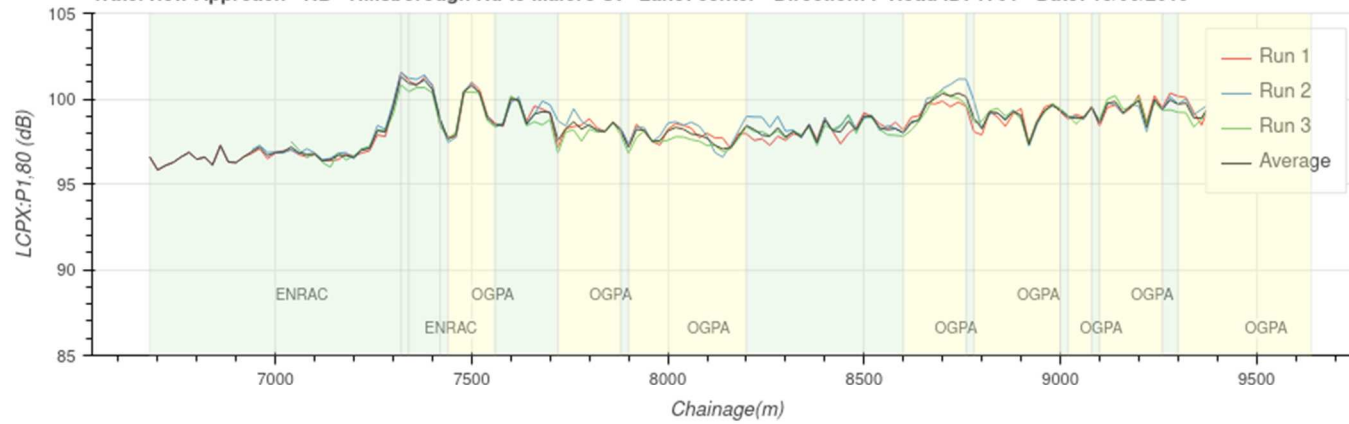


	Average	Run 2	Run 1	Run 3
Lcpx (dB)	96.1	96.1	96.1	96.2
Variation (dB)	1.2	1.1	1.2	1.3



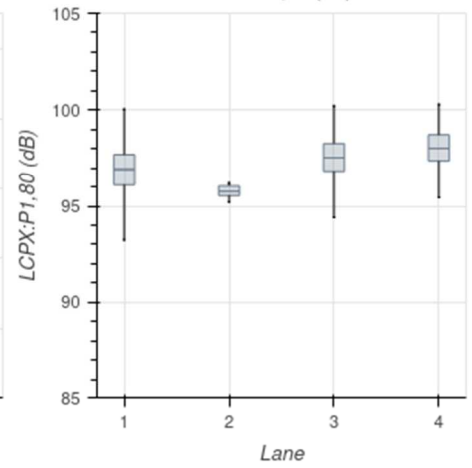
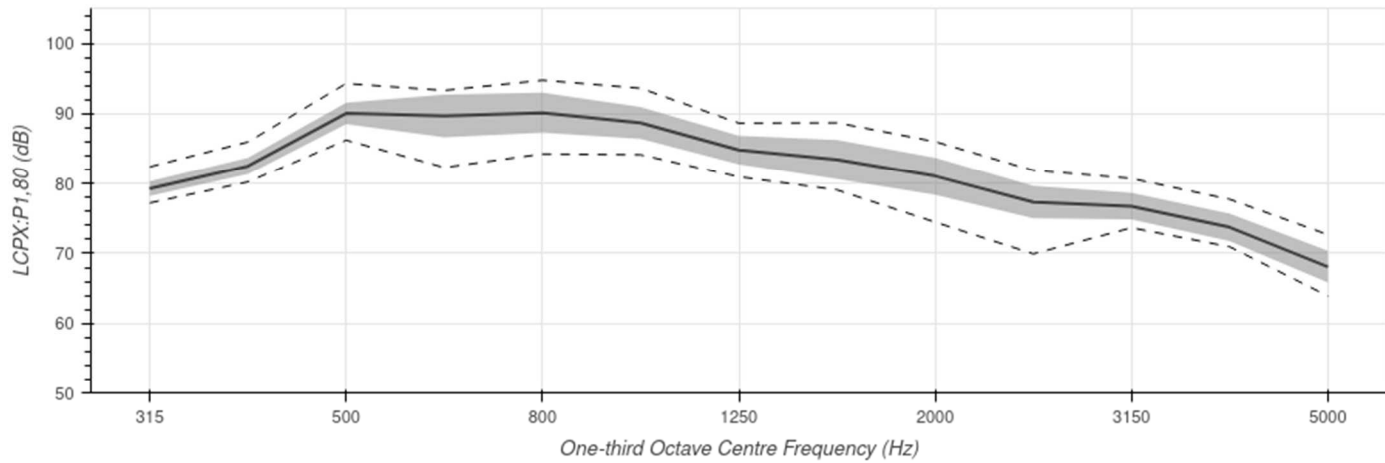
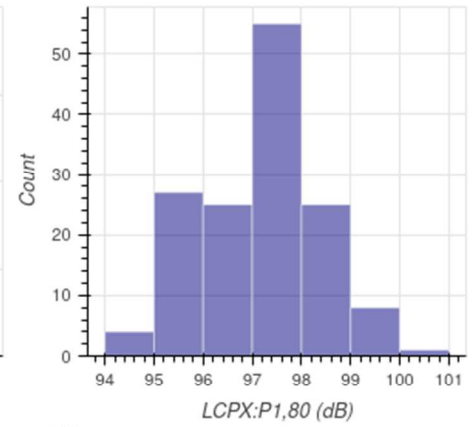
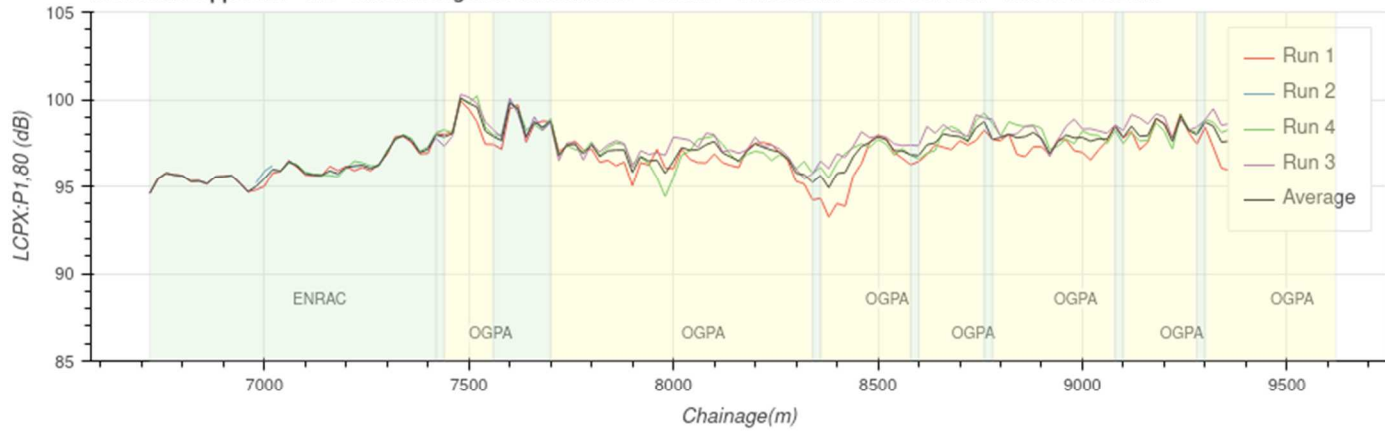
## H.2 SH20 – Waterview Approach – Hillsborough to Maioro Street – Southbound – Centre

Waterview Approach - NB - Hillsborough Rd to Maioro St - Lane: center - Direction: I - Road ID: 1761 - Date: 18/06/2019

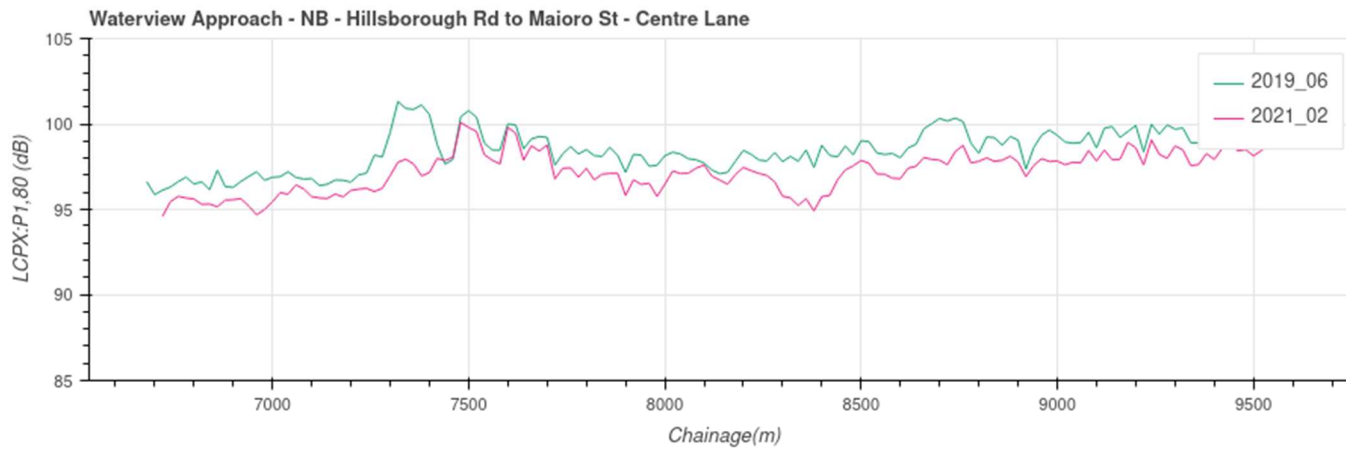
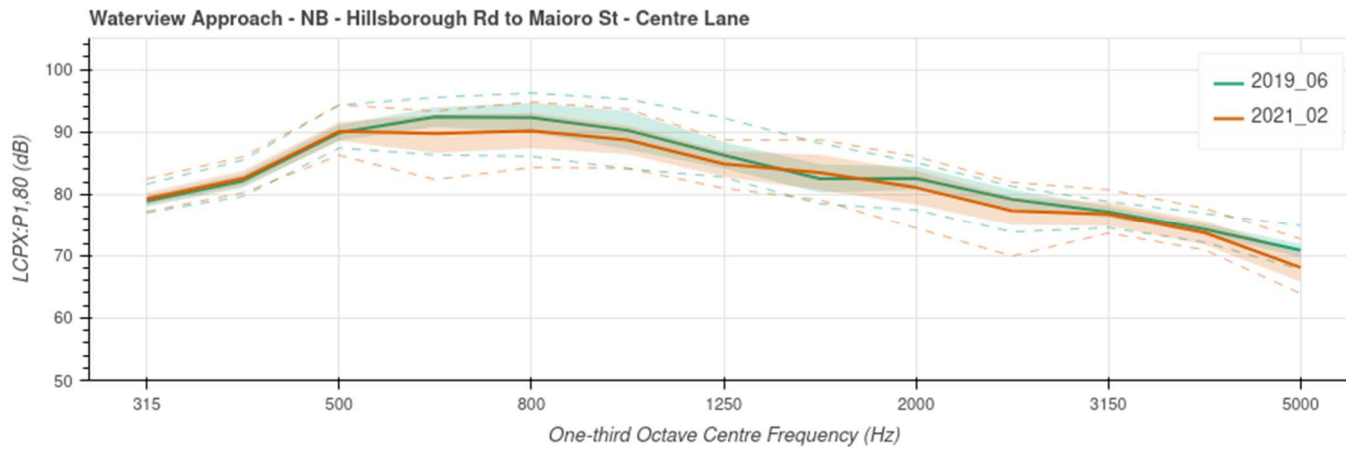


	Average	Run 1	Run 2	Run 3
LcpX (dB)	98.7	98.5	98.9	98.7
Variation (dB)	1.2	1.3	1.2	1.2

Waterview Approach - NB - Hillsborough Rd to Maioro St - Lane: 2 - Direction: I - Road ID: 1761 - Date: 02/02/2021

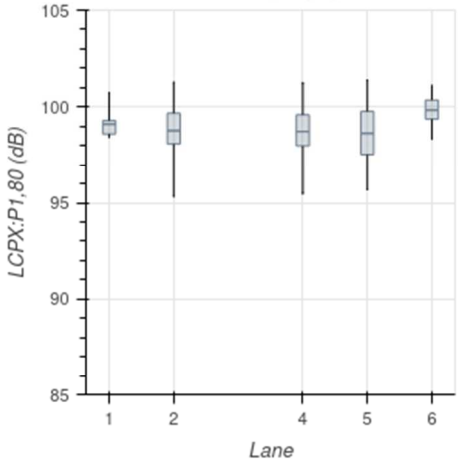
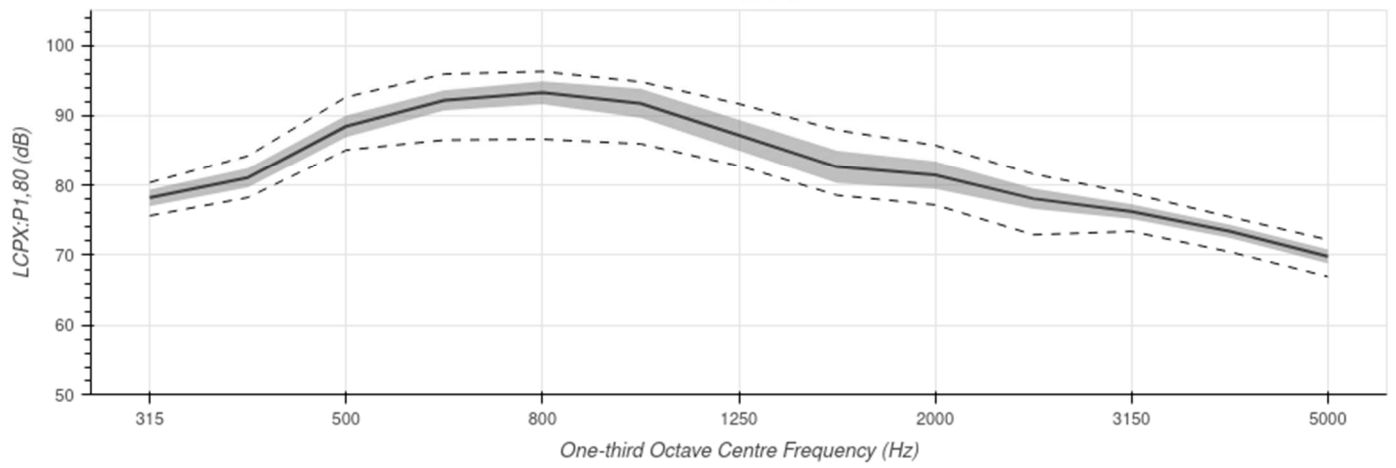
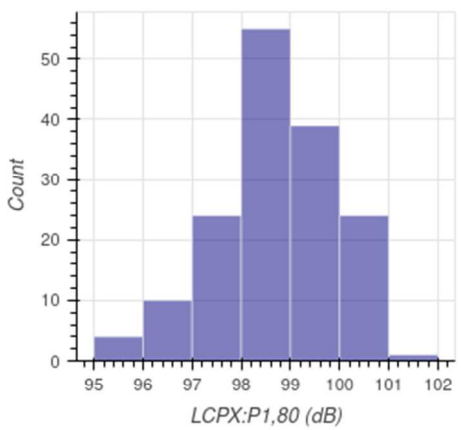
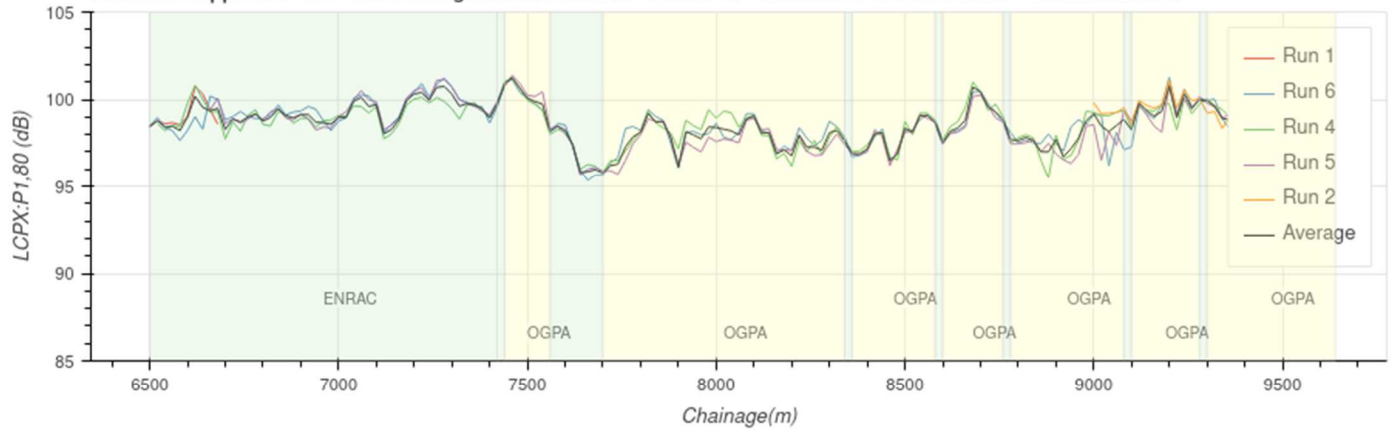


	Average	Run 1	Run 2	Run 4	Run 3
Lcpx (dB)	97.1	96.9	95.8	98	97.5
Variation (dB 1)		1.3	0.5	1	1.1



### H.3 SH20 – Waterview Approach – Hillsborough to Maioro Street – Southbound - Left

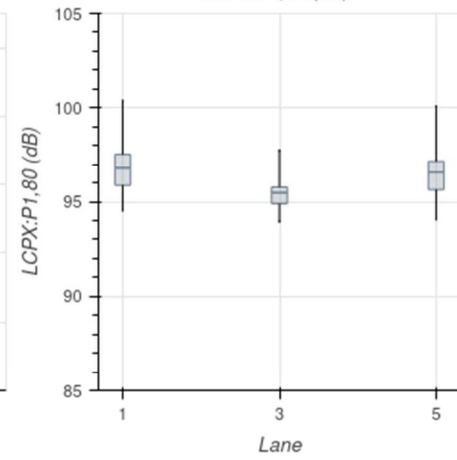
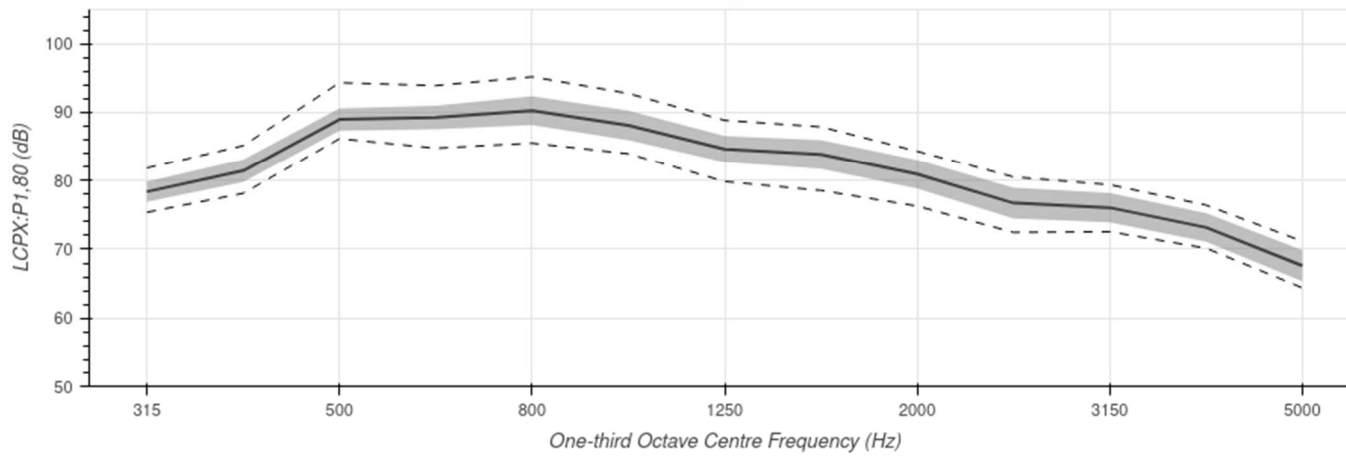
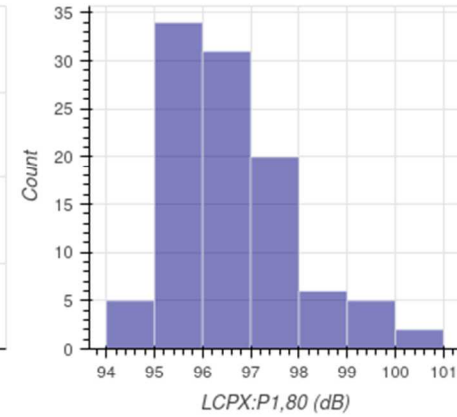
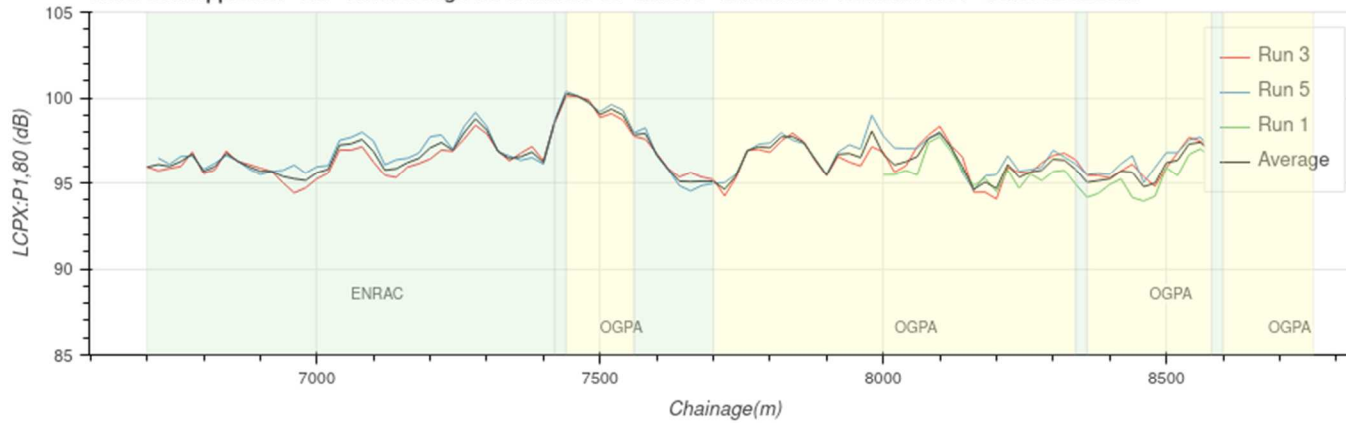
Waterview Approach - NB - Hillsborough Rd to Maioro St - Lane: left - Direction: I - Road ID: 1761 - Date: 18/06/2019



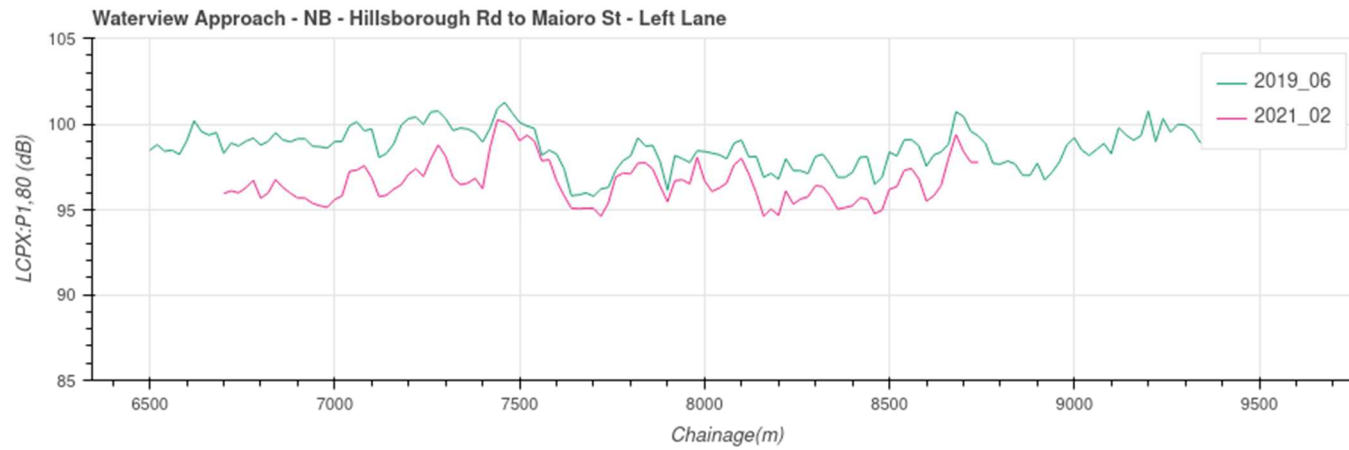
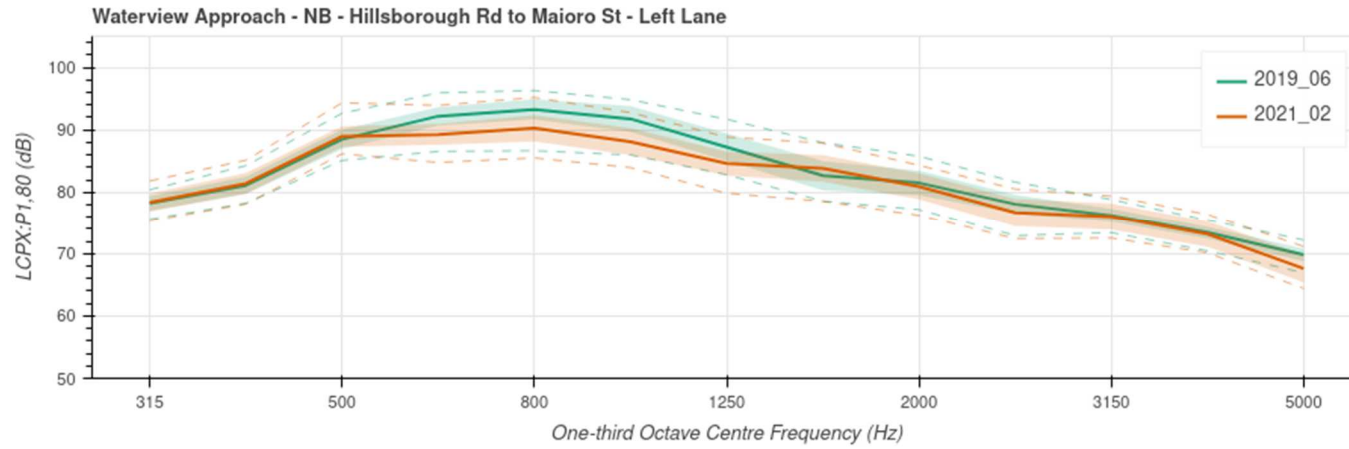
	Average	Run 1	Run 6	Run 4	Run 5	Run 2
Lcp <sub>x</sub> (dB)	99	99.1	99.8	98.7	98.6	98.8
Variation (σ)	1.1	0.8	0.7	1.2	1.4	1.2



Waterview Approach - NB - Hillsborough Rd to Maiero St - Lane: 3 - Direction: I - Road ID: 1761 - Date: 02/02/2021

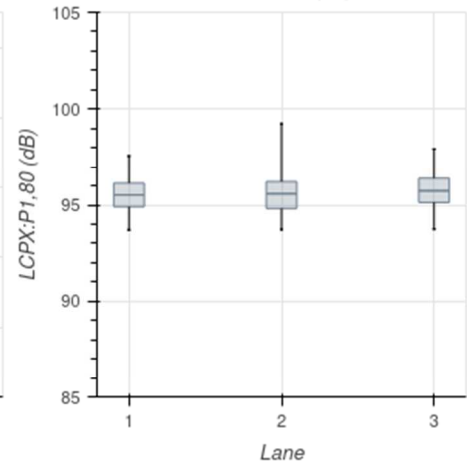
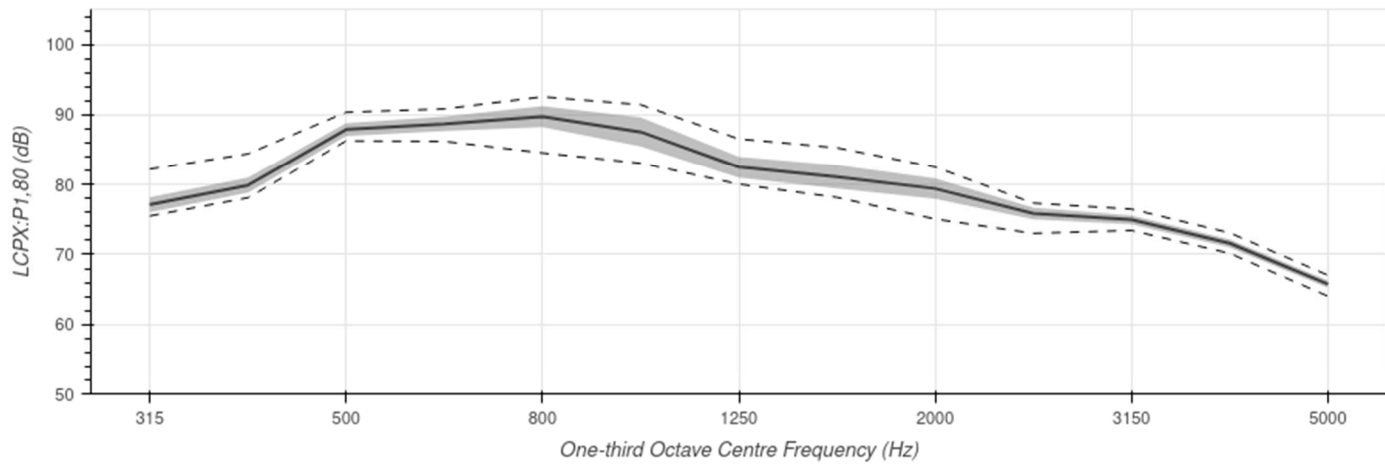
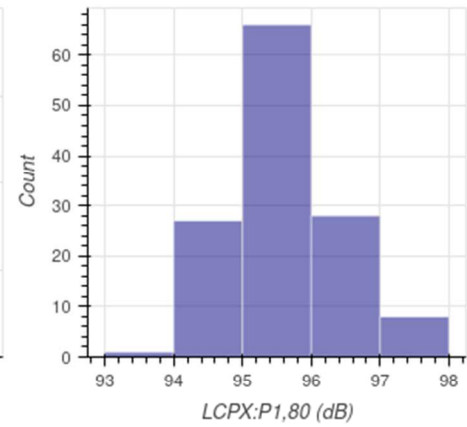
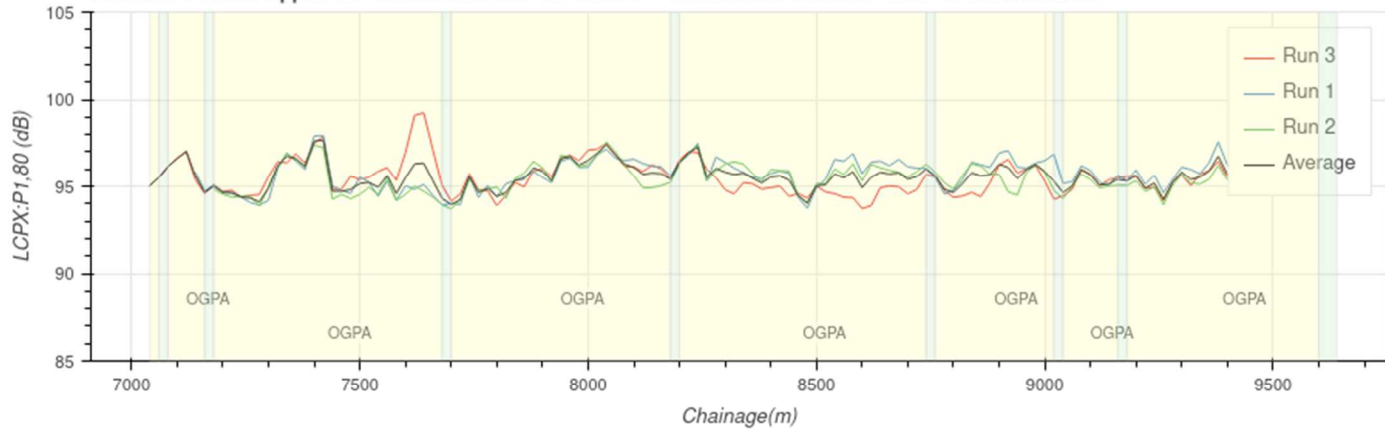


	Average	Run 3	Run 5	Run 1
Lcpx (dB)	96.3	95.5	96.6	96.8
Variation (dB)	1.2	0.9	1.3	1.2



### H.4 SH20 – Waterview Approach – Hillsborough to Maioro Street – Northbound - Right

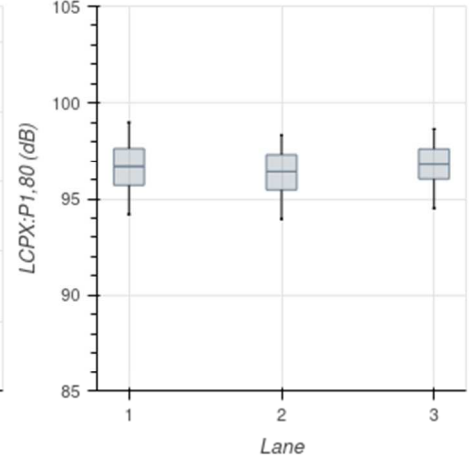
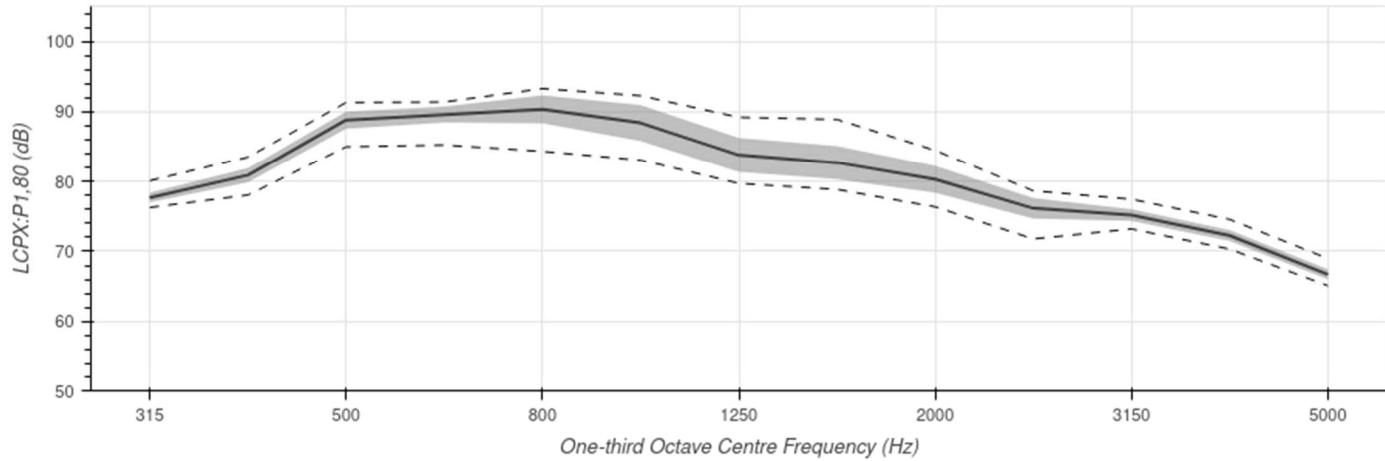
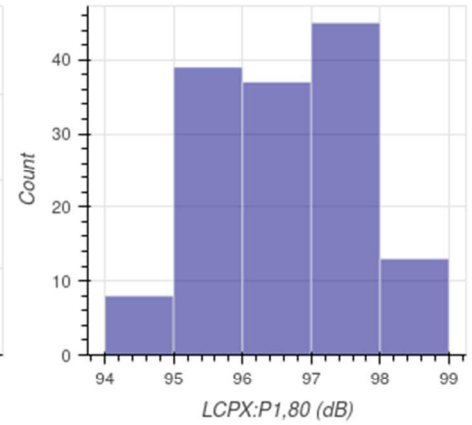
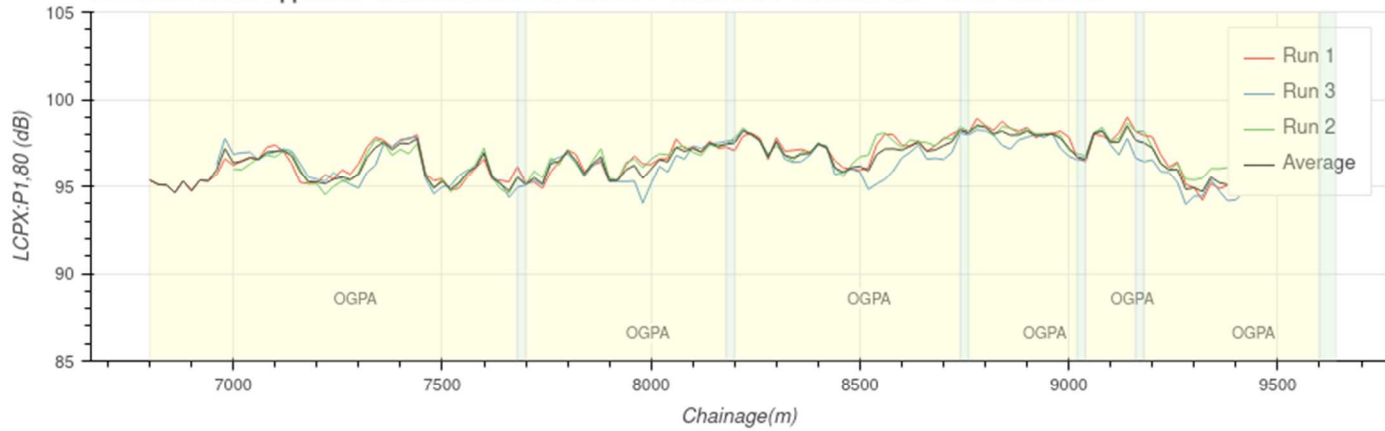
Waterview Tunnel Approach - Tunnel to Maioro St - Lane: 1 - Direction: D -Road ID: 1760 - Date: 03/02/2021



	Average	Run 3	Run 1	Run 2
Lcpx (dB)	95.6	95.7	95.5	95.6
Variation (dB)	0.9	0.9	0.9	1

**H.5 SH20 – Waterview Approach – Hillsborough to Maioro Street – Northbound – Centre**

Waterview Tunnel Approach - Tunnel to Maioro St - Lane: 2 - Direction: D -Road ID: 1760 - Date: 02/02/2021

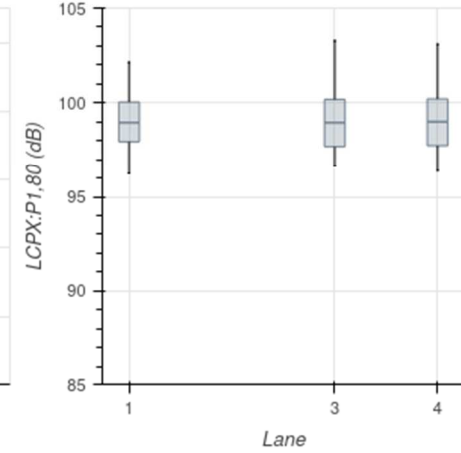
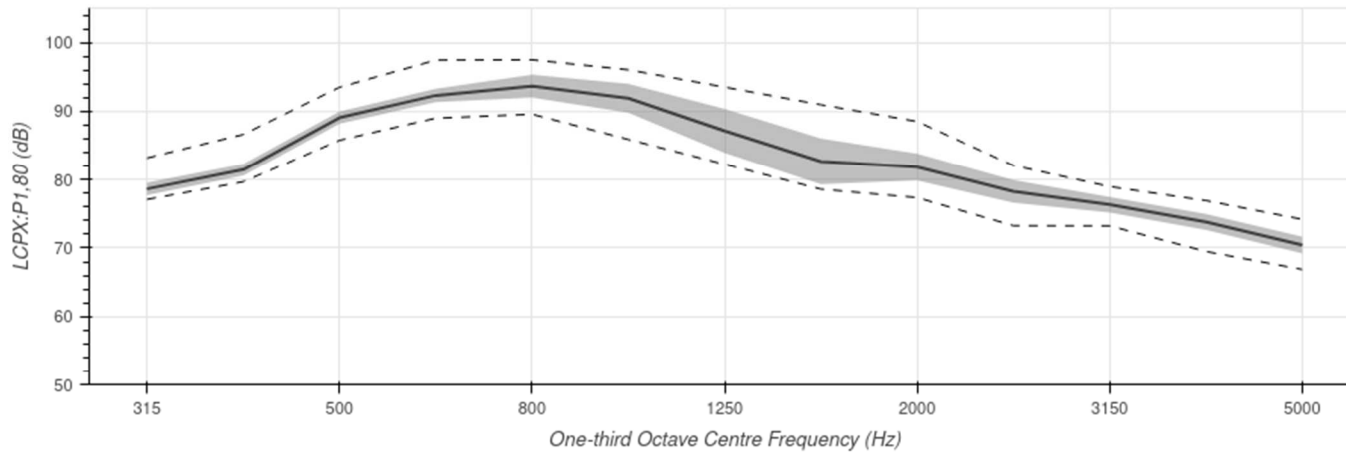
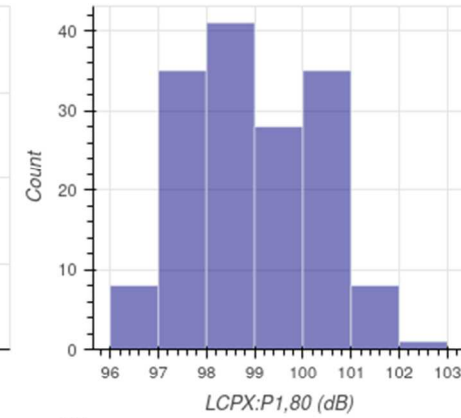
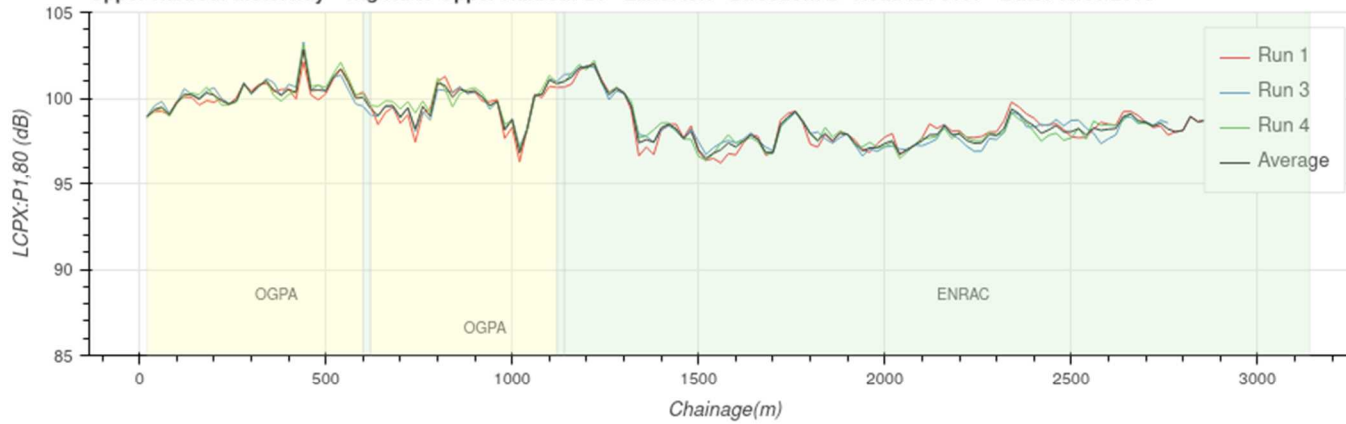


	Average	Run 1	Run 3	Run 2
Lcpx (dB)	96.6	96.7	96.8	96.4
Variation (dB)	1.1	1.1	1	1.1

## Appendix I: SH18 – Upper Harbour Motorway

**I.1 SH18 – Upper Harbour Motorway – Northbound – Left**

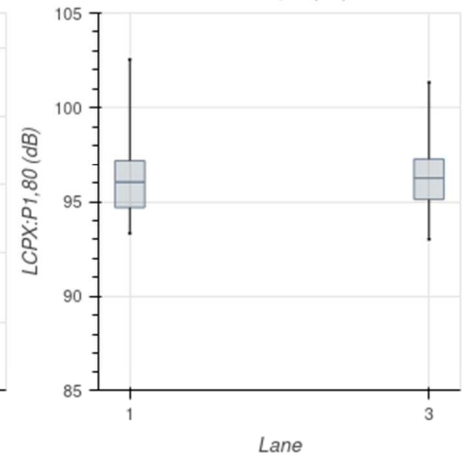
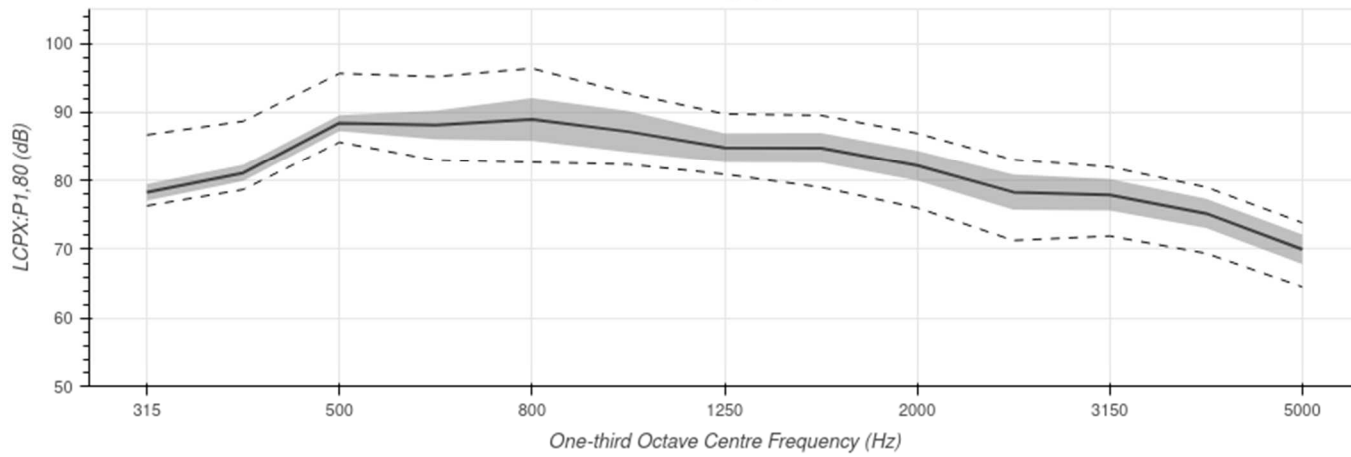
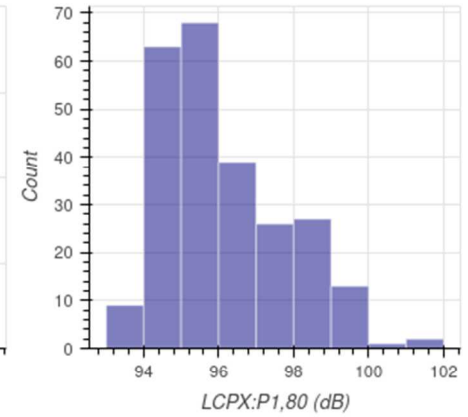
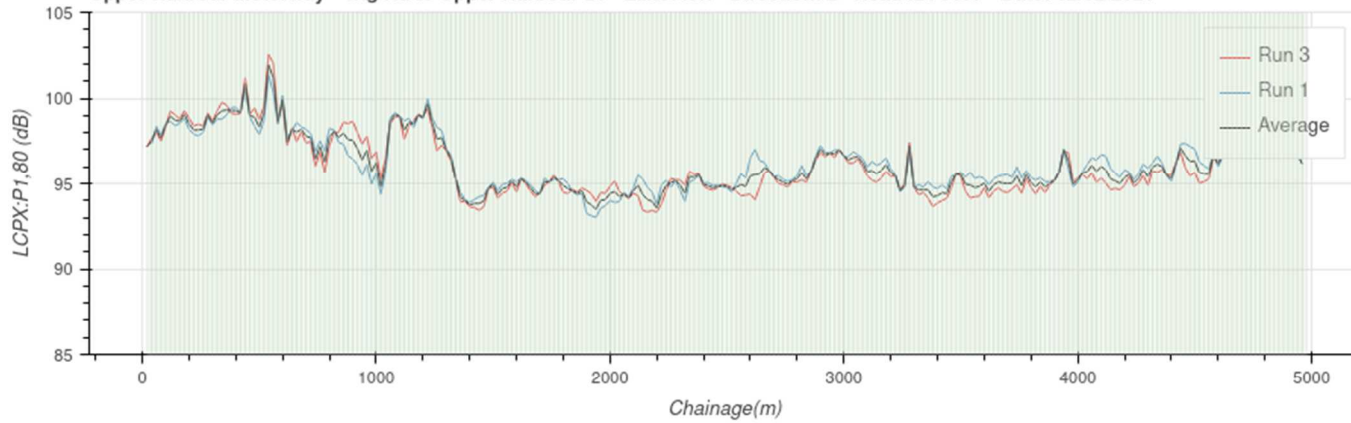
Upper Harbour Motorway - Trig Rd to Upper Harbour Dr - Lane: left - Direction: D -Road ID: 3197 - Date: 10/06/2019



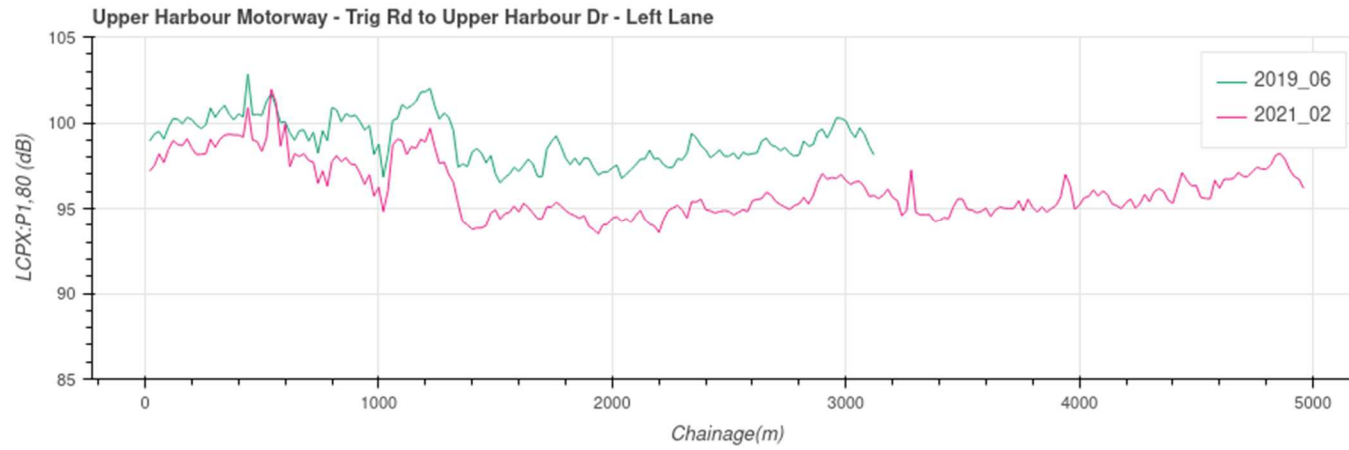
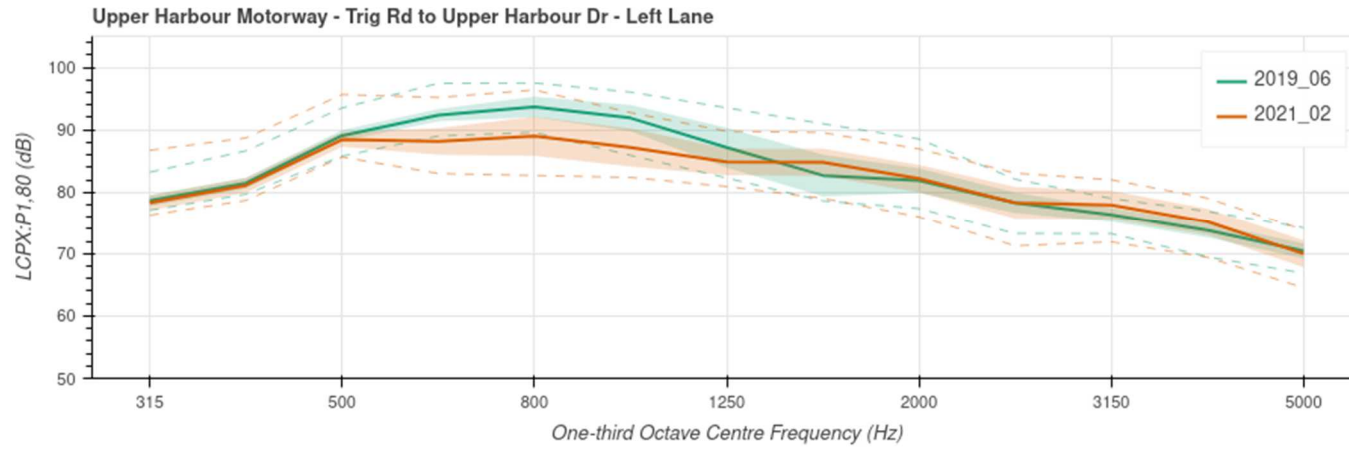
	Average	Run 1	Run 3	Run 4
LcpX (dB)	99	99	99	99
Variation (dB)	1.4	1.3	1.4	1.4



Upper Harbour Motorway - Trig Rd to Upper Harbour Dr - Lane: left - Direction: D - Road ID: 3197 - Date: 02/02/2021

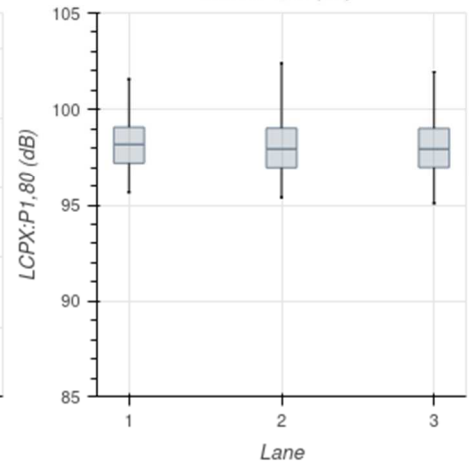
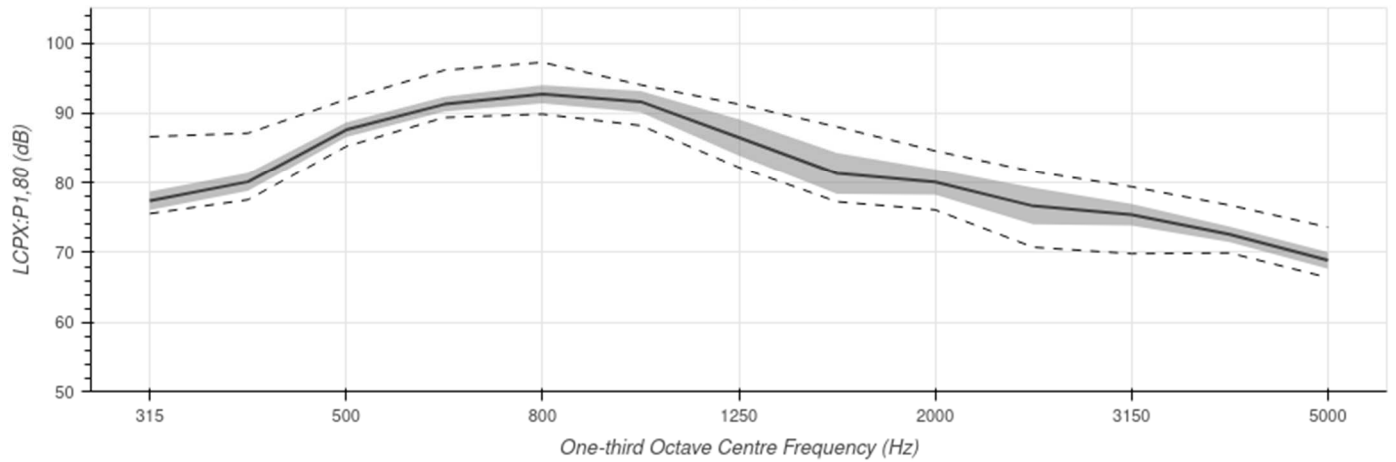
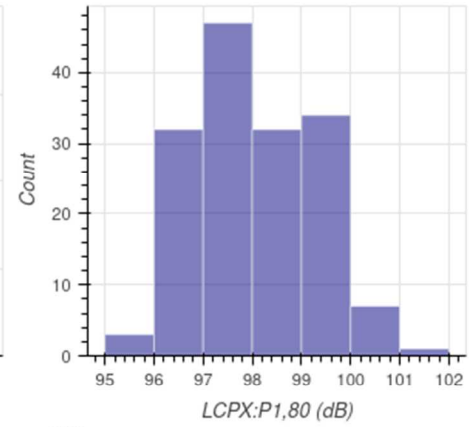
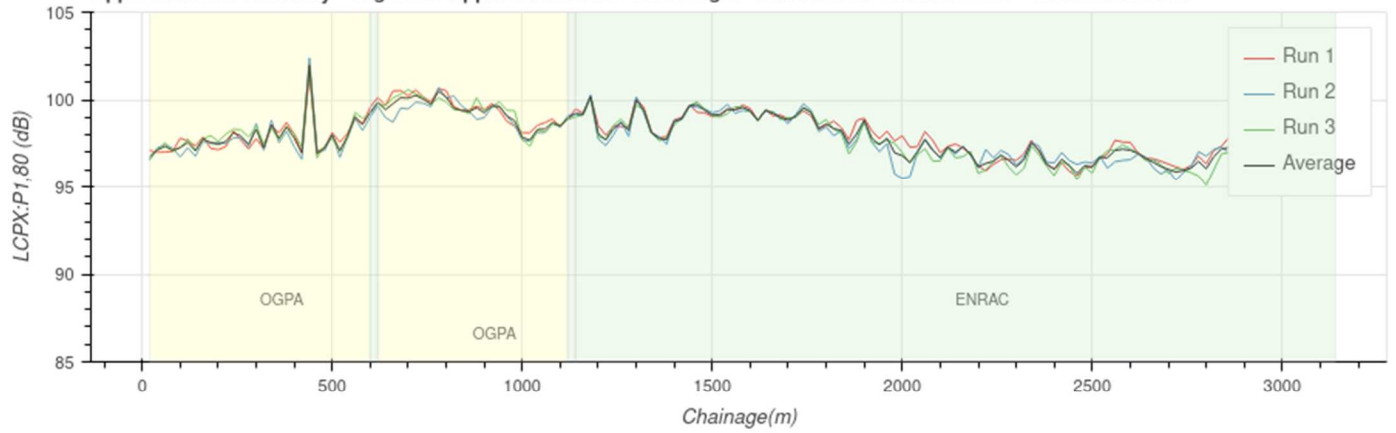


	Average	Run 3	Run 1
Lcpx (dB)	96.1	96.2	96
Variation (dB)	1.7	1.6	1.8



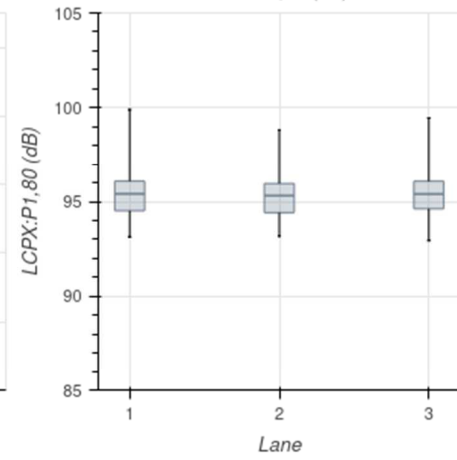
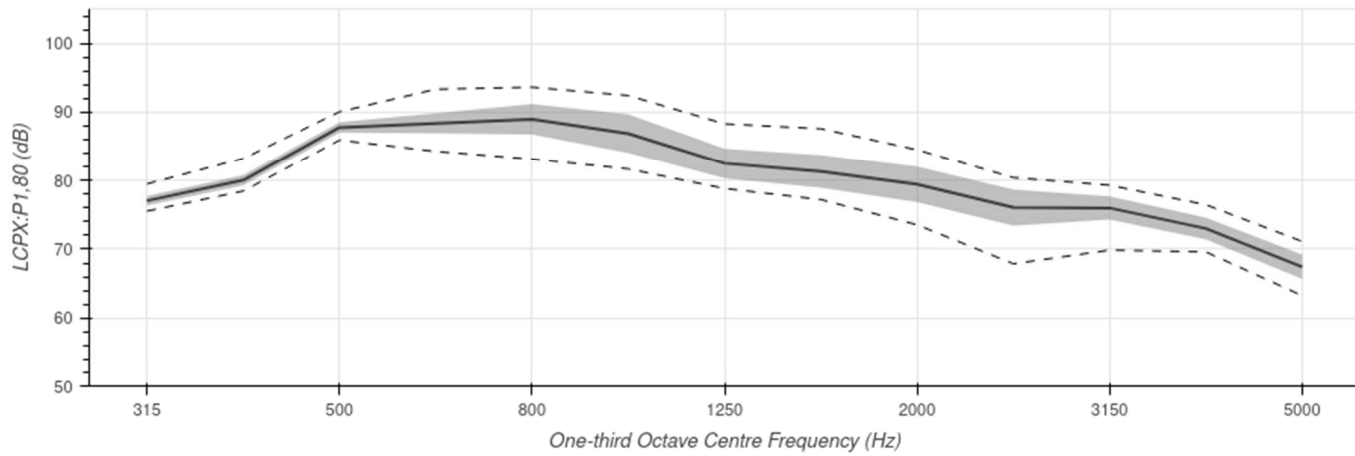
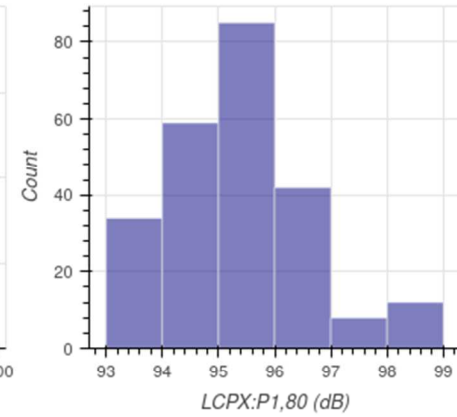
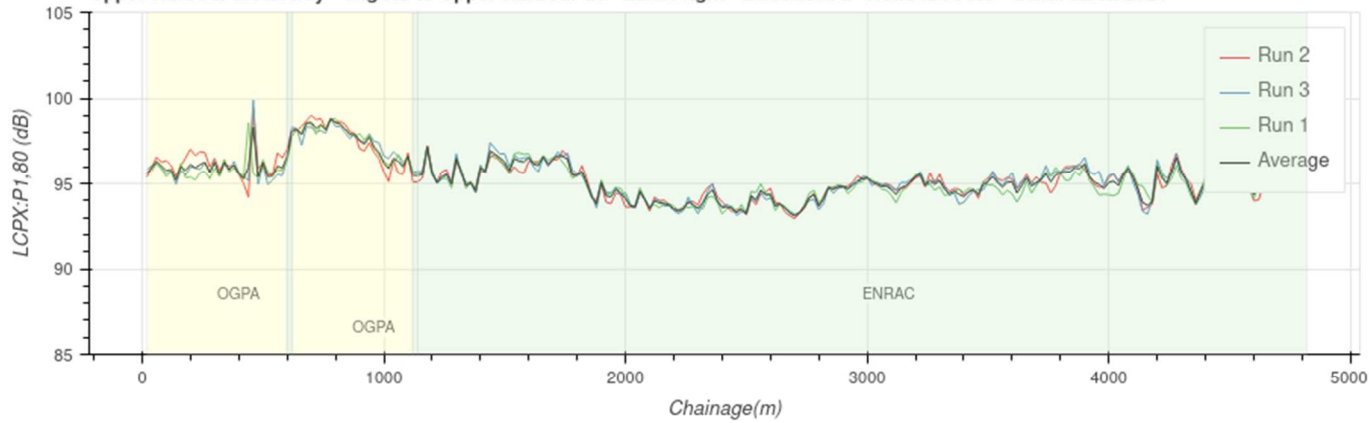
**I.2 SH18 – Upper Harbour Motorway – Northbound – right**

Upper Harbour Motorway - Trig Rd to Upper Harbour Dr - Lane: right - Direction: D -Road ID: 3197 - Date: 10/06/2019

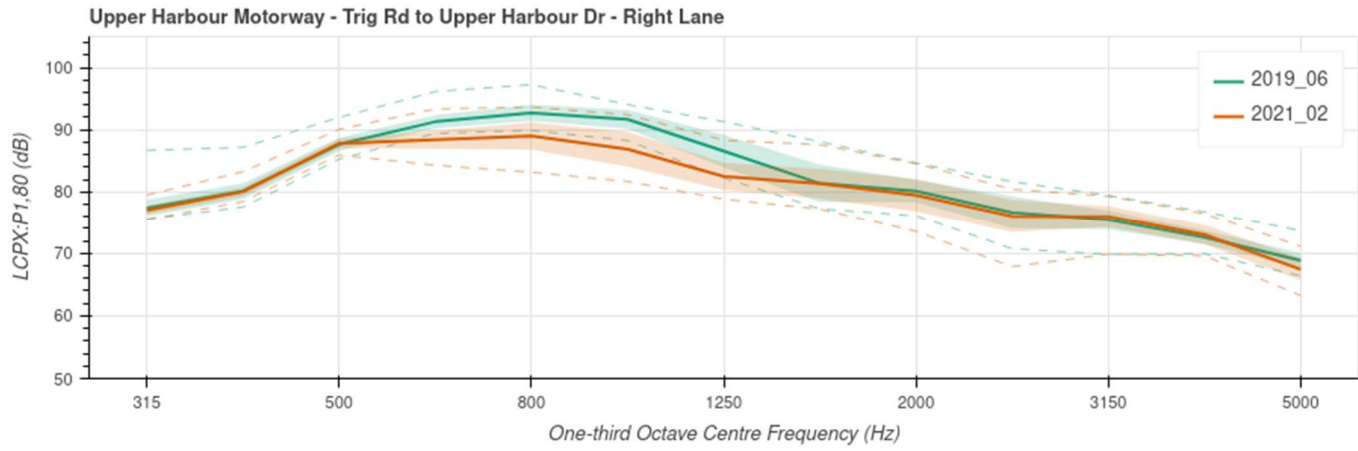


	Average	Run 1	Run 2	Run 3
Lcpx (dB)	98	98.2	98	98
Variation (dB)	1.3	1.2	1.3	1.3

Upper Harbour Motorway - Trig Rd to Upper Harbour Dr - Lane: right - Direction: D - Road ID: 3197 - Date: 02/02/2021

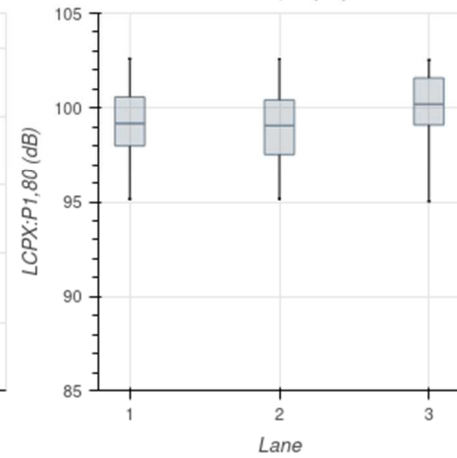
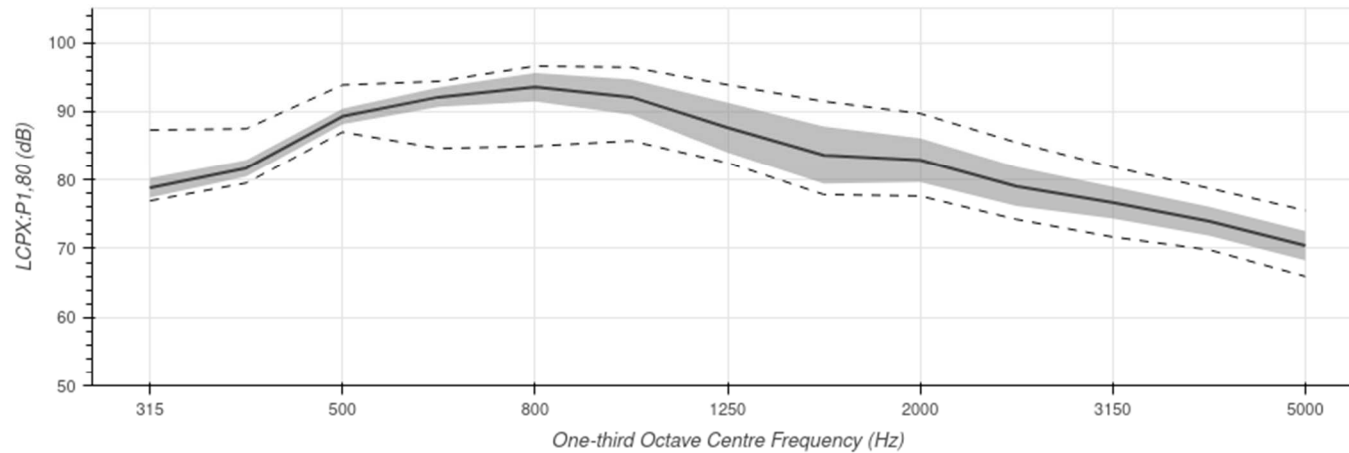
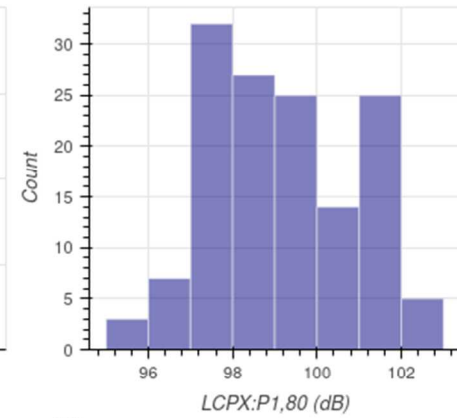
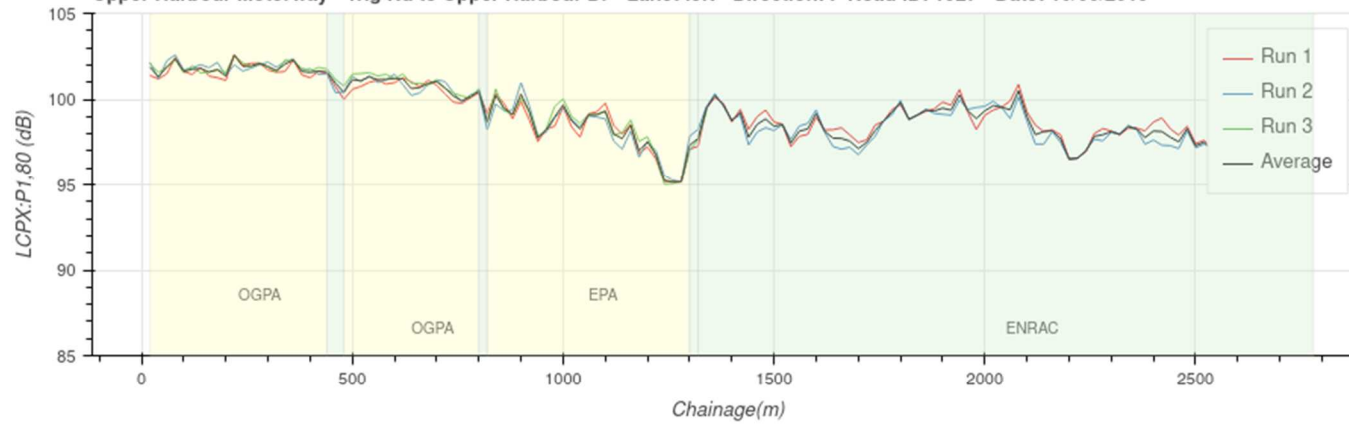


	Average	Run 2	Run 3	Run 1
LcpX (dB)	95.4	95.3	95.4	95.4
Variation (dB)	1.3	1.2	1.3	1.3



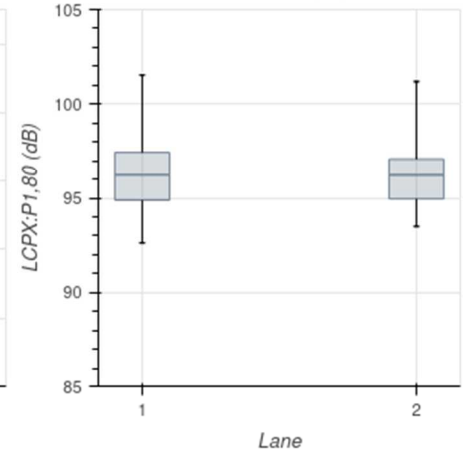
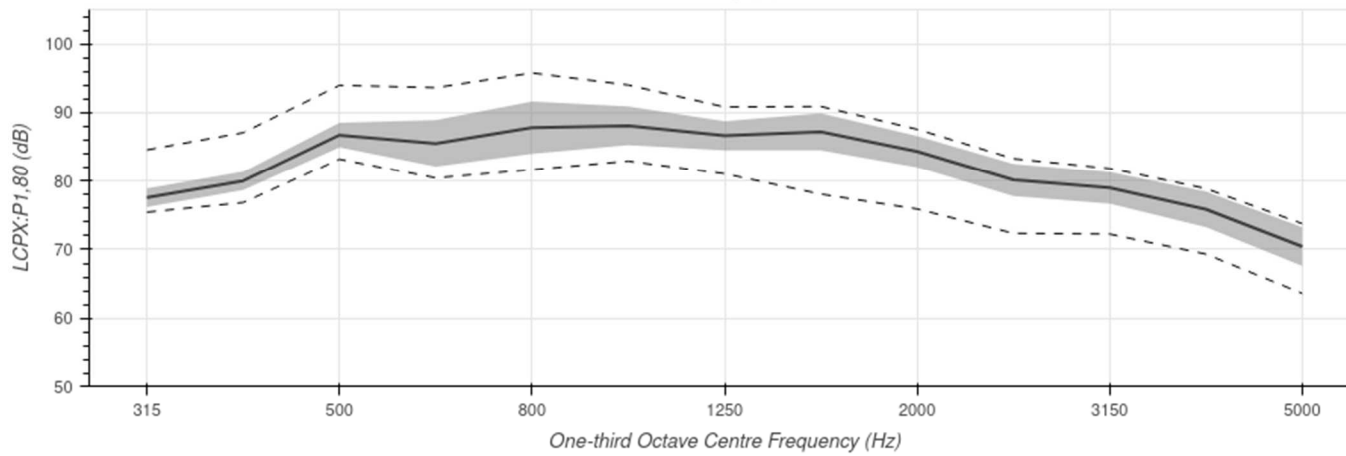
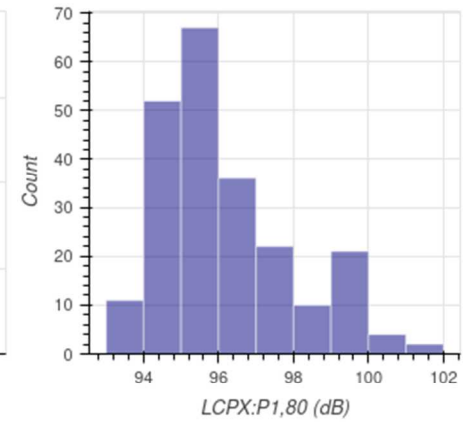
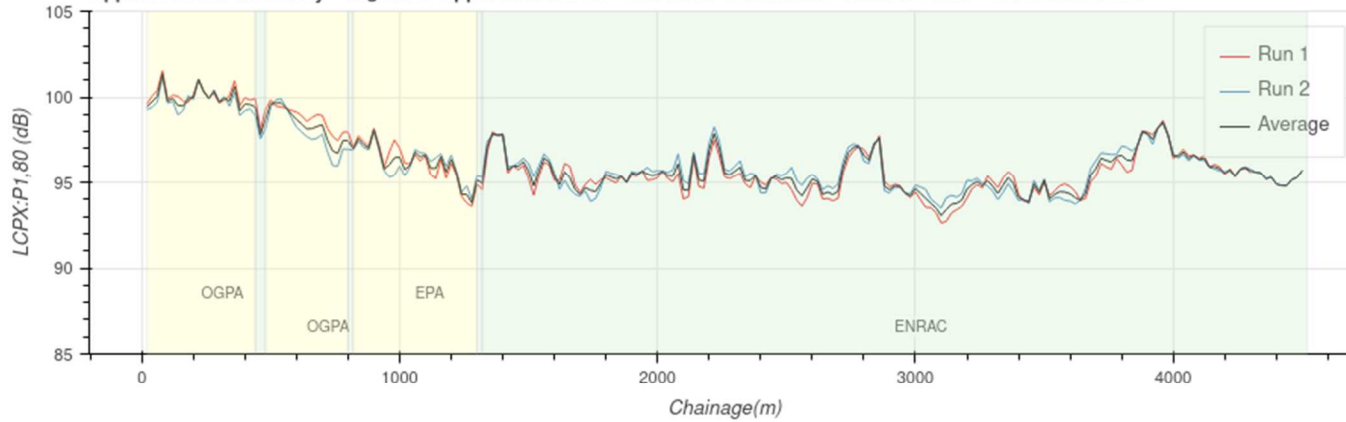
### I.3 SH18 – Upper Harbour Motorway – Southbound – Left Lane

Upper Harbour Motorway - Trig Rd to Upper Harbour Dr - Lane: left - Direction: I -Road ID: 1927 - Date: 10/06/2019



	Average	Run 1	Run 2	Run 3
LcpX (dB)	99.5	99.2	99.1	100.2
Variation (dB)	1.8	1.6	1.8	1.9

Upper Harbour Motorway - Trig Rd to Upper Harbour Dr - Lane: left - Direction: I - Road ID: 1927 - Date: 02/02/2021



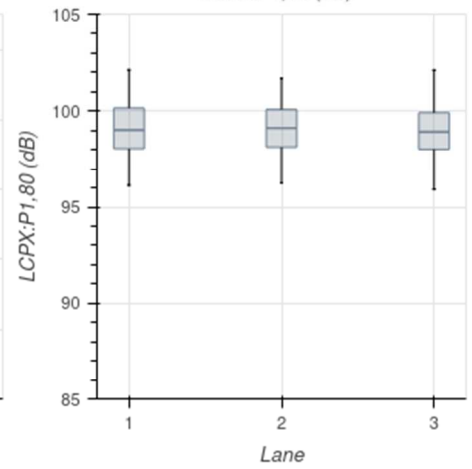
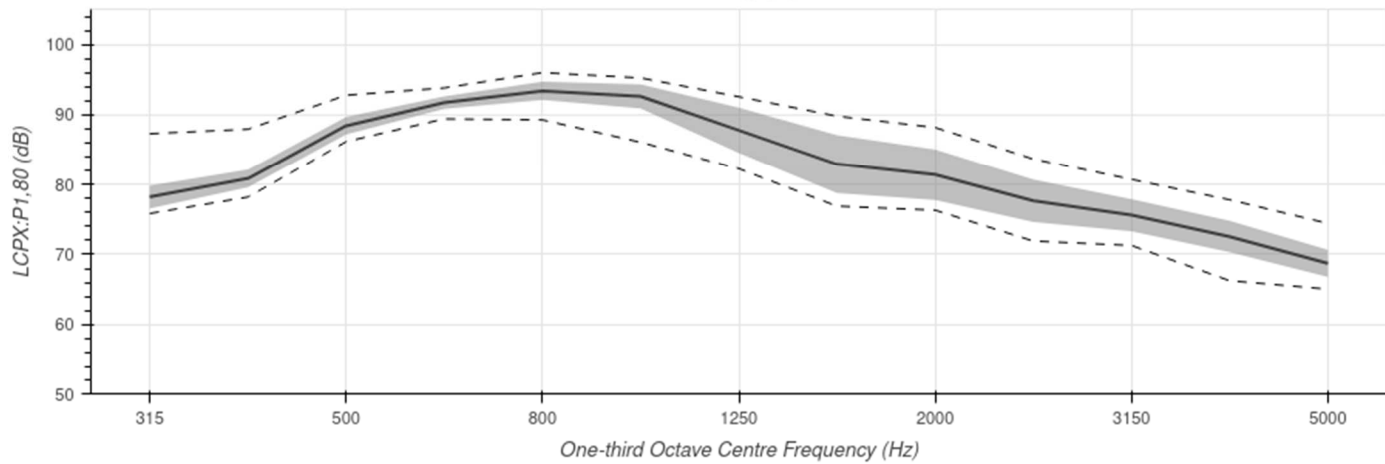
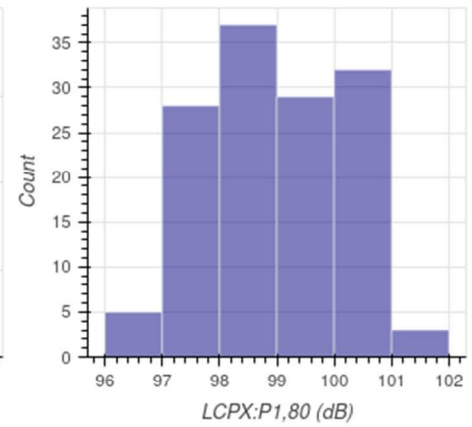
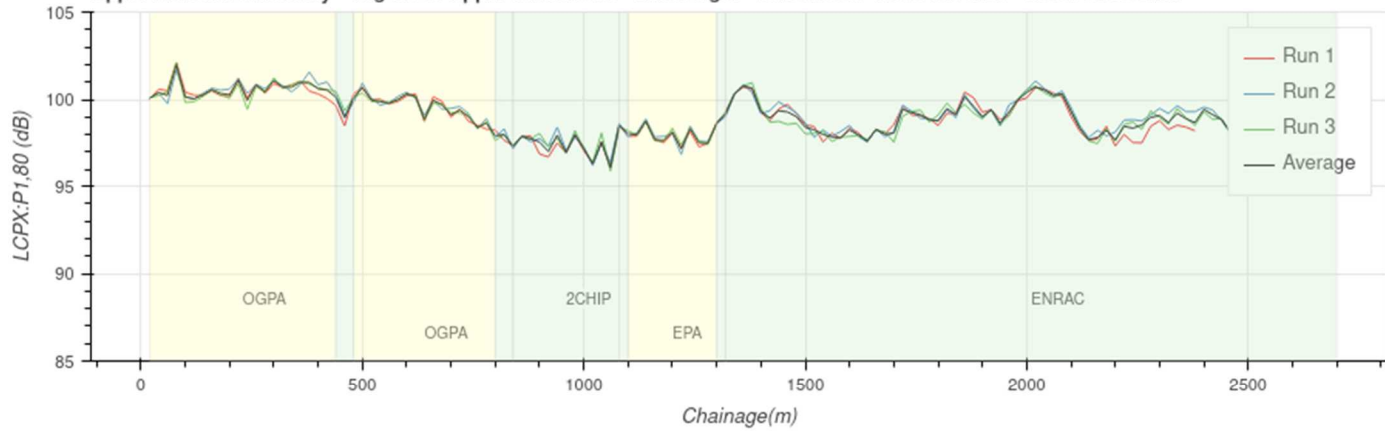
	Average	Run 1	Run 2
Lcpx (dB)	96.2	96.2	96.2
Variation (dB)	1.8	1.9	1.7





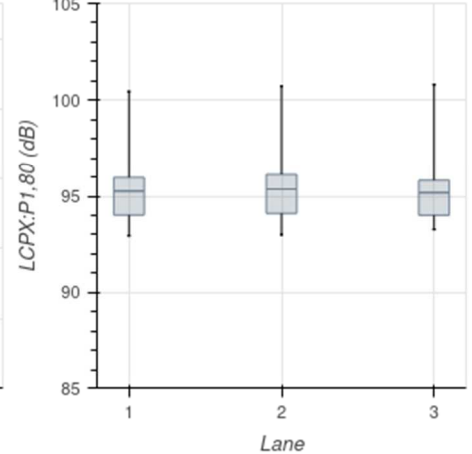
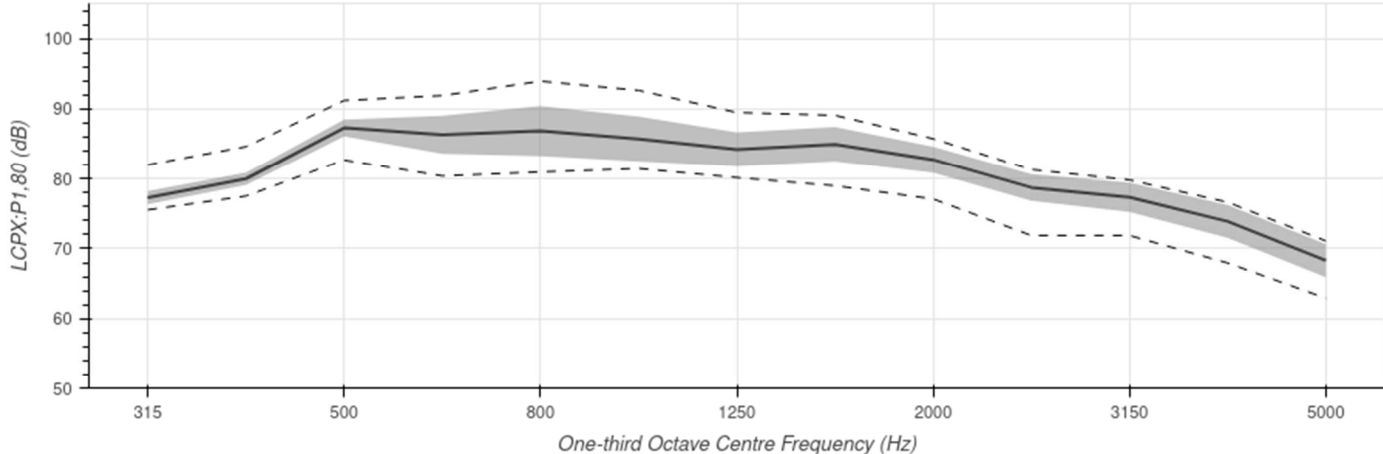
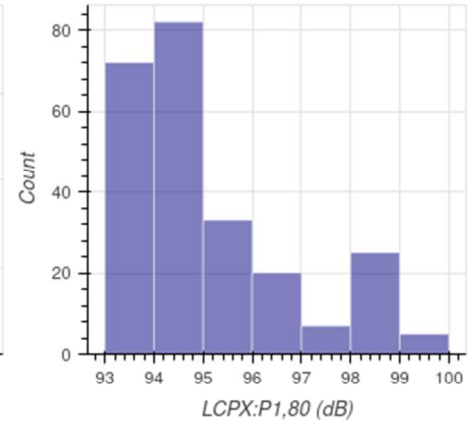
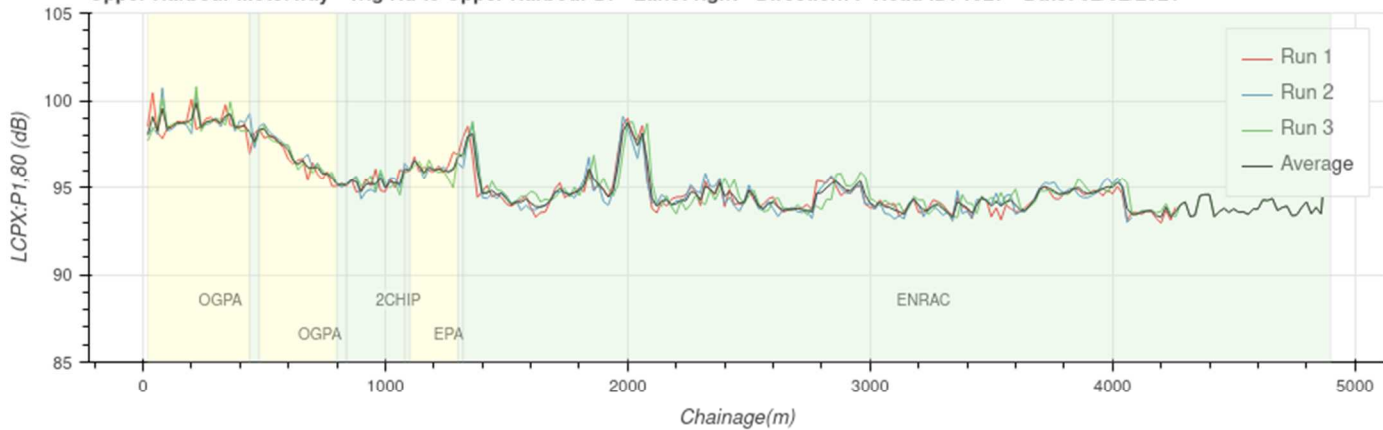
### I.4 SH18 – Upper Harbour Motorway – Southbound – right

Upper Harbour Motorway - Trig Rd to Upper Harbour Dr - Lane: right - Direction: I - Road ID: 1927 - Date: 10/06/2019

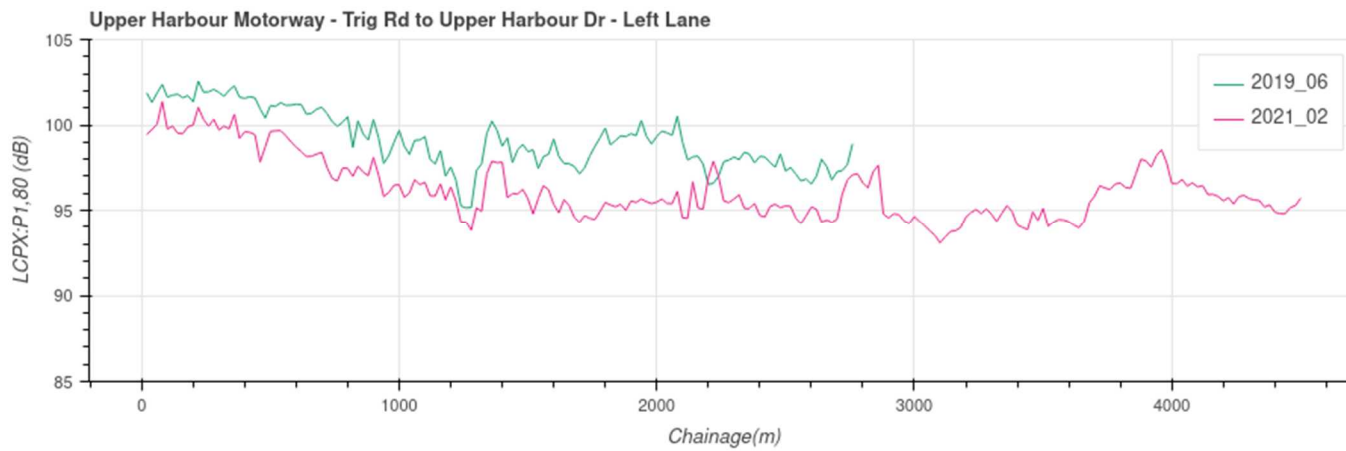
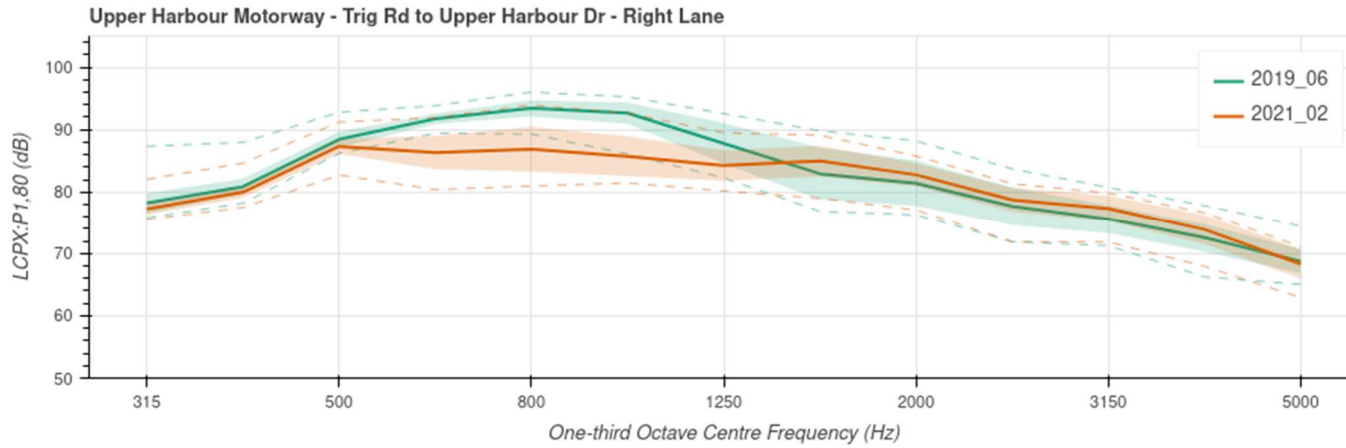


	Average	Run 1	Run 2	Run 3
Lcpx (dB)	99	99	99.1	98.9
Variation (dB)	1.2	1.2	1.2	1.2

Upper Harbour Motorway - Trig Rd to Upper Harbour Dr - Lane: right - Direction: I - Road ID: 1927 - Date: 02/02/2021



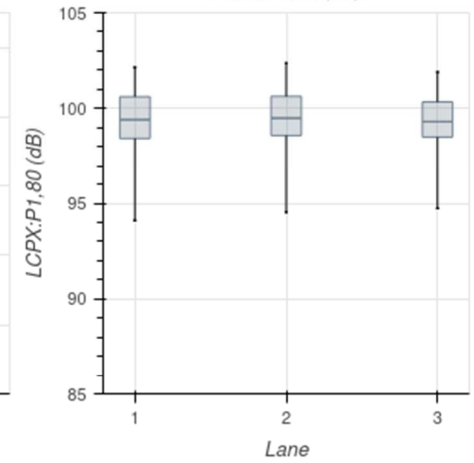
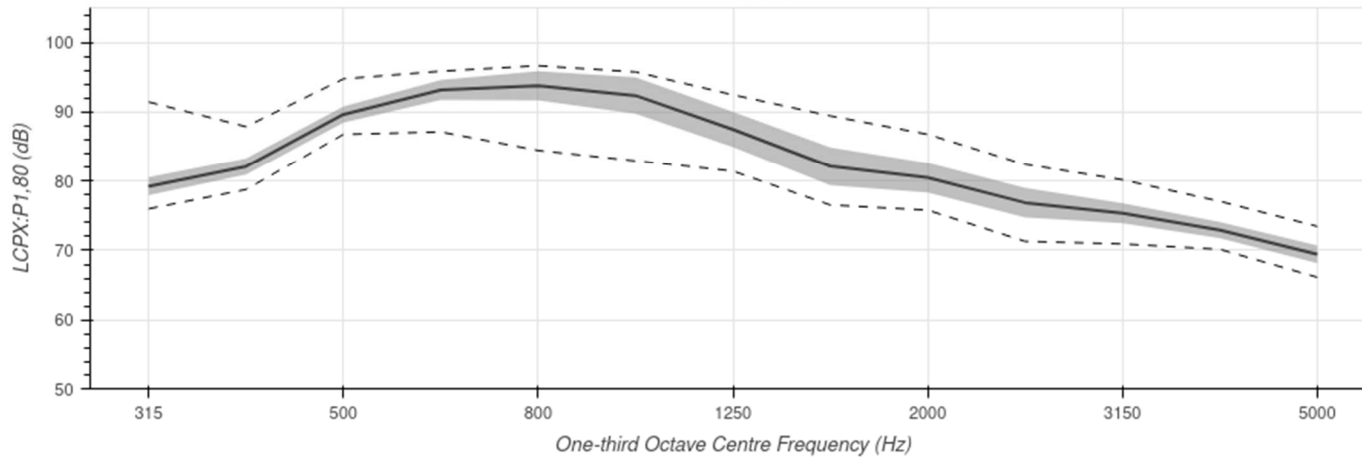
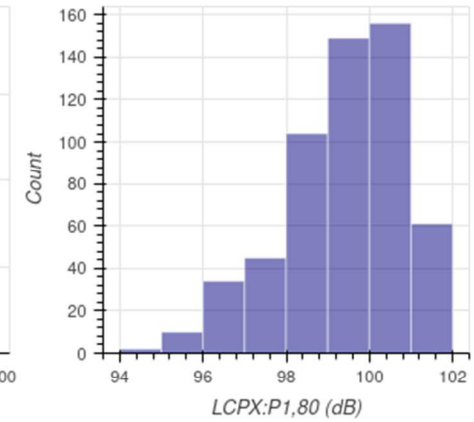
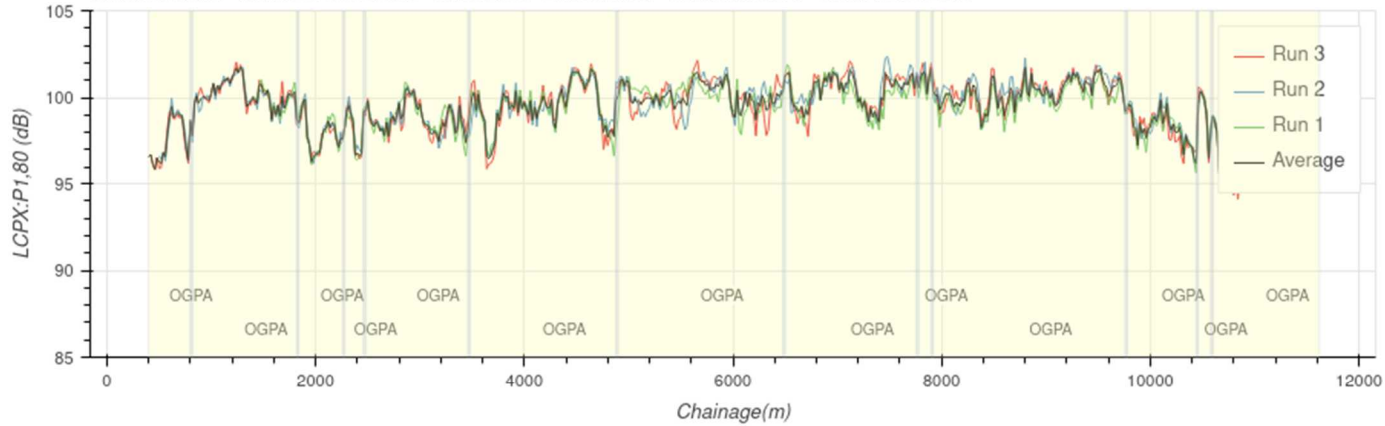
	Average	Run 1	Run 2	Run 3
Lcpx (dB)	95.3	95.3	95.4	95.2
Variation (dB)	1.7	1.7	1.7	1.6



## Appendix J: SH1 – Auckland Northern Motorway

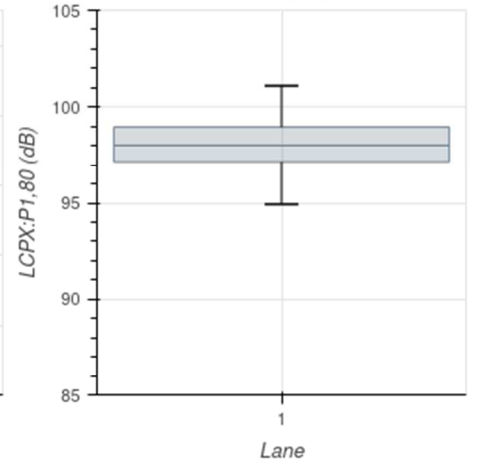
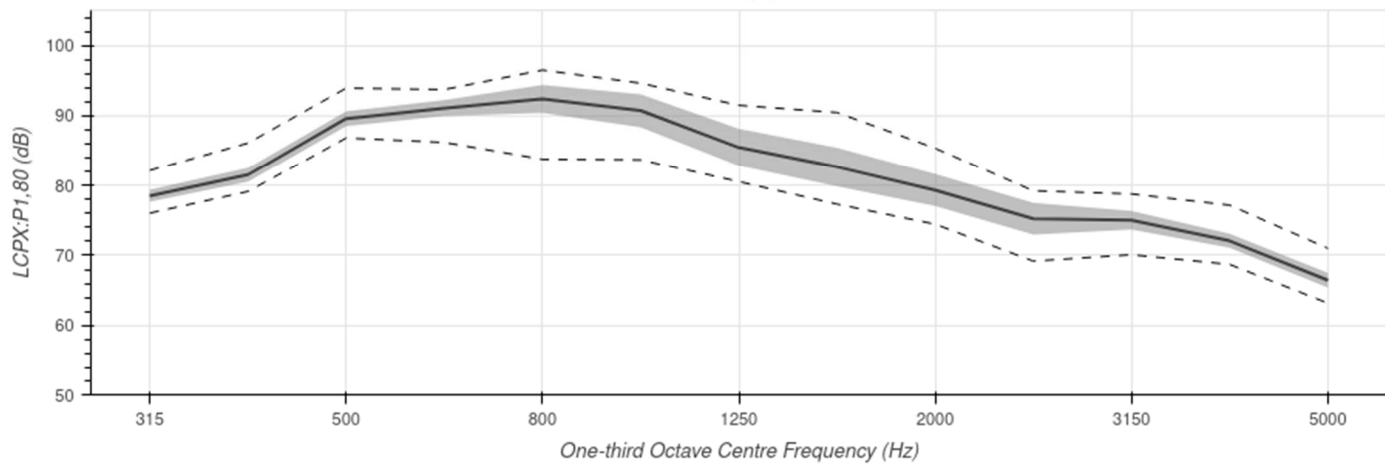
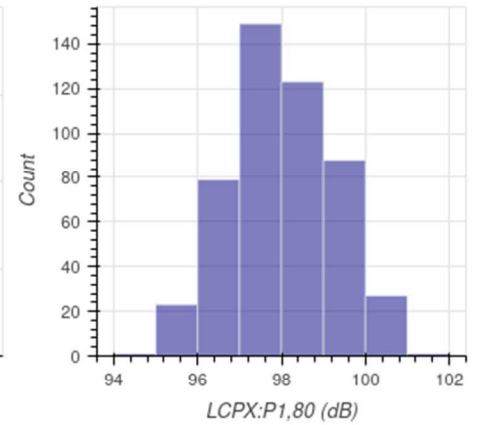
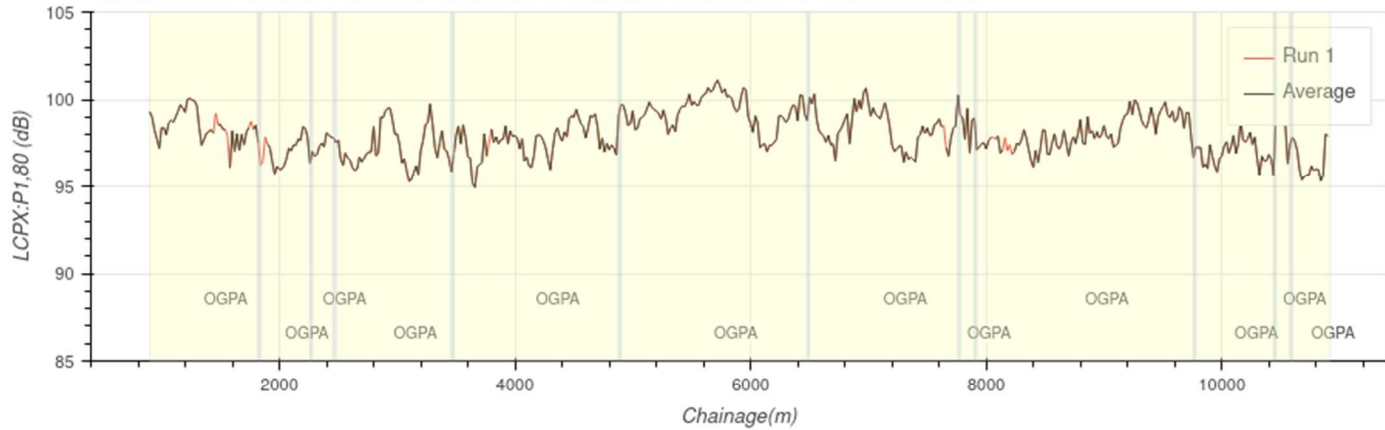
**J.1 SH1 – Auckland Northern Motorway – Northbound – Left**

SH1 Auckland - North to Silverdale - Lane: left - Direction: D -Road ID: 2614 - Date: 10/06/2019



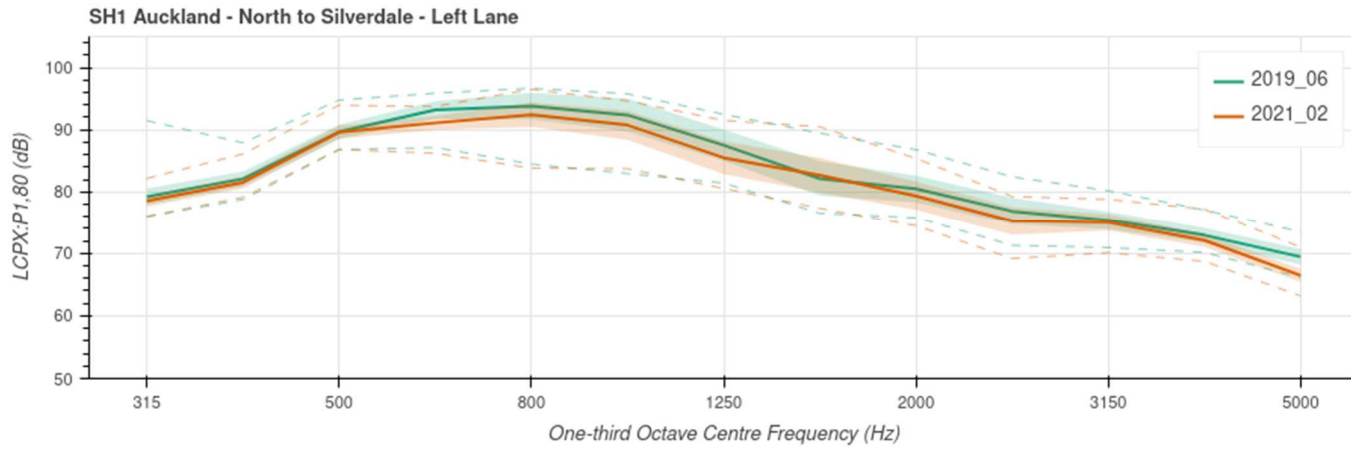
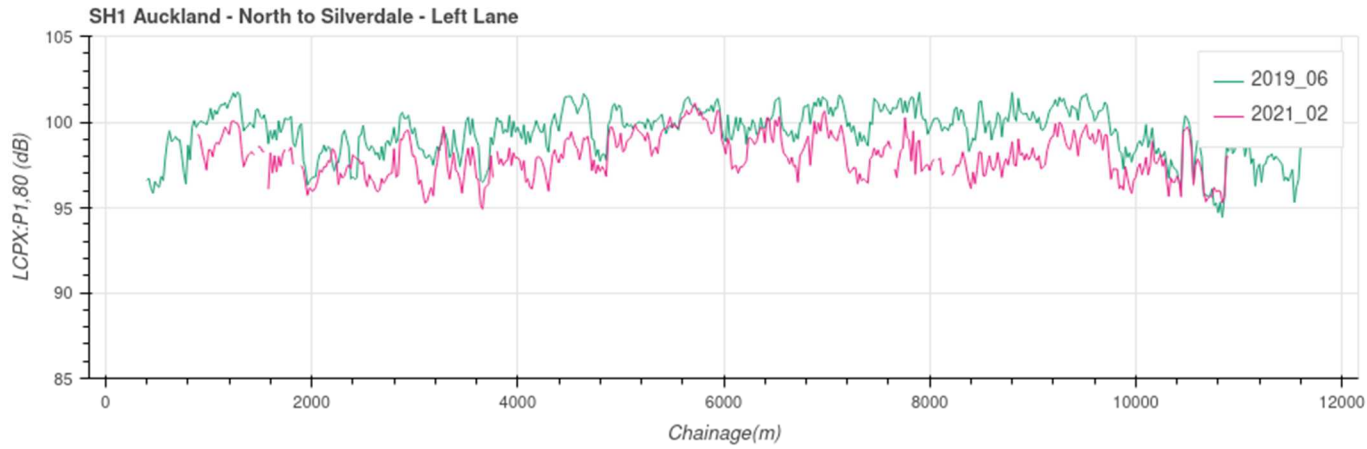
	Average	Run 3	Run 2	Run 1
Lcpx (dB)	99.4	99.3	99.5	99.4
Variation (dB)	1.5	1.4	1.4	1.5

SH1 Auckland - North to Silverdale - Lane: left - Direction: D -Road ID: 2614 - Date: 03/02/2021



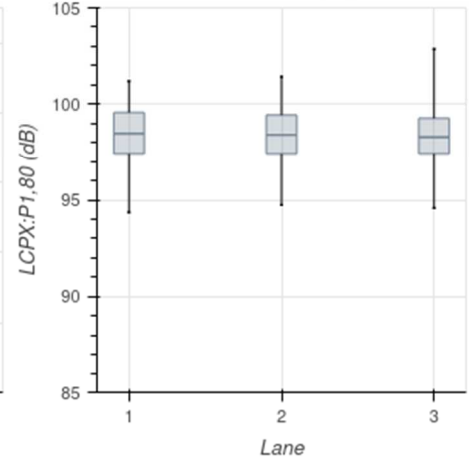
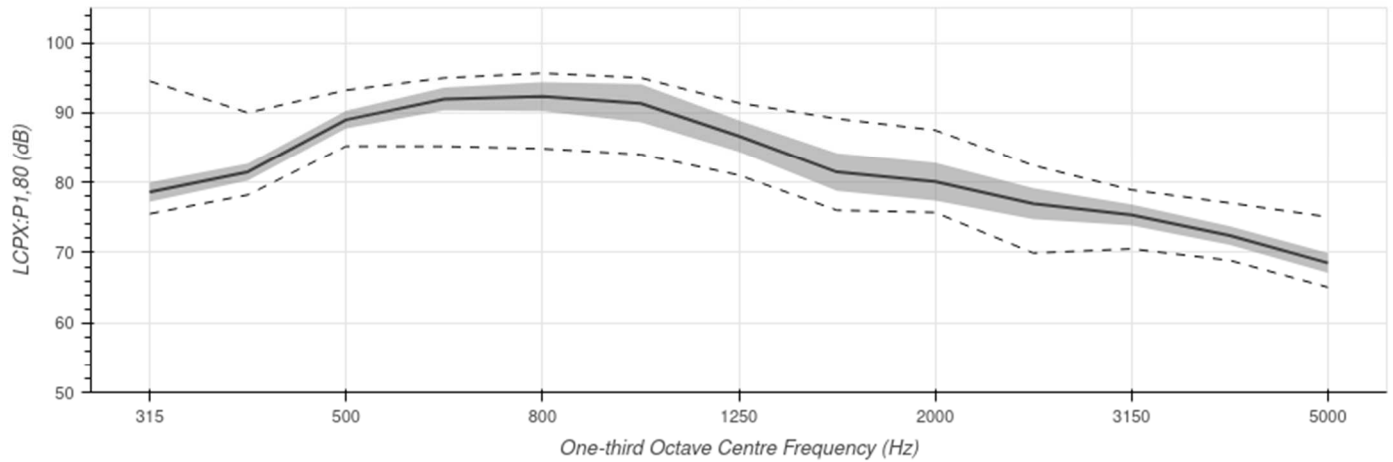
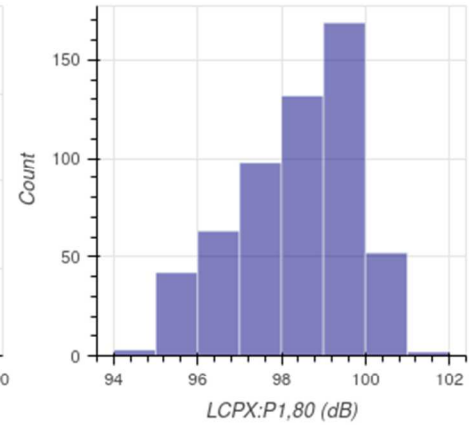
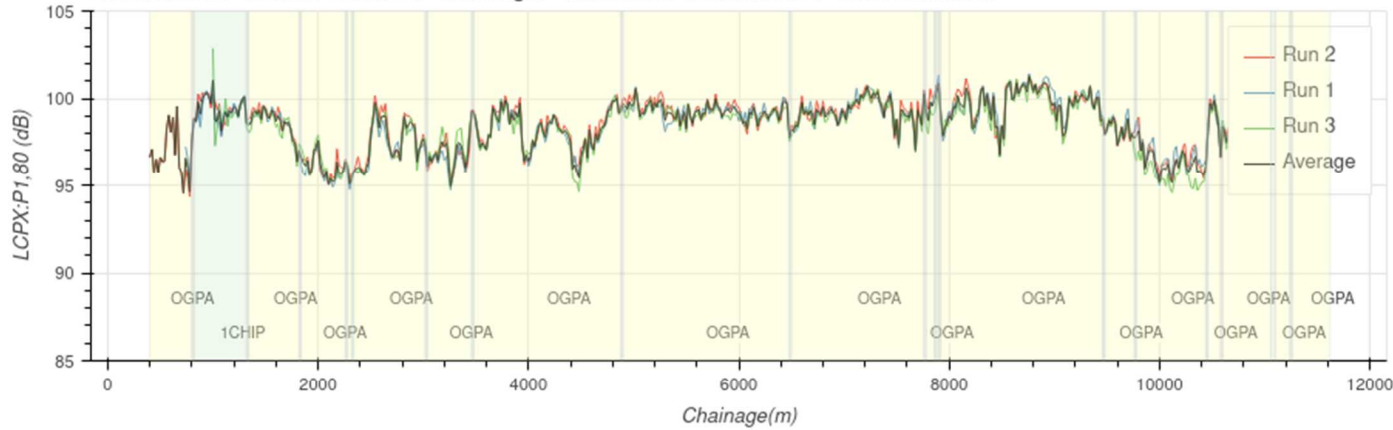
	Average	Run 1
Lcpx (dB)	98	98
Variation (dB)	1.2	1.2





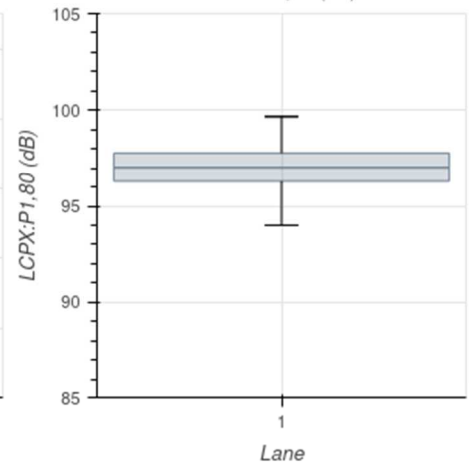
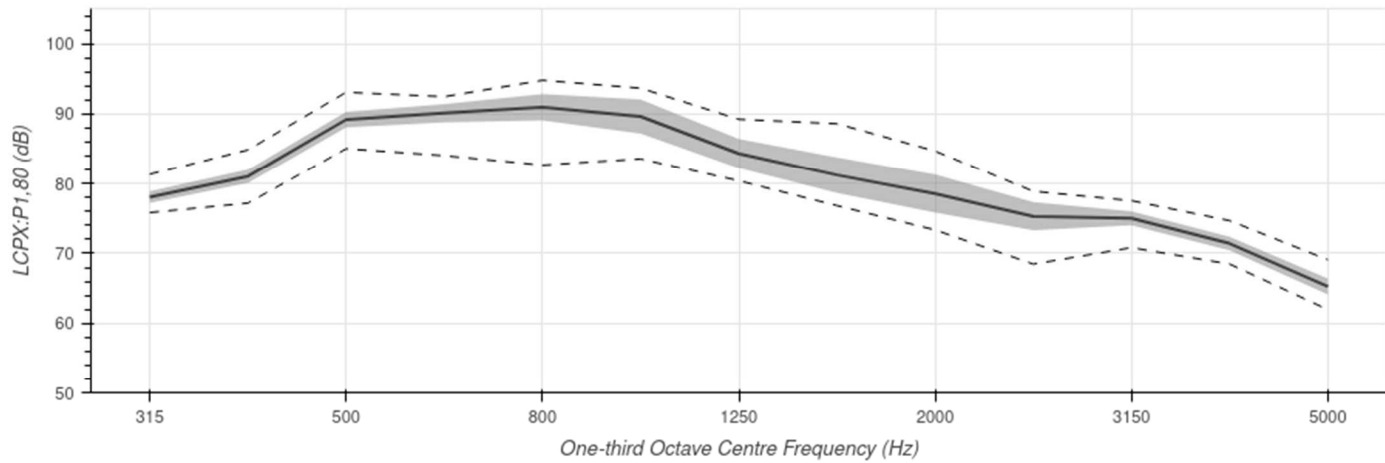
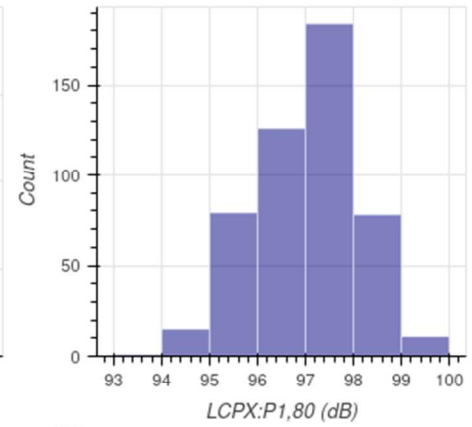
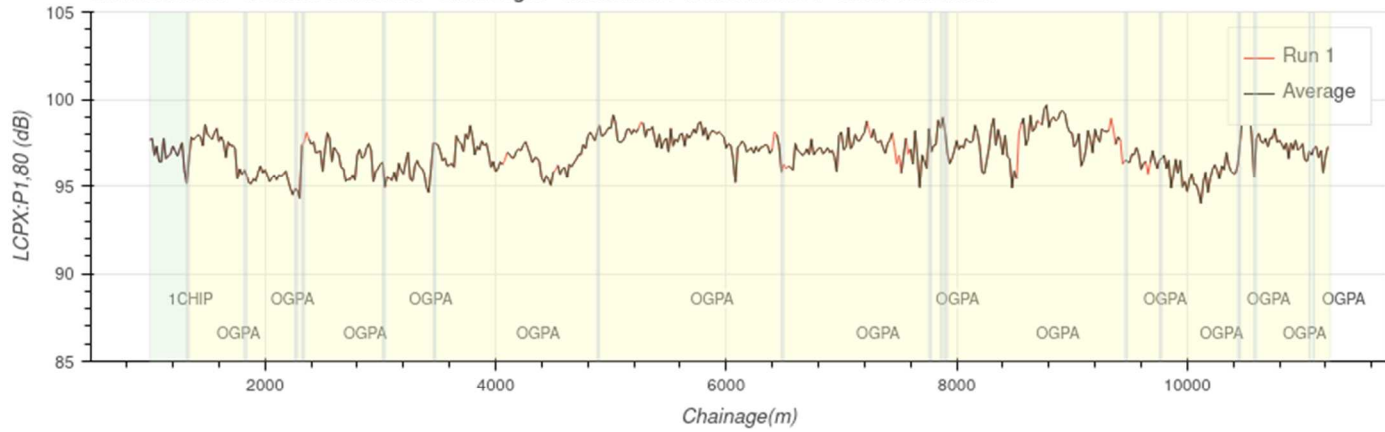
**J.2 SH1 – Auckland Northern Motorway – Northbound – Right**

SH1 Auckland - North to Silverdale - Lane: right - Direction: D - Road ID: 2614 - Date: 10/06/2019

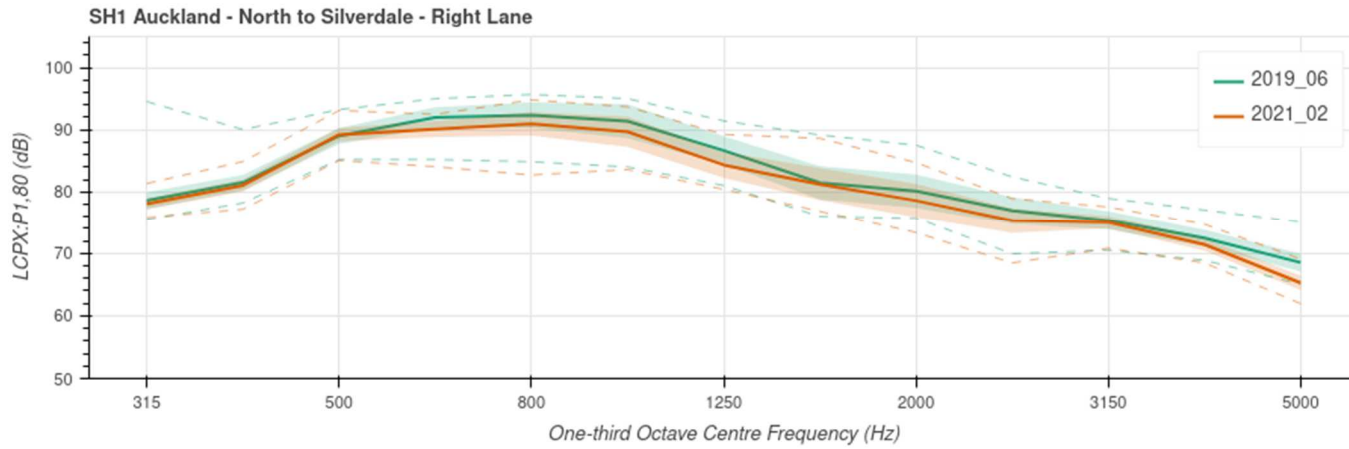
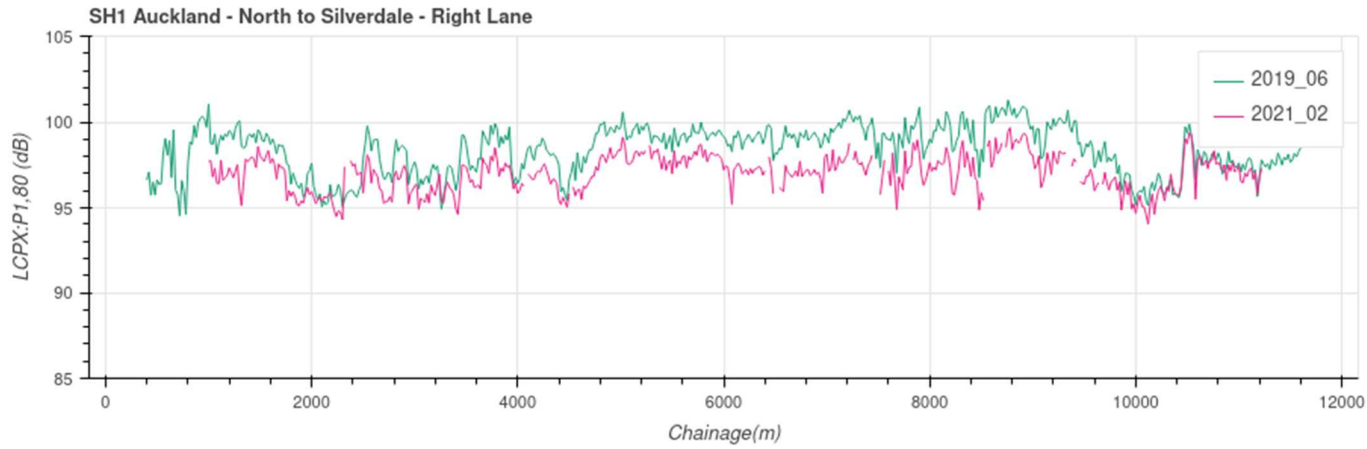


	Average	Run 2	Run 1	Run 3
LcpX (dB)	98.4	98.4	98.5	98.3
Variation (dB)	1.4	1.4	1.4	1.4

SH1 Auckland - North to Silverdale - Lane: right - Direction: D - Road ID: 2614 - Date: 03/02/2021

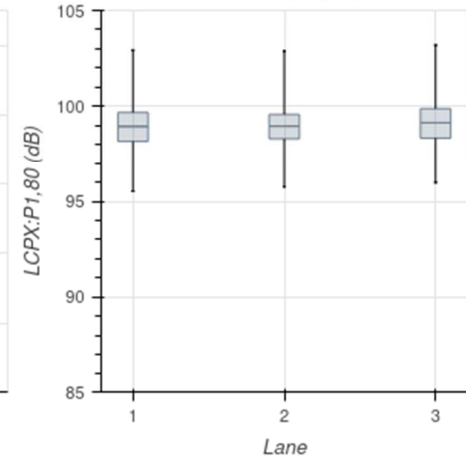
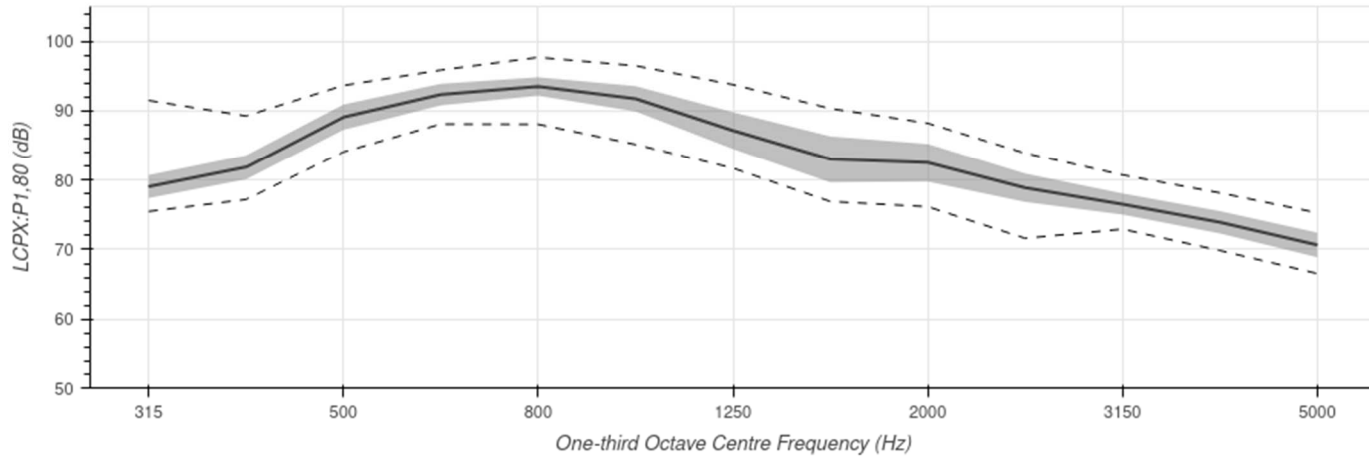
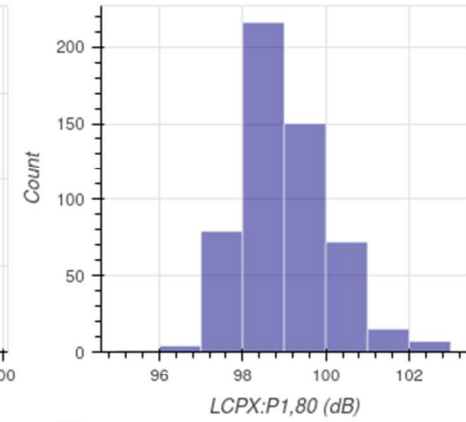
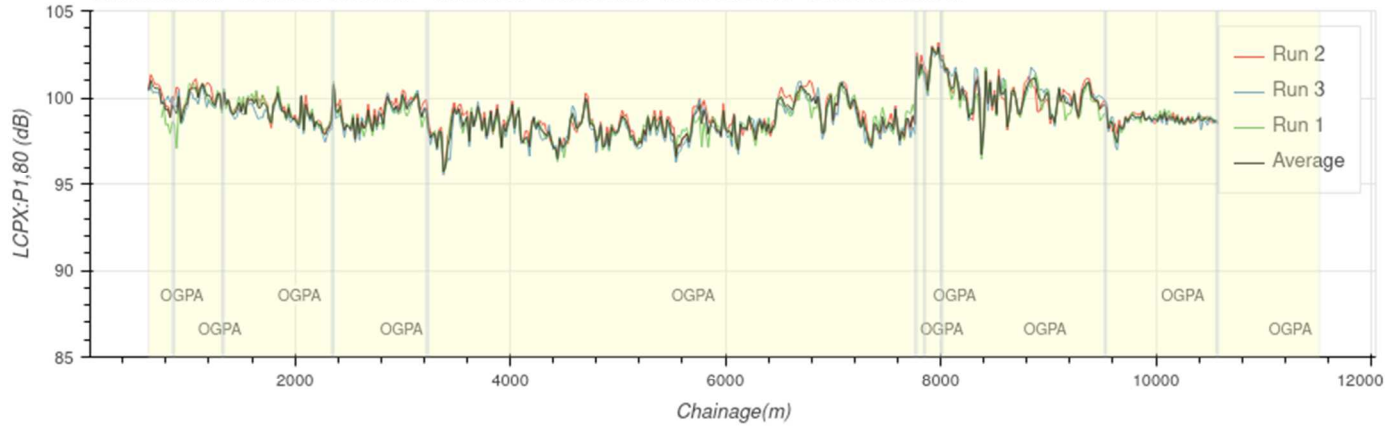


	Average	Run 1
Lcpx (dB)	97	97
Variation (dB)	1.1	1.1



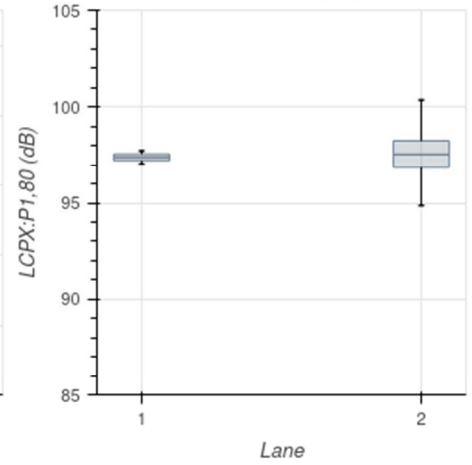
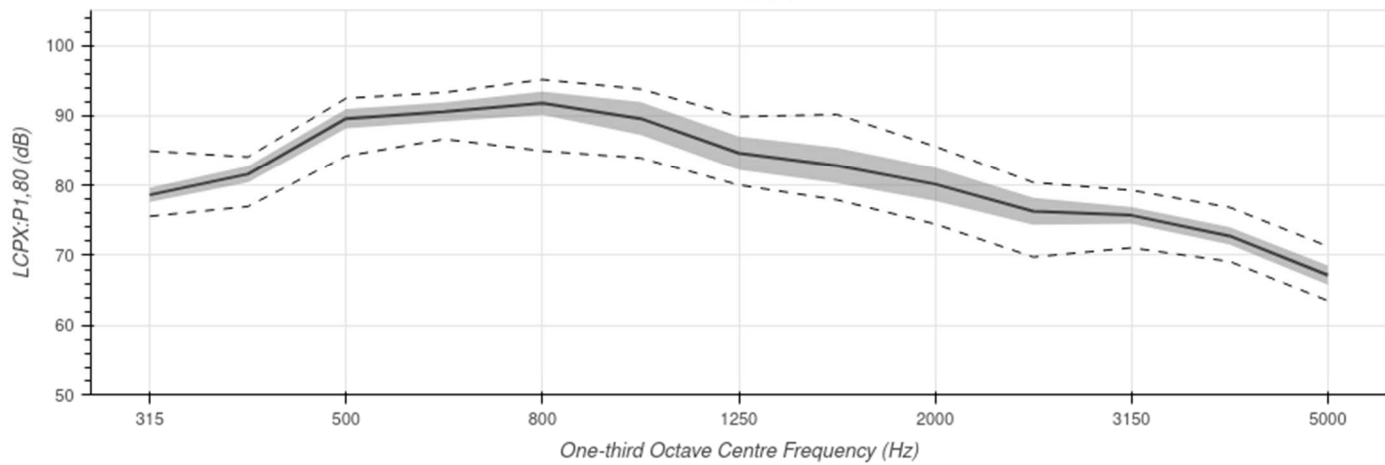
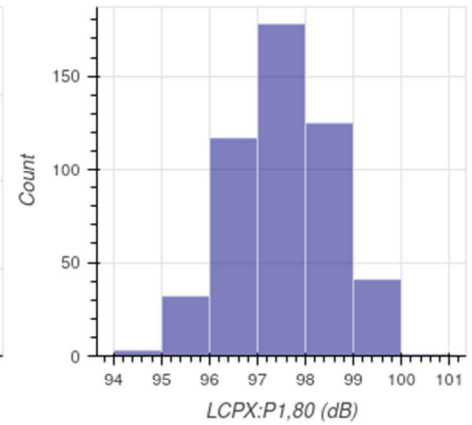
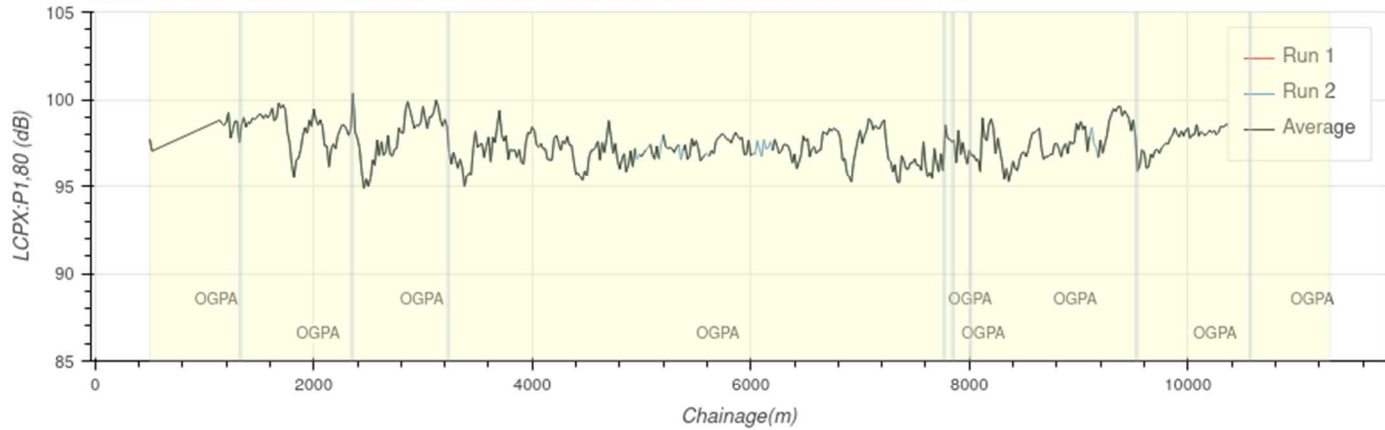
**J.3 SH1 – Auckland Northern Motorway – Southbound – Left**

SH1 Auckland - North to Silverdale - Lane: left - Direction: I -Road ID: 2613 - Date: 10/06/2019

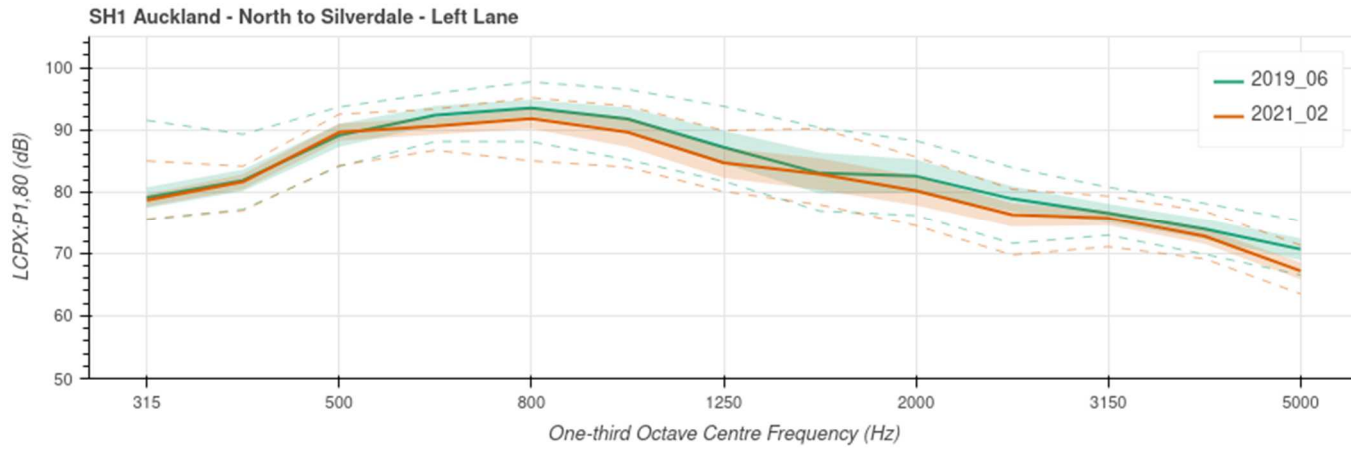
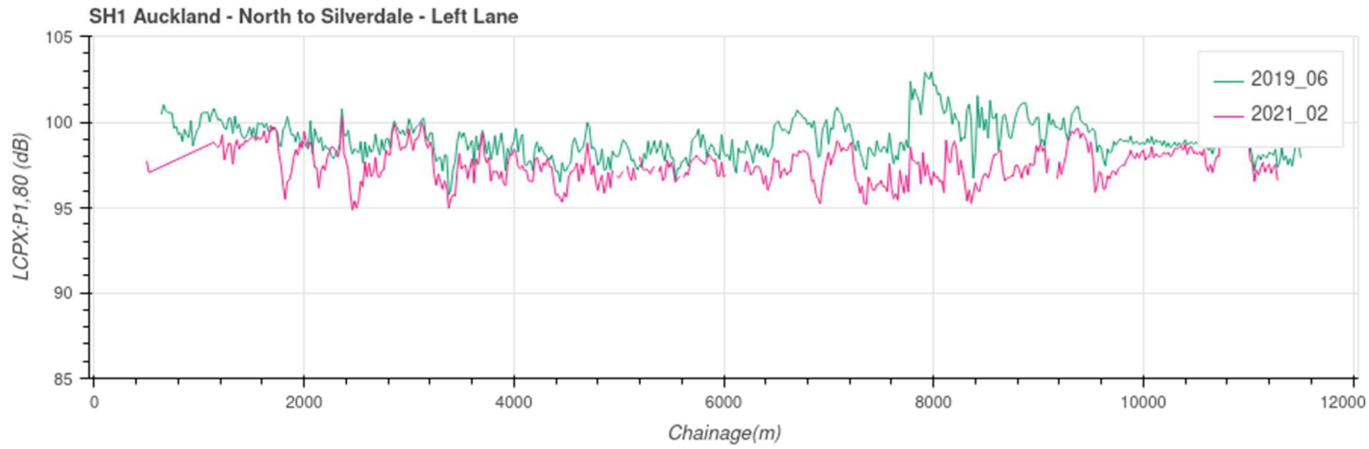


	Average	Run 2	Run 3	Run 1
Lcpx (dB)	99	99	99.1	98.9
Variation (dB)	1.1	1.1	1.1	1.1

SH1 Auckland - North to Silverdale - Lane: left - Direction: I - Road ID: 2613 - Date: 03/02/2021



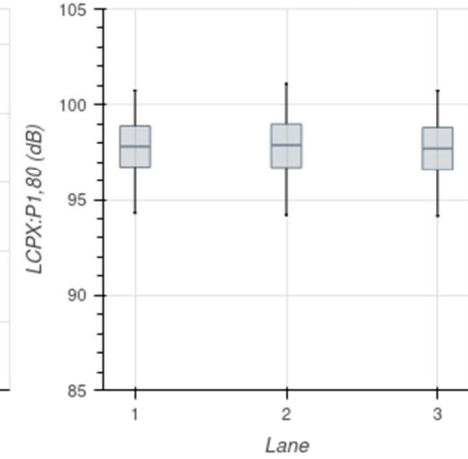
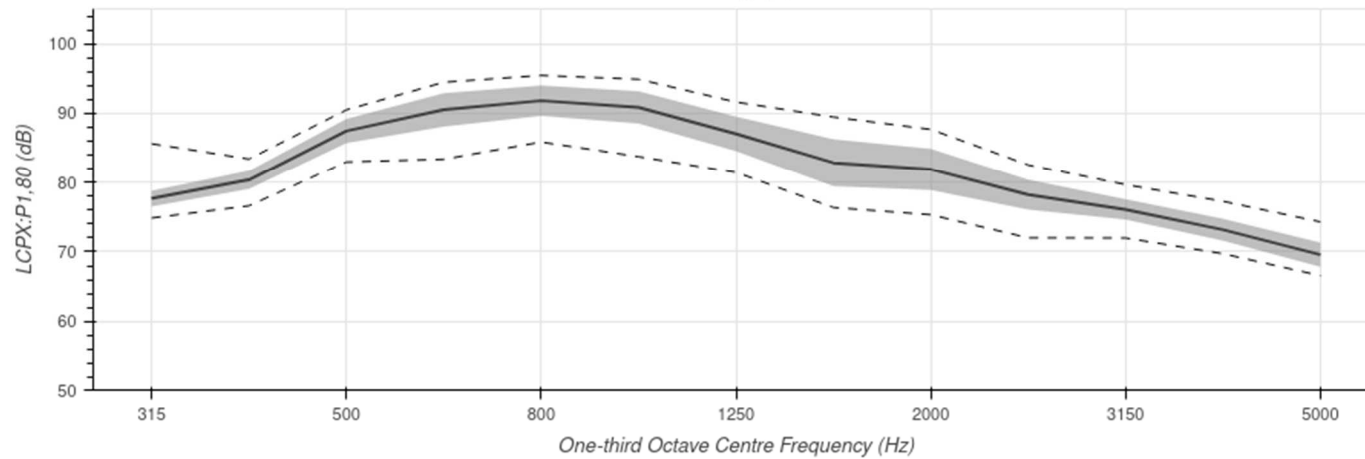
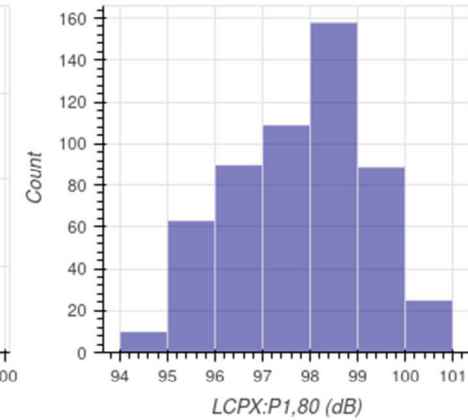
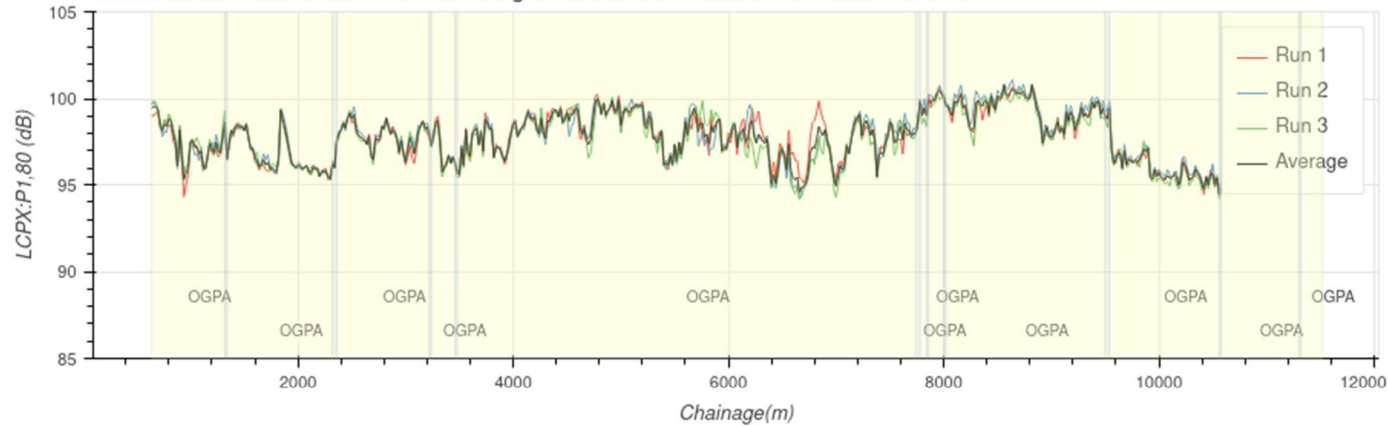
	Average	Run 1	Run 2
Lcpx (dB)	97.5	97.4	97.5
Variation (dB)	0.8	0.5	1





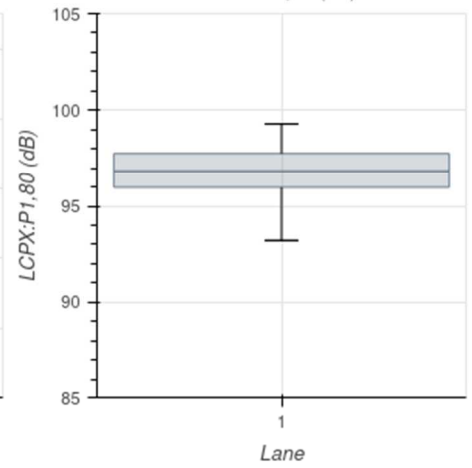
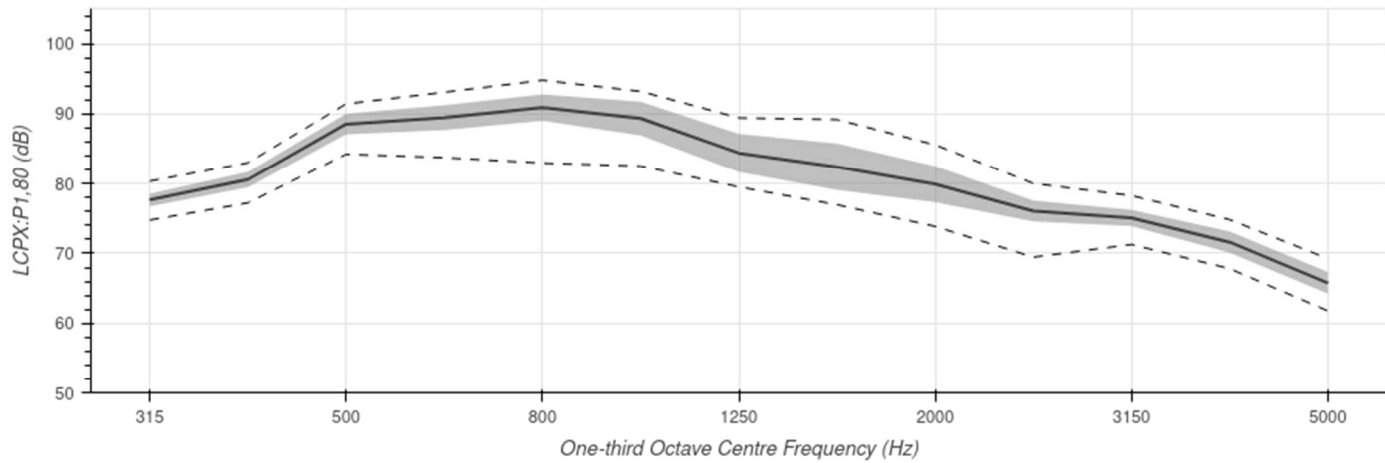
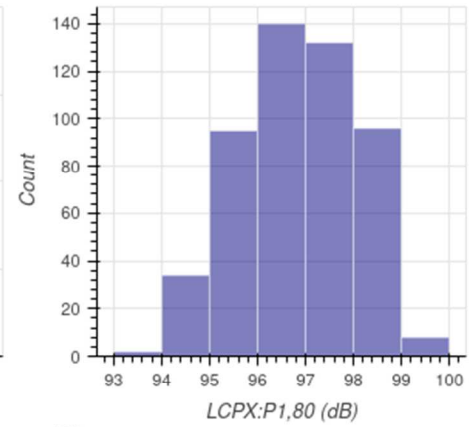
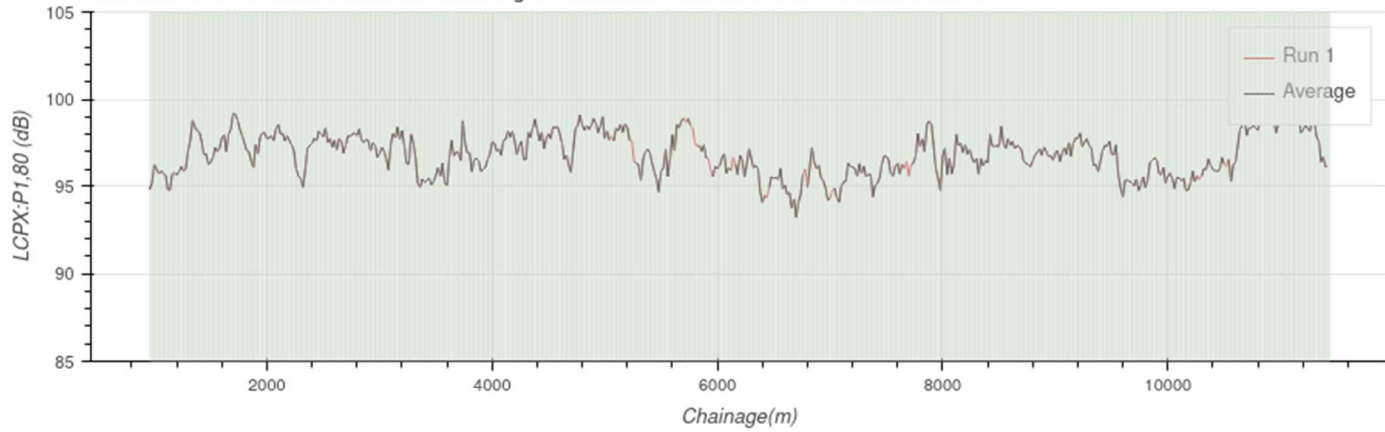
**J.4 SH1 – Auckland Northern Motorway – Southbound – Right**

SH1 Auckland - North to Silverdale - Lane: right - Direction: I -Road ID: 2613 - Date: 10/06/2019

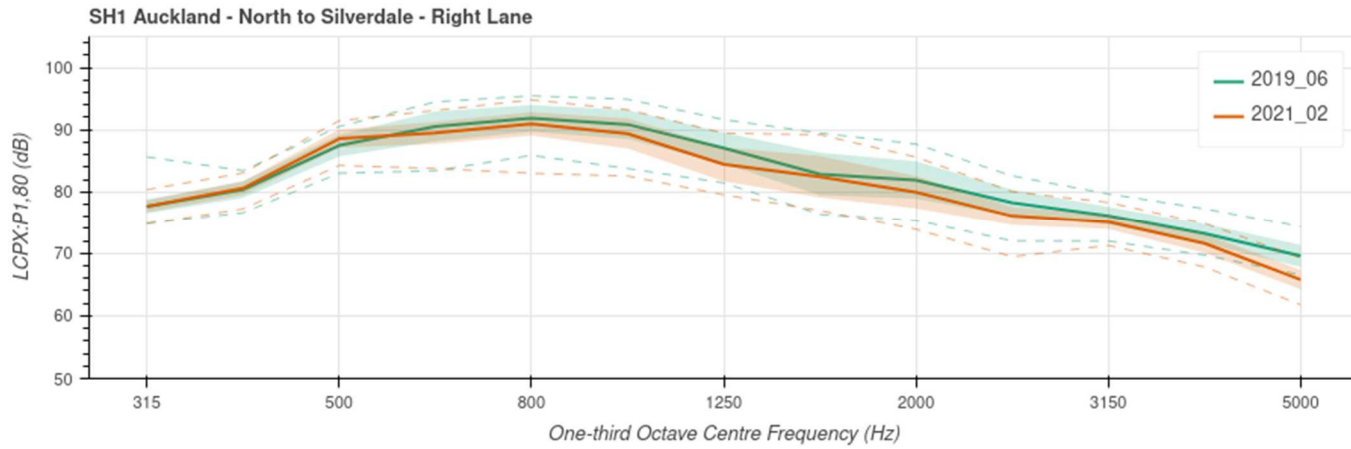
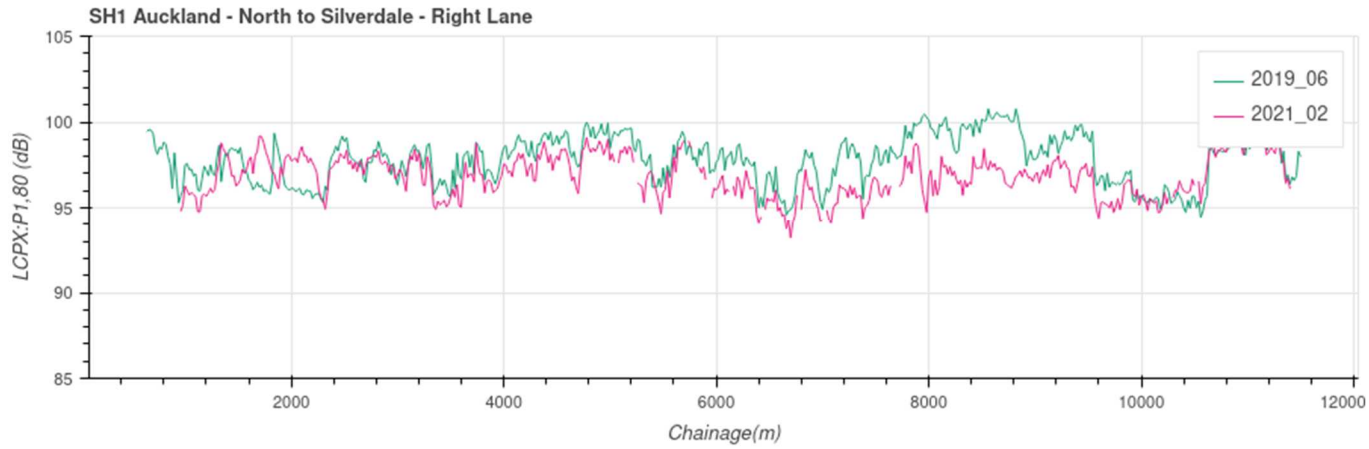


	Average	Run 1	Run 2	Run 3
Lcpx (dB)	97.8	97.8	97.9	97.7
Variation (dB)	1.4	1.4	1.5	1.4

SH1 Auckland - North to Silverdale - Lane: right - Direction: I - Road ID: 2613 - Date: 03/02/2021



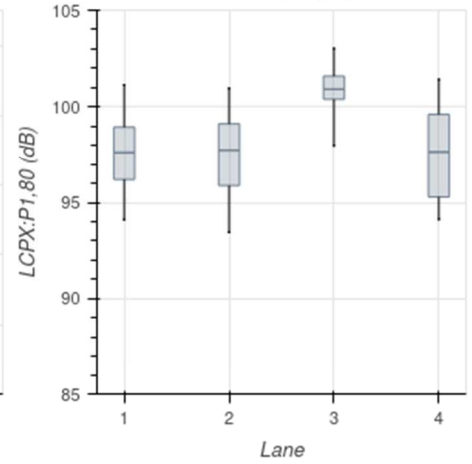
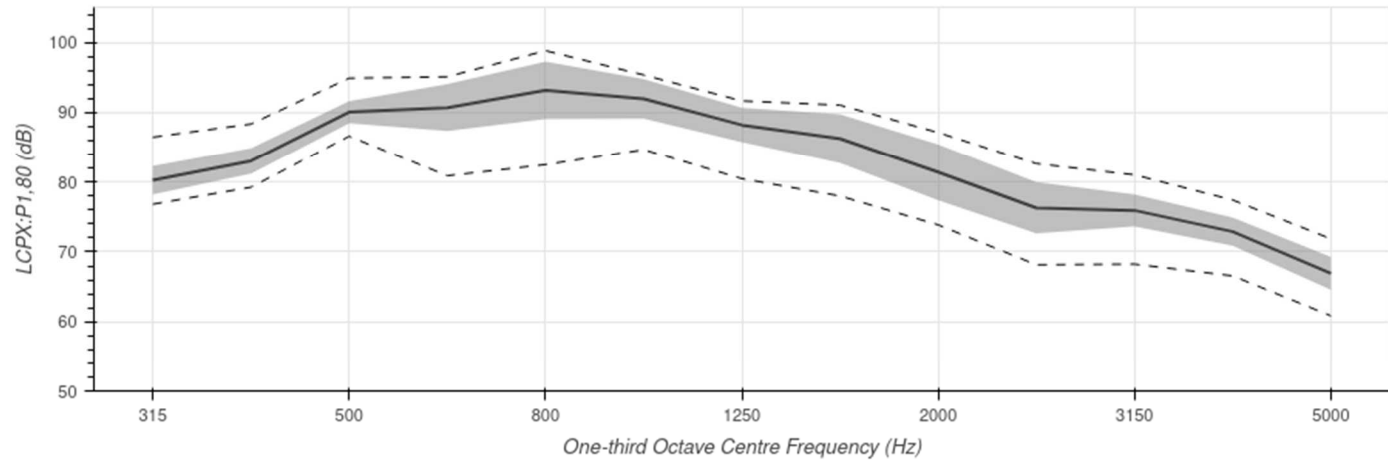
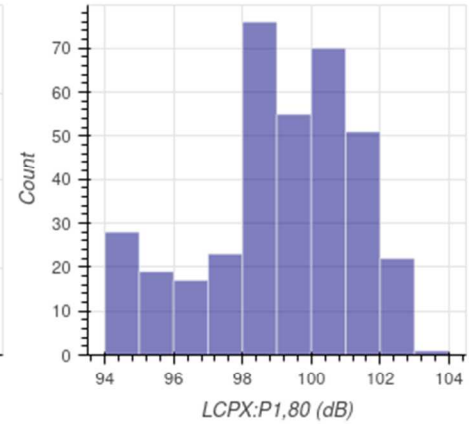
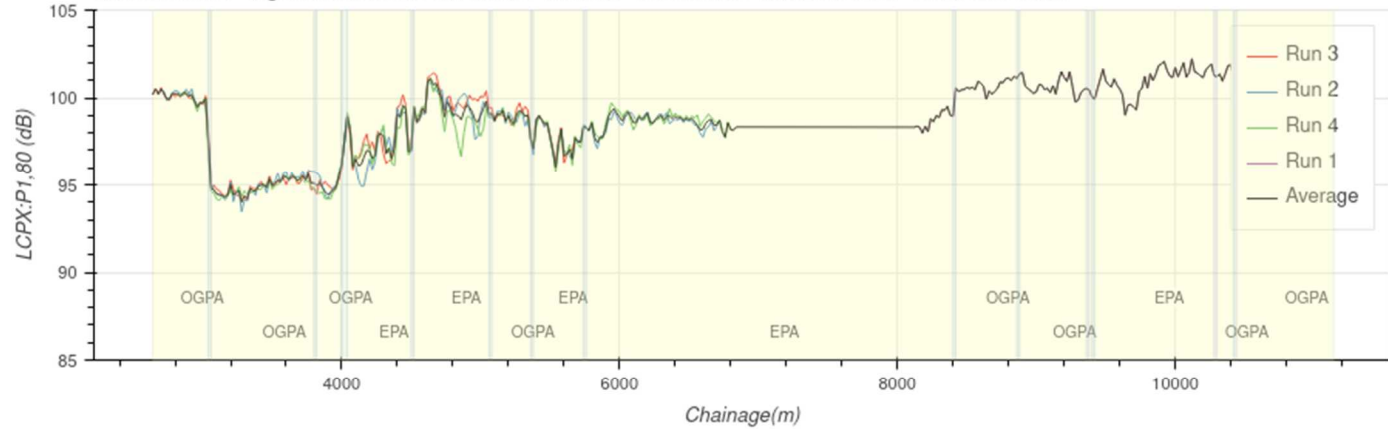
	Average	Run 1
Lcpx (dB)	96.8	96.8
Variation (dB)	1.2	1.2



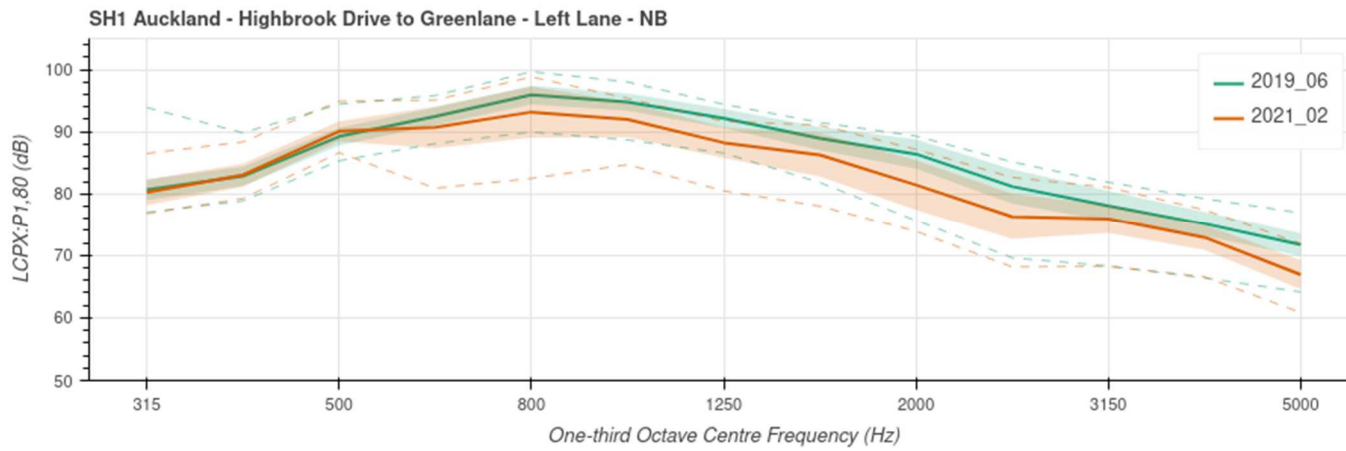
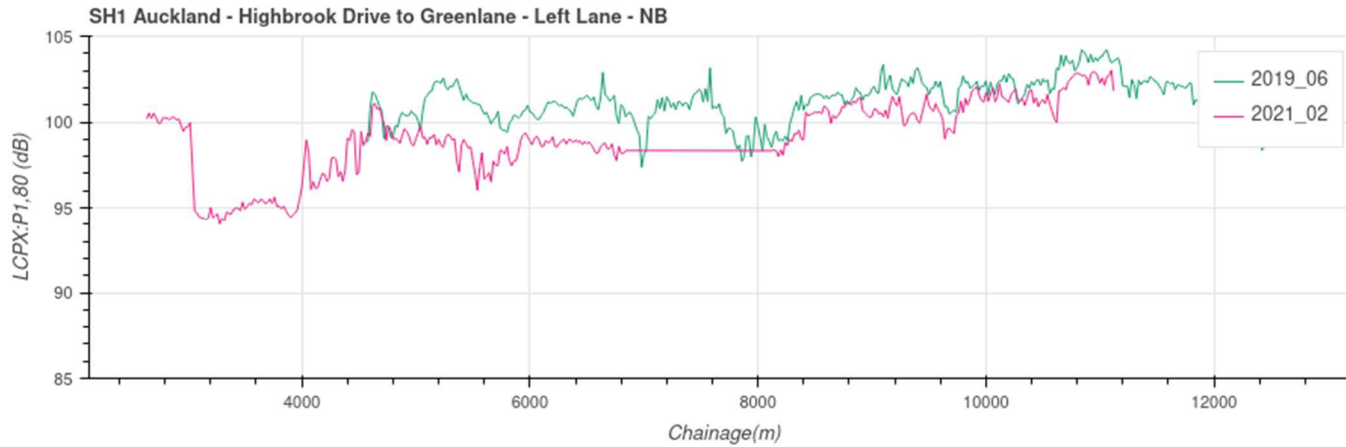
## Appendix K: SH1 – Auckland Southern Motorway

**K.1 SH1 – Auckland Southern Motorway – Northbound – Left**

SH1 Auckland - Highbrook Drive to Greenlane - Lane: 3 - Direction: D - Road ID: 1781 - Date: 03/02/2021

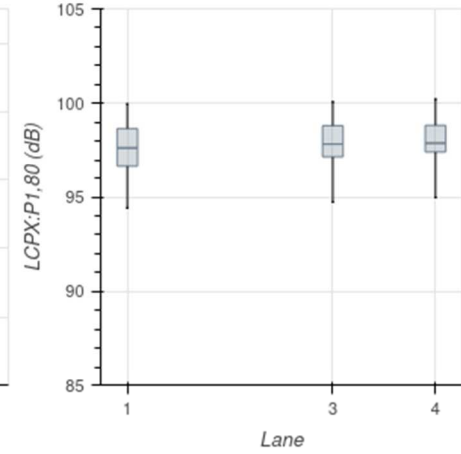
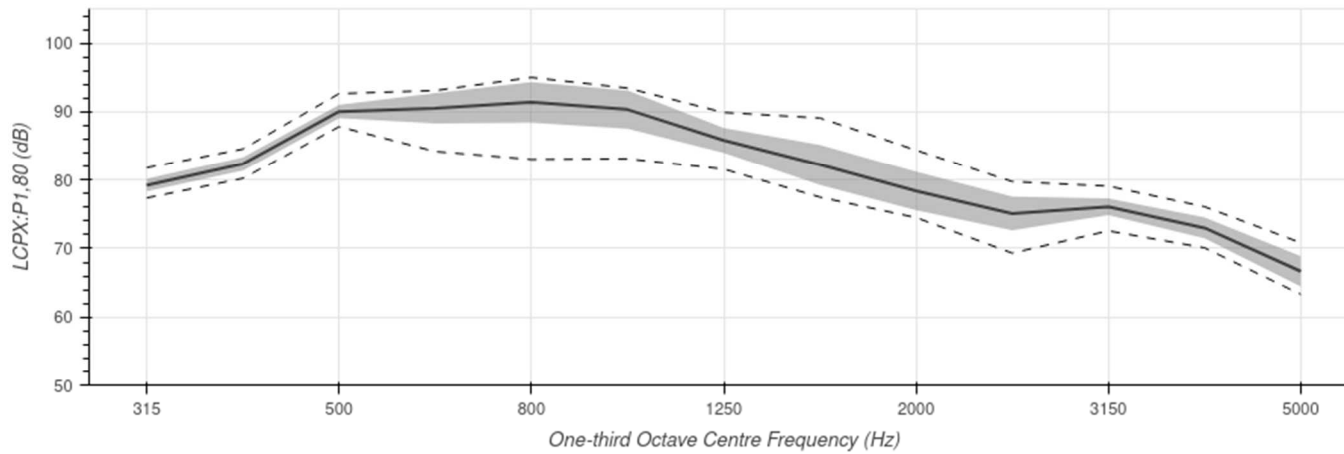
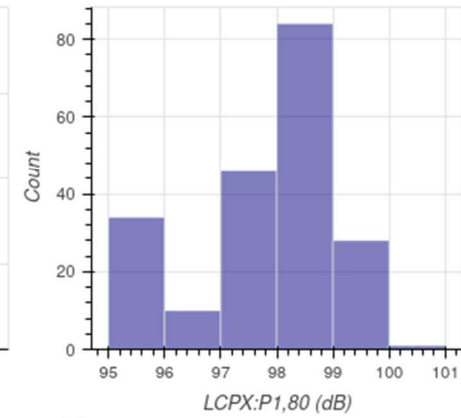
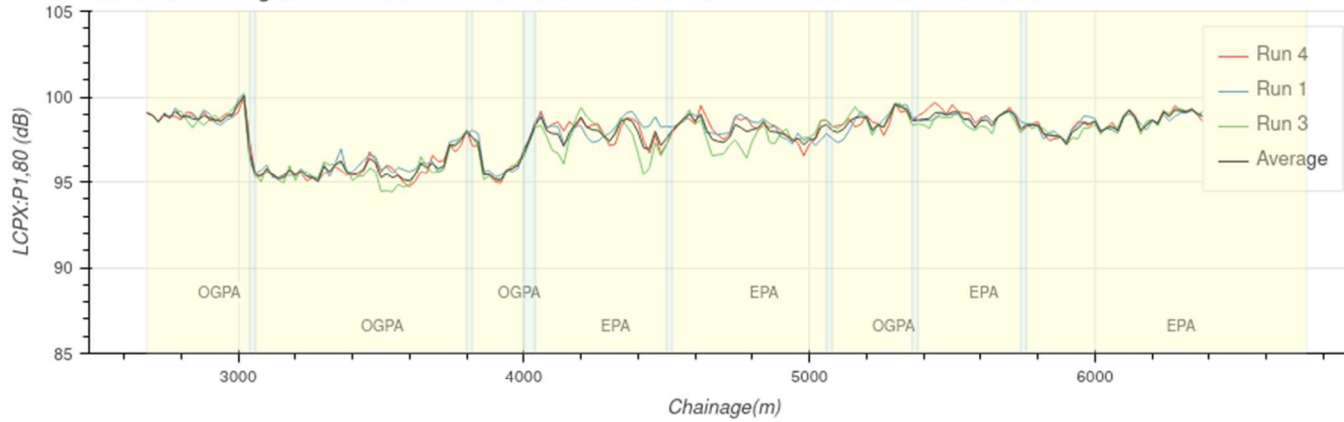


	Average	Run 3	Run 2	Run 4	Run 1
LcpX (dB)	98.5	100.9	97.8	97.7	97.6
Variation (dB)	1.7	1.1	1.9	2.2	1.8



**K.2 SH1 – Auckland Southern Motorway – Northbound – Centre**

SH1 Auckland - Highbrook Drive to Greenlane - Lane: 2 - Direction: D - Road ID: 1781 - Date: 03/02/2021

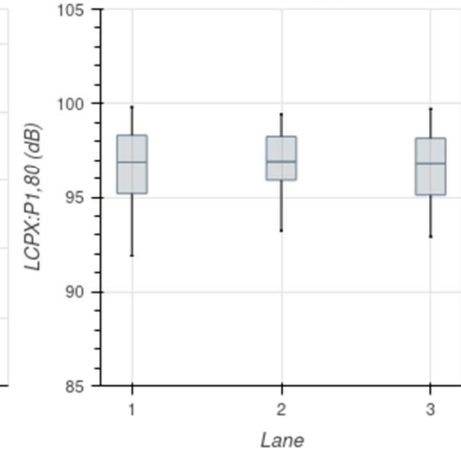
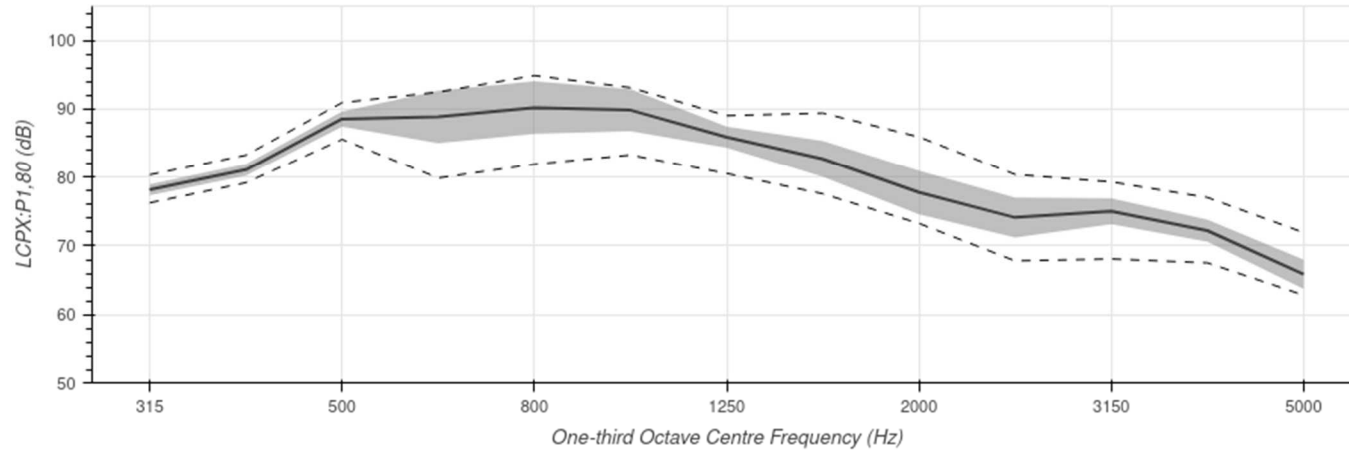
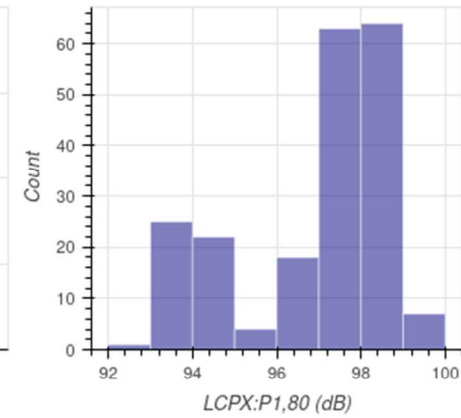
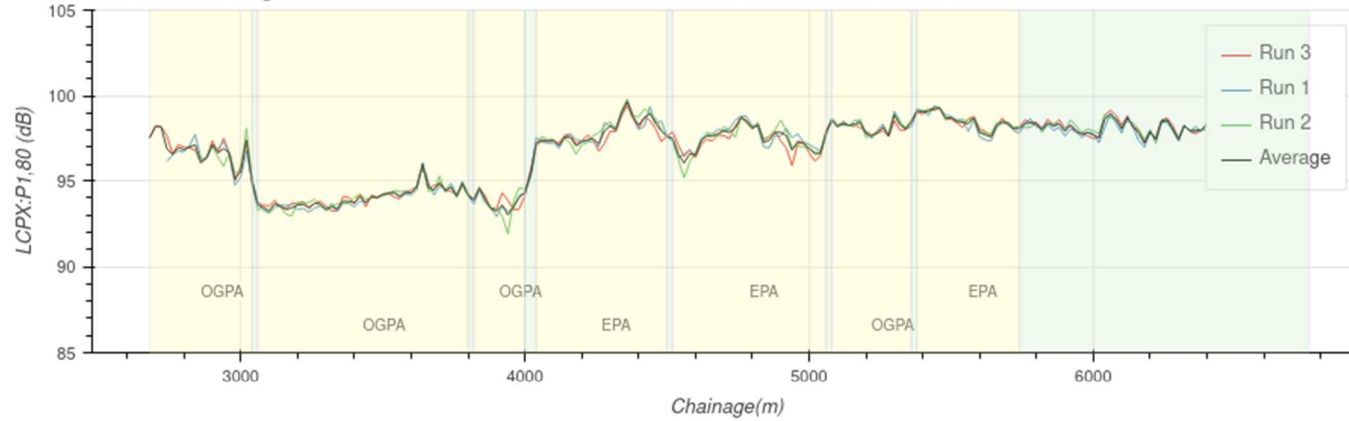


	Average	Run 4	Run 1	Run 3
Lcp <sub>x</sub> (dB)	97.8	97.9	97.6	97.8
Variation (dB)	1.3	1.3	1.4	1.3



### K.3 SH1 – Auckland Southern Motorway – Northbound – Right

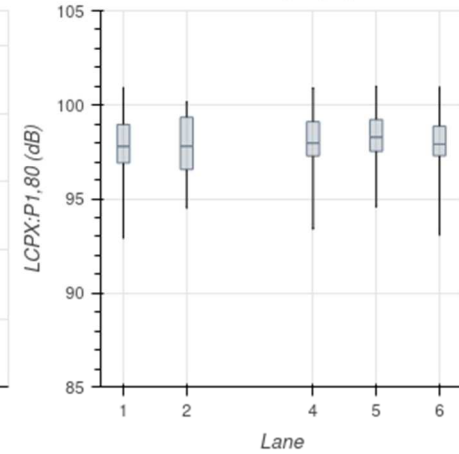
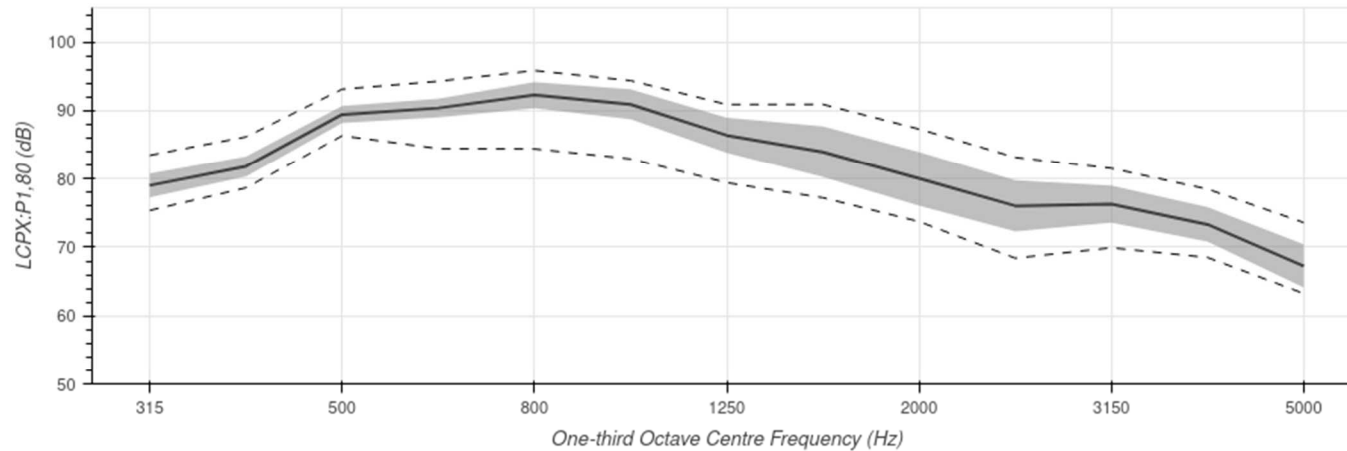
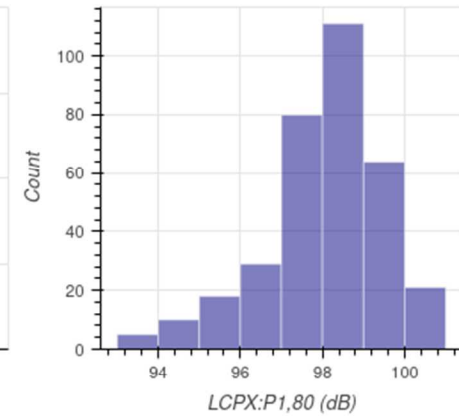
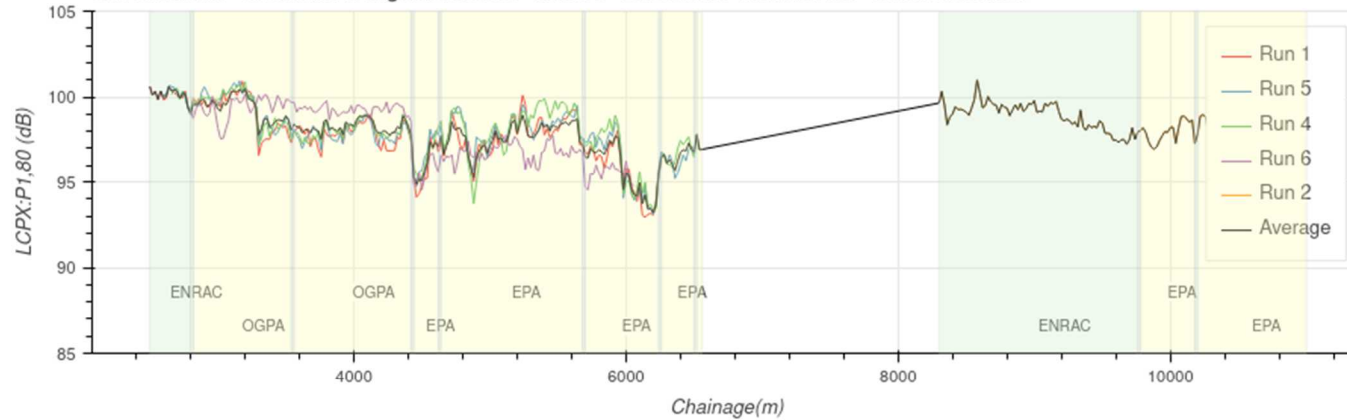
SH1 Auckland - Highbrook Drive to Greenlane - Lane: 1 - Direction: D - Road ID: 1781 - Date: 03/02/2021



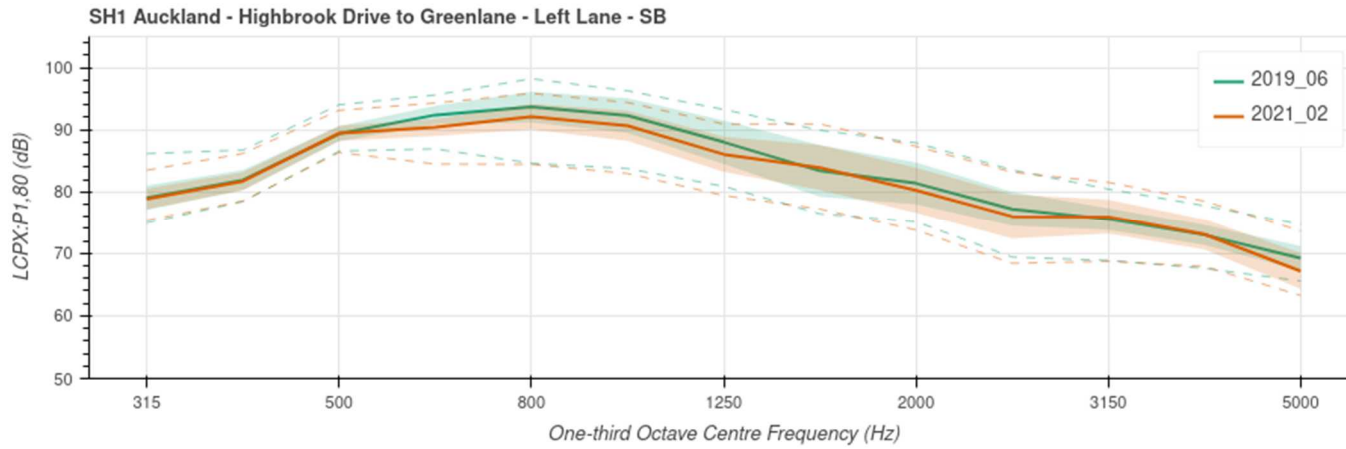
	Average	Run 3	Run 1	Run 2
LcpX (dB)	96.9	96.8	96.9	96.9
Variation (dB)	1.9	1.9	1.9	1.8

**K.4 SH1 – Auckland Southern Motorway – Southbound – Left**

SH1 Auckland - Greenlane to Highbrook Drive - Lane: 3 - Direction: I - Road ID: 157 - Date: 03/02/2021

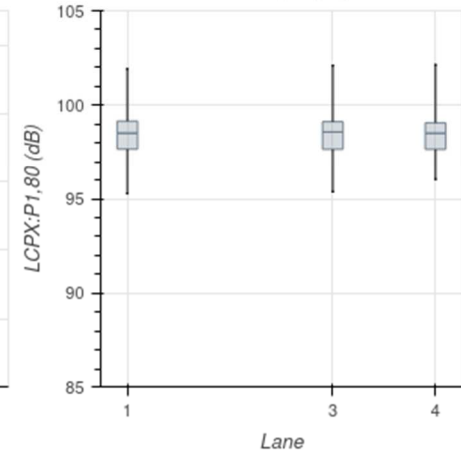
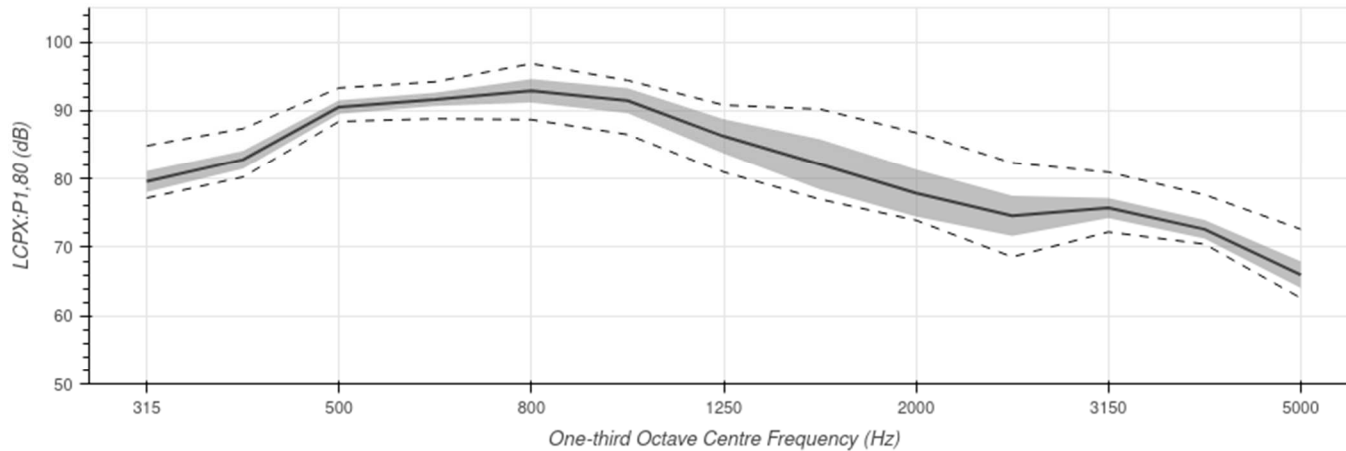
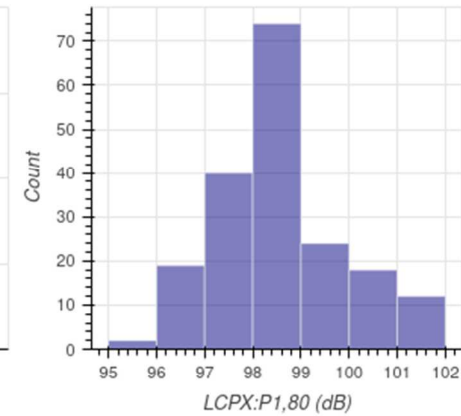
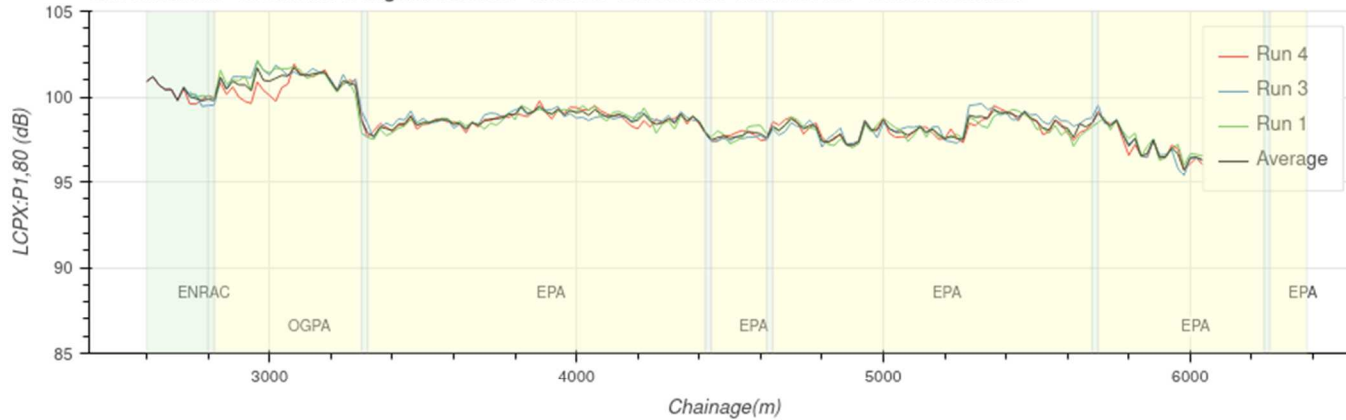


	Average	Run 1	Run 5	Run 4	Run 6	Run 2
Lcpx (dB)	98	97.8	98.3	98	97.9	97.8
Variation (σ)	1.6	1.7	1.3	1.6	1.6	1.6

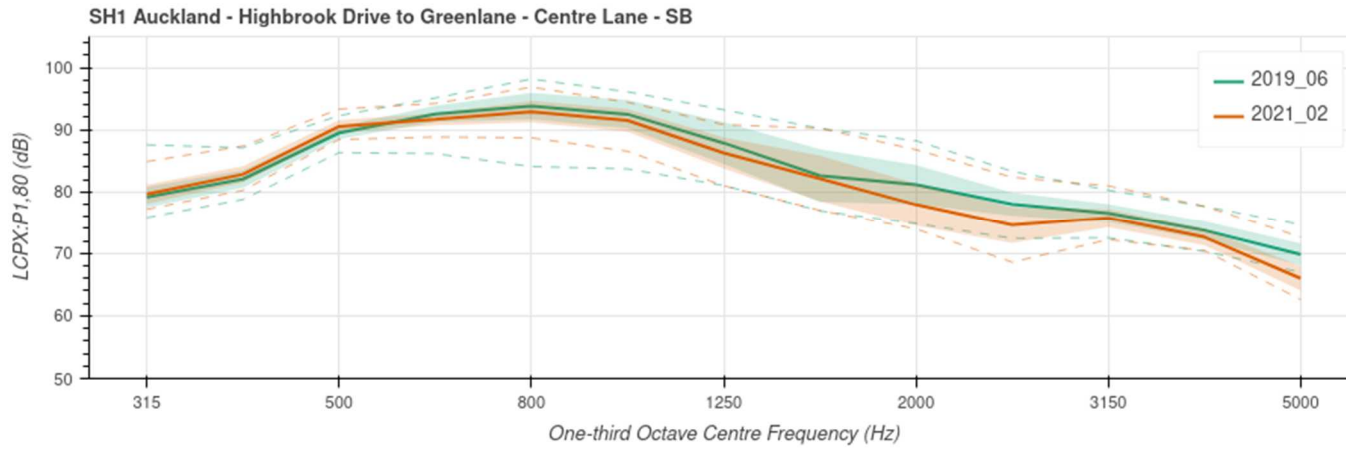
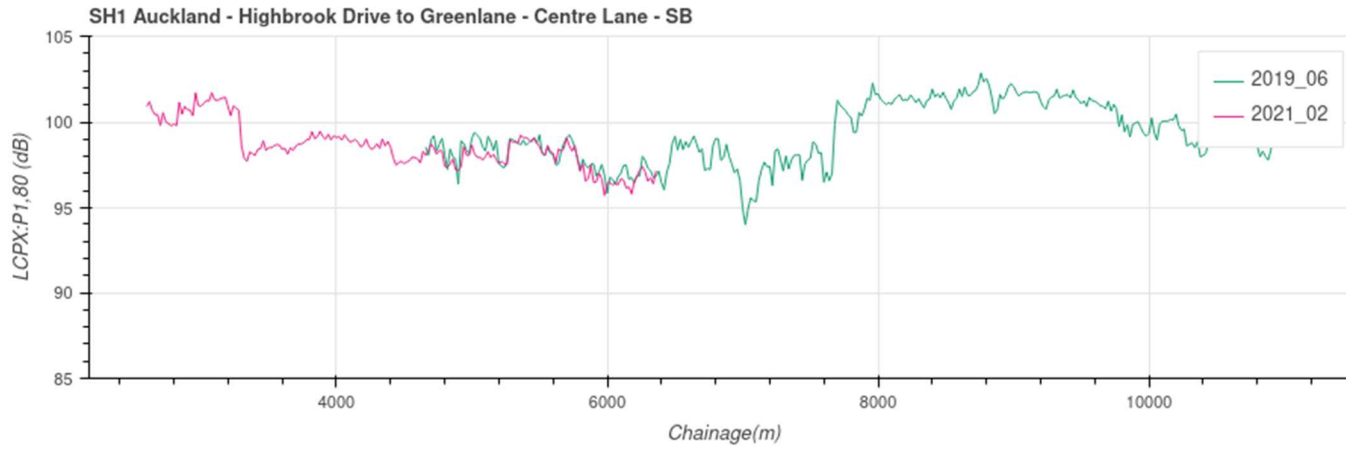


**K.5 SH1 – Auckland Southern Motorway – Southbound – Centre**

SH1 Auckland - Greenlane to Highbrook Drive - Lane: 2 - Direction: I - Road ID: 157 - Date: 03/02/2021

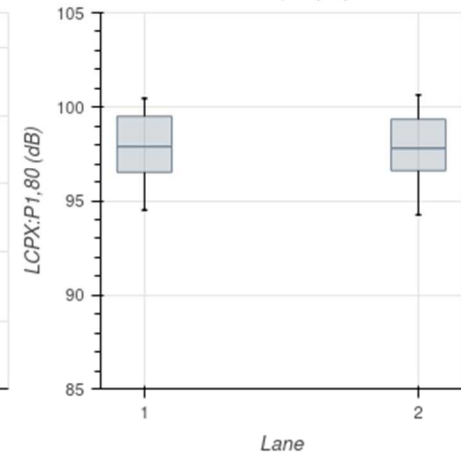
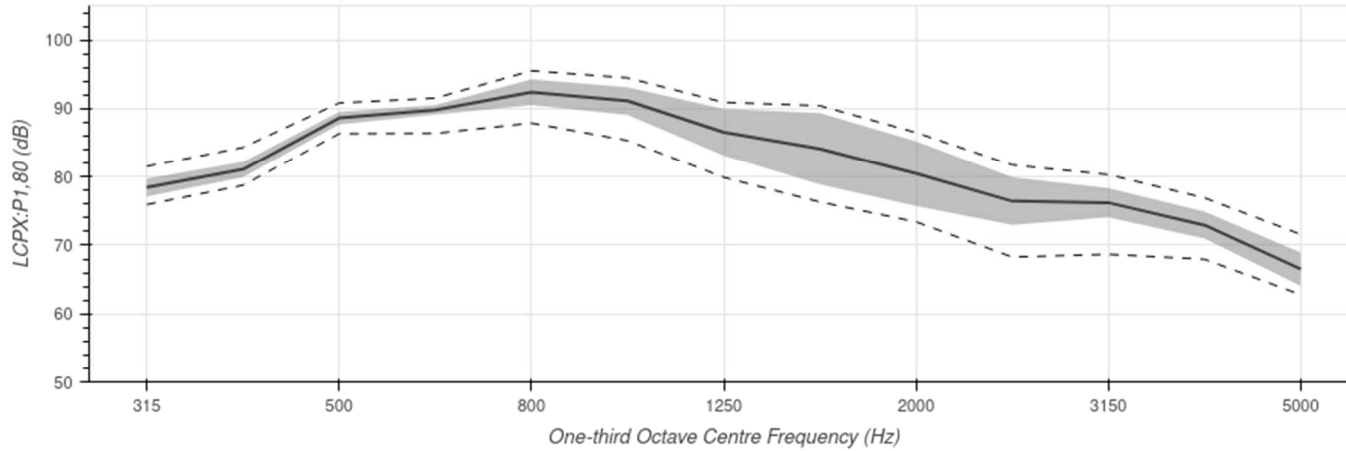
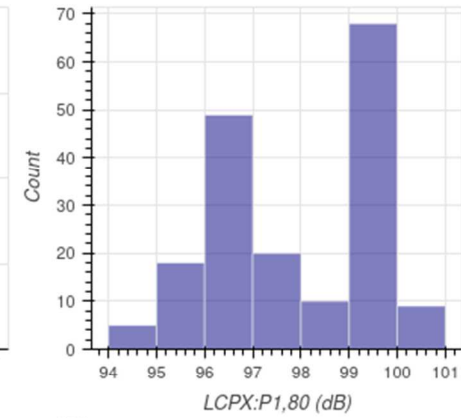
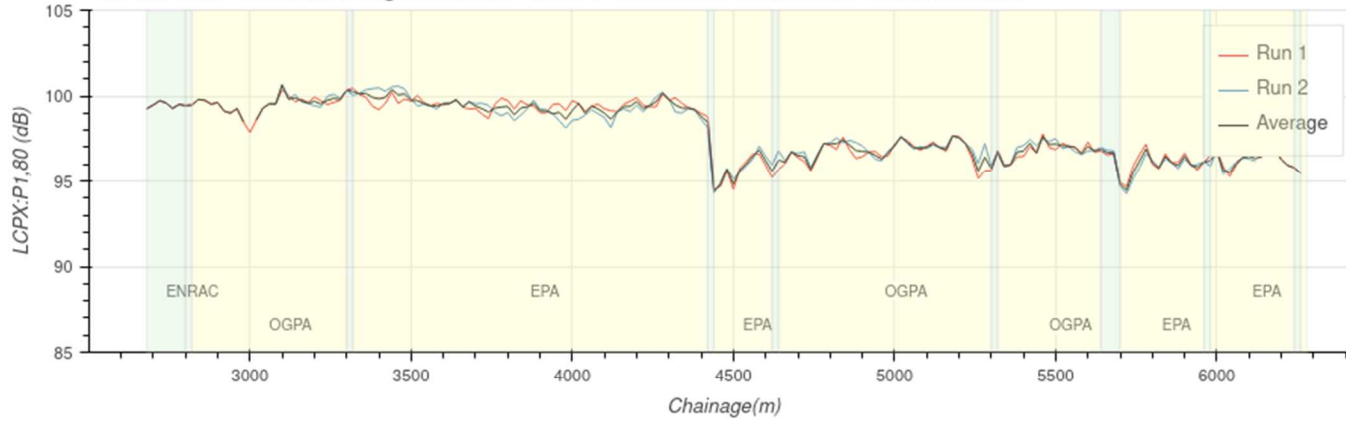


	Average	Run 4	Run 3	Run 1
LcpX (dB)	98.5	98.5	98.6	98.5
Variation (dB)	1.3	1.3	1.4	1.3

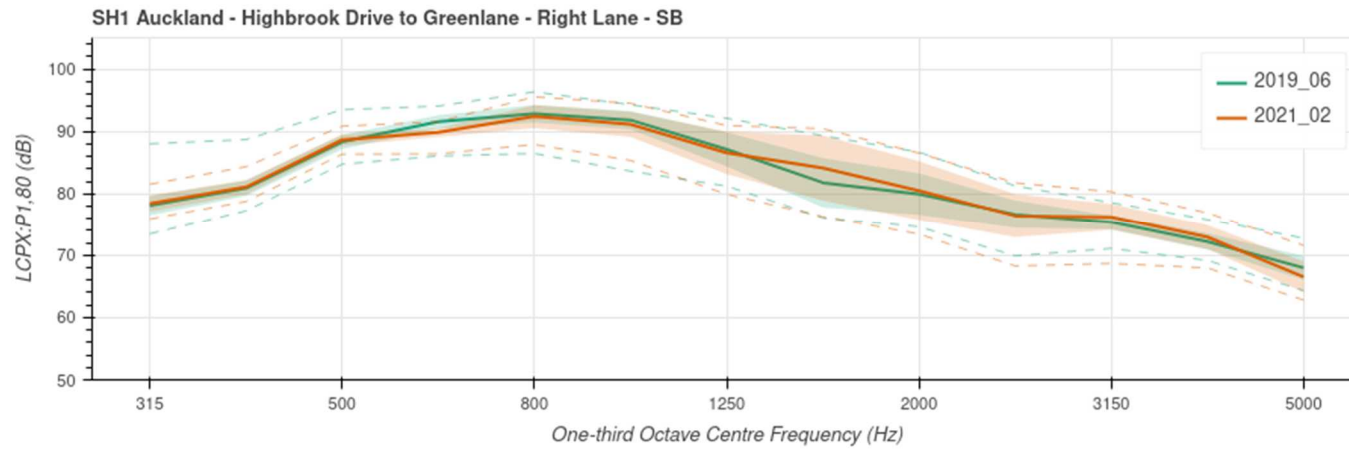
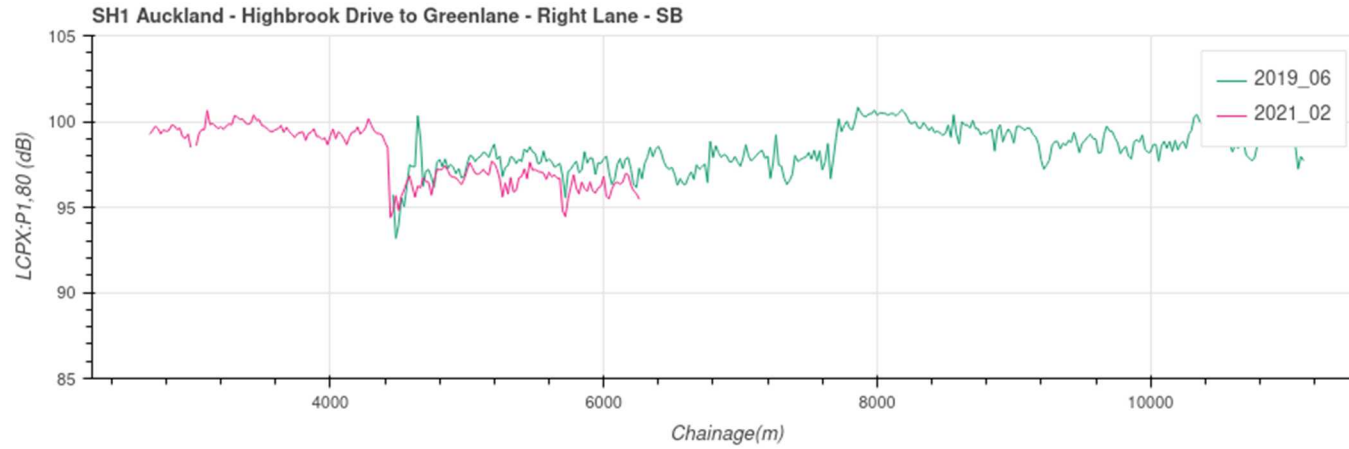


**K.6 SH1 – Auckland Southern Motorway – Southbound – Right**

SH1 Auckland - Greenlane to Highbrook Drive - Lane: 1 - Direction: I - Road ID: 157 - Date: 03/02/2021



	Average	Run 1	Run 2
Lcpx (dB)	97.9	97.9	97.8
Variation (dB)	1.6	1.7	1.6

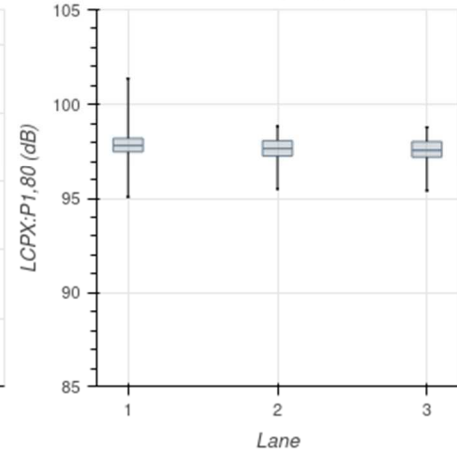
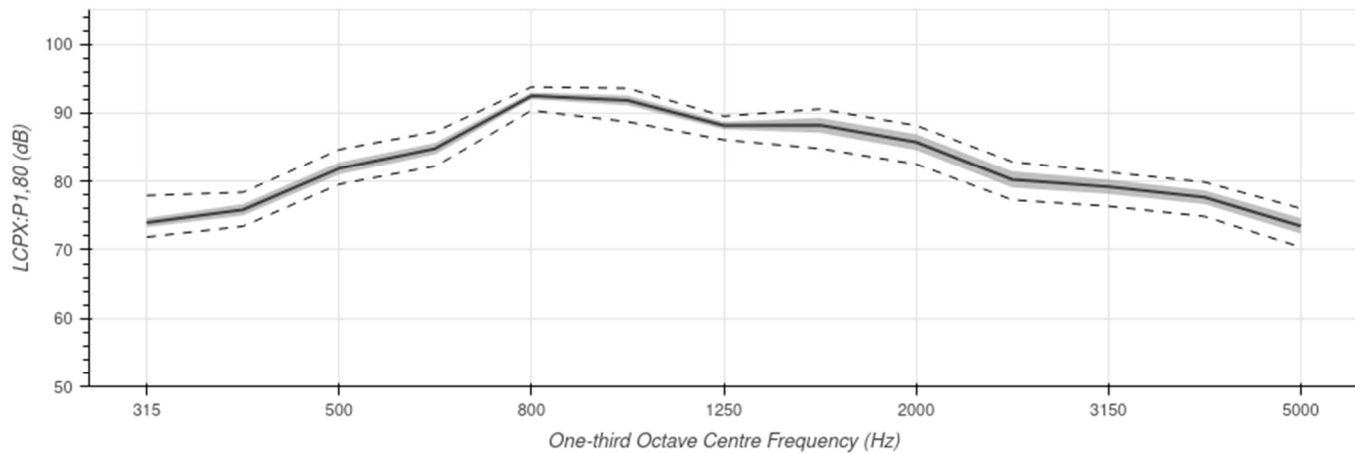
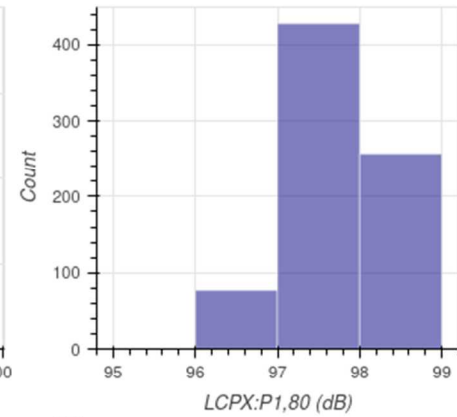
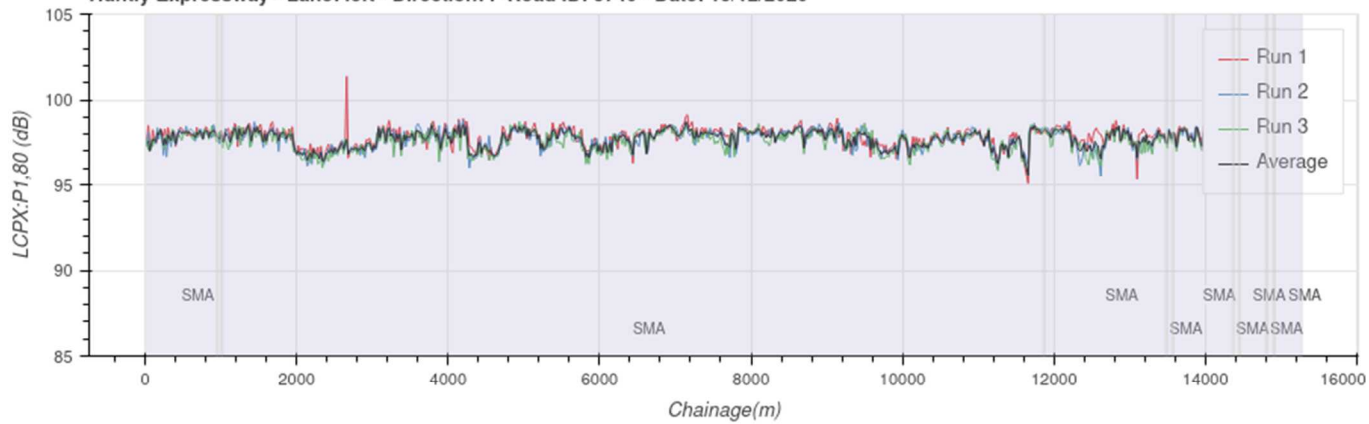




## Appendix L: SH1 – Huntly Expressway

**L.1 SH1 – Huntly Expressway – Southbound – Left**

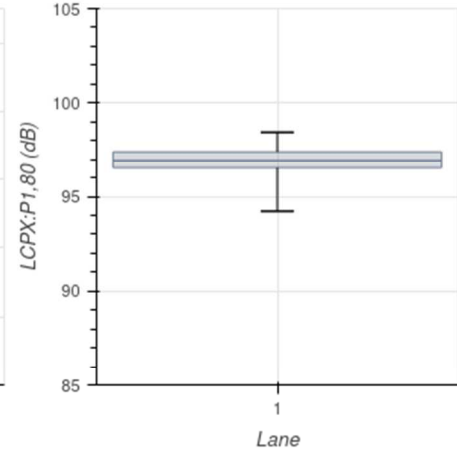
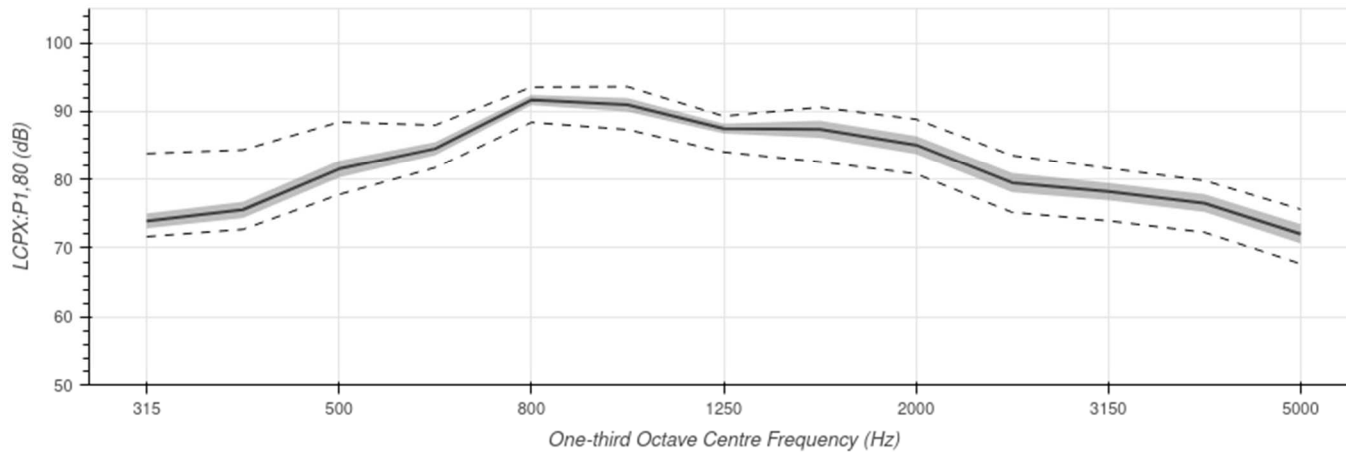
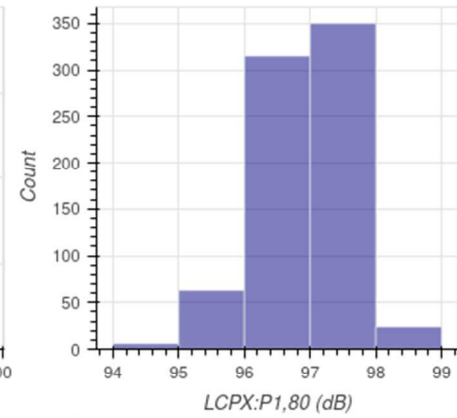
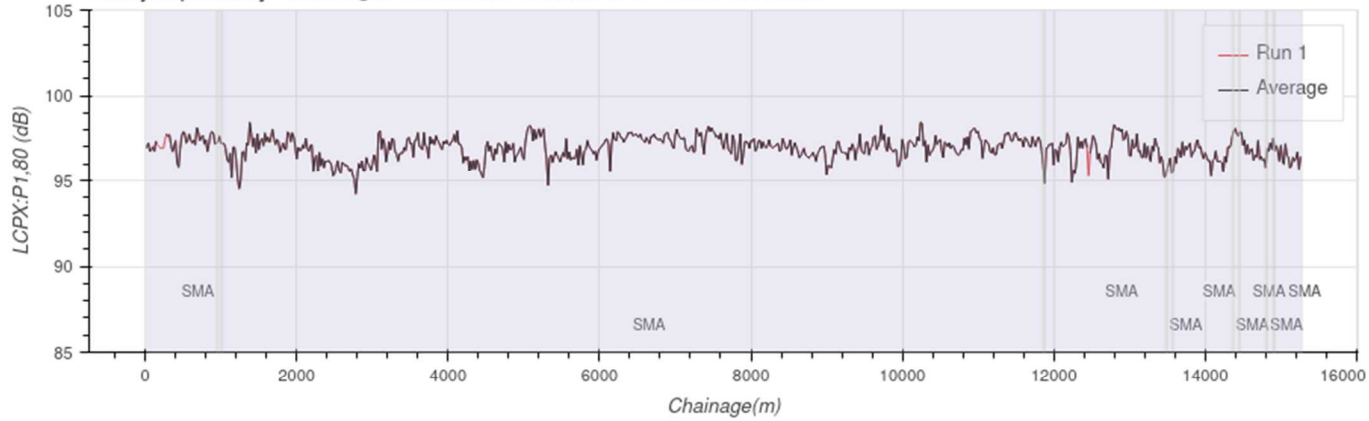
Huntly Expressway - Lane: left - Direction: I -Road ID: 3740 - Date: 15/12/2020



	Average	Run 1	Run 2	Run 3
LcpX (dB)	97.7	97.8	97.7	97.6
Variation (dB)	0.6	0.5	0.5	0.6

**L.2 SH1 – Huntly Expressway – Southbound – Right**

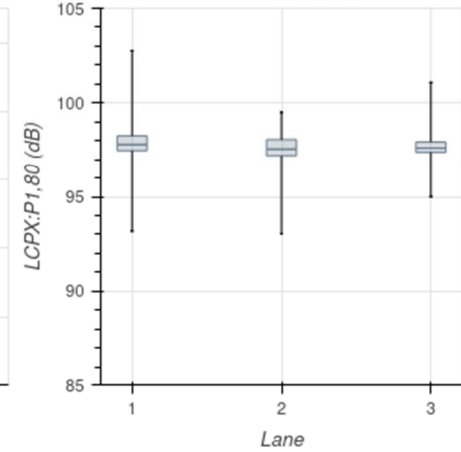
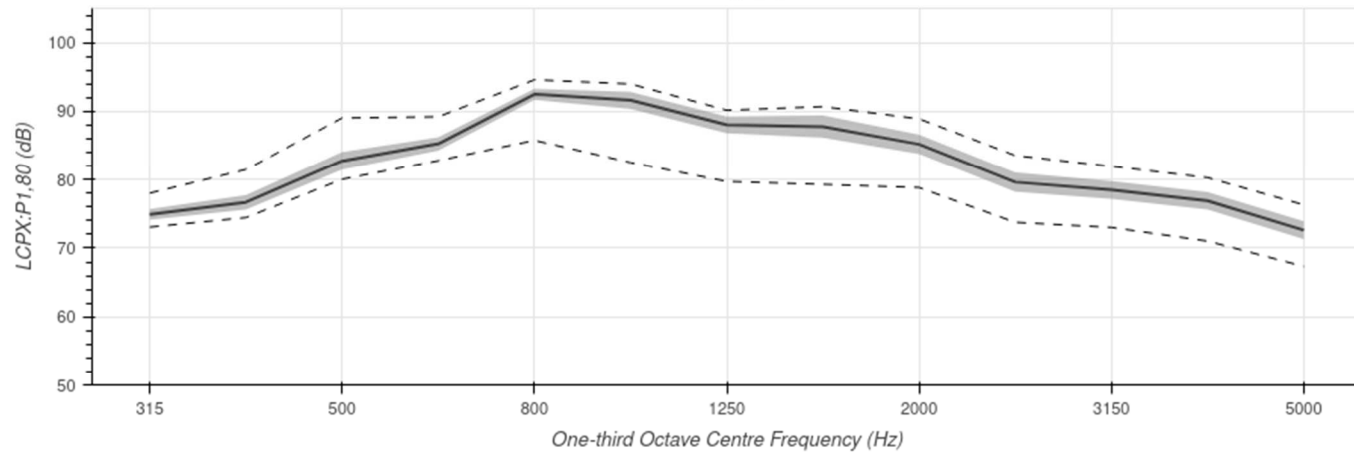
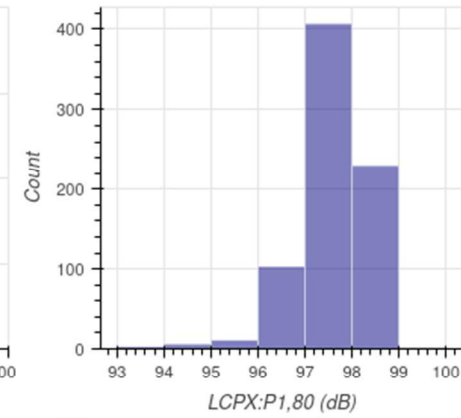
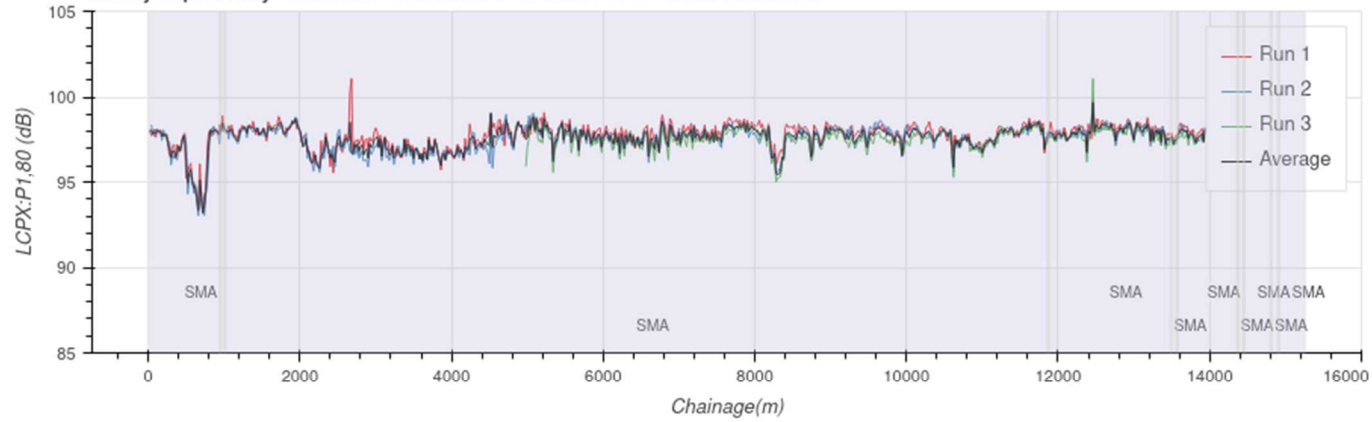
Huntly Expressway - Lane: right - Direction: I - Road ID: 3740 - Date: 15/12/2020



	Average	Run 1
Lcpx (dB)	96.9	96.9
Variation (dB)	0.7	0.7

**L.3 SH1 – Huntly Expressway – Northbound – Left**

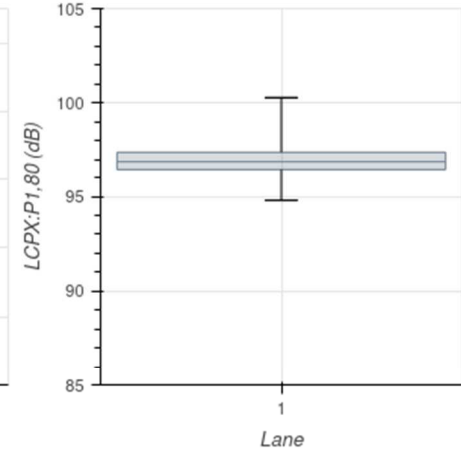
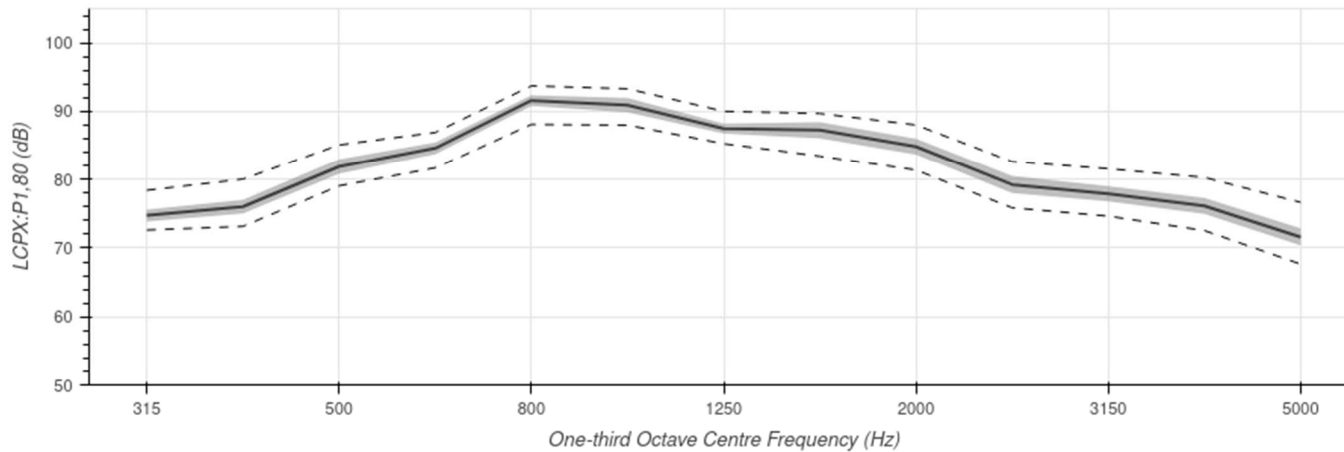
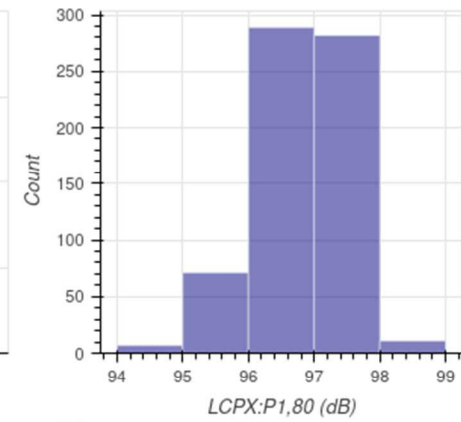
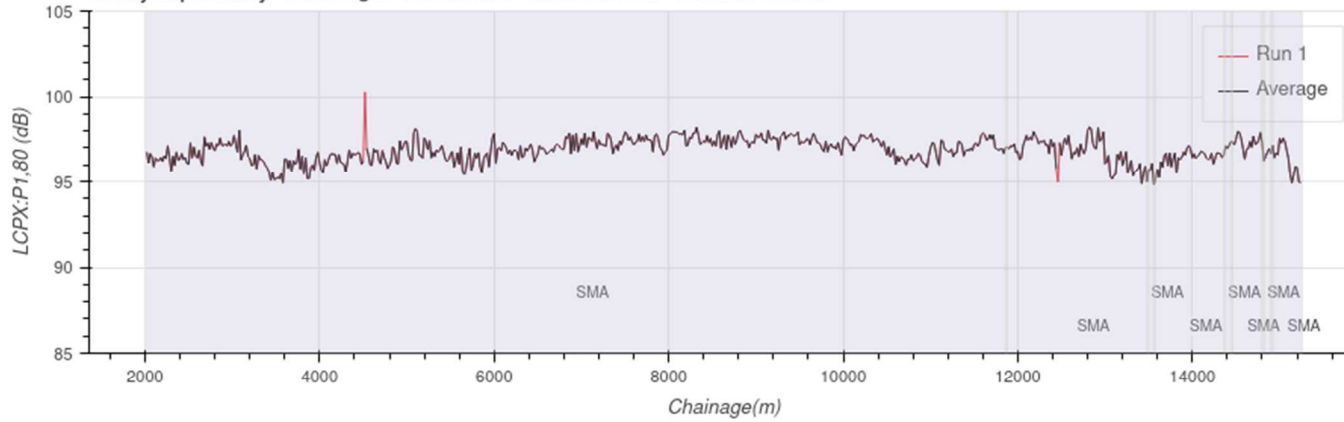
Huntly Expressway - Lane: left - Direction: D -Road ID: 3741 - Date: 15/12/2020



	Average	Run 1	Run 2	Run 3
LcpX (dB)	97.6	97.8	97.5	97.6
Variation (dB)	0.7	0.8	0.8	0.6

**L.4 SH1 – Huntly Expressway – Northbound – Right**

Huntly Expressway - Lane: right - Direction: D -Road ID: 3741 - Date: 15/12/2020



	Average	Run 1
Lcpx (dB)	96.9	96.9
Variation (dB)	0.7	0.7