

## Memorandum

<b>To:</b>	<b>Auckland Council</b>
<b>From:</b>	Supporting Growth (Siiri Wilkening, Claire Drewery SGA Noise Specialists)
<b>Date:</b>	06 March 2023
<b>Subject:</b>	Section 92: Request for further information (Operational Noise Matters)

The following Operational Noise Assessment information has been provided in response to requests for further information from Auckland Council's noise specialist. More information has been requested in regard to following matters.

- Noise effects on future receiving environment / Future Urban Zone
- Health effects that might be experienced as a result of noise levels
- Annoyance effects

### Noise effects on future receiving environment / Future Urban Zone

Areas identified for future development such as the FUZ will need to be integrated with the transportation network developed by Te Tupu Ngātahi. There is no certainty about what such development will look like. Structure plans, where available, give a general indication of future uses; however, the final form, location and sensitivity of the future receivers is not known. For these reasons, the noise level contours provided with the traffic noise reports can be used by future developers to gain an understanding of the treatment that noise sensitive activities may require in order to provide a suitable internal noise environment. Table 1 gives an indication which acoustic treatment may be included should noise sensitive activities be established within certain traffic noise levels.

**Table 1 Noise Levels and possible treatment of new sensitive activities**

Noise level range (dB $L_{Aeq(24h)}$ )	Possible treatment of new sensitive activities (to achieve an internal noise level of 40 dB $L_{Aeq(24h)}$ )
<55	No specific treatment is required. An internal noise level of 40 dB $L_{Aeq(24h)}$ can be achieved with windows open for ventilation
55 – 60	Windows may need to be closed at times. Therefore, alternative ventilation and a means of cooling may be required. Sensitive activities could be designed to face away from the road, e.g. having garages, bathrooms and hallways face the road.
60 – 65	Windows will need to be closed to achieve 40 dB $L_{Aeq(24h)}$ inside. Alternative ventilation and a means of cooling are required. Sensitive activities could be designed to face away from the road, e.g. having garages, bathrooms and hallways face the road. Less sensitive activities could be placed in these levels, e.g. shops, offices or similar.

Noise level range (dB LAeq(24h))	Possible treatment of new sensitive activities (to achieve an internal noise level of 40 dB LAeq(24h))
65 – 70	Not generally suited for noise sensitive use unless significant mitigation is included in the building envelope (e.g. heavy façade materials, non-openable windows, laminated double glazing etc). Less or non-noise sensitive uses are better suited for this environment. Buildings fronting the road could be used for shielding sensitive uses, e.g. a row of shops shielding dwellings behind.
>70	Not suited for noise sensitive uses.

### Health effects that might be experienced as a result of noise levels

Our assessment of effects on people is generally quantitative, relating to the noise level received in the future, the change in noise level experienced due to the Project and the number of people potentially highly annoyed by ongoing long term traffic noise. There are also several qualitative aspects that affect how people perceive the acoustic effects of a Project.

The World Health Organisation has identified that noise levels above 50 dB LAeq may cause adverse health effects. Exposures to high noise levels can result in a reduction in sleep quality, awakenings, annoyance, lack of concentration, which in turn can lead to an impact on people's health. This means that as levels increase further, more focus is applied to management, mitigation and landuse planning to reduce effects.

We consider that the 50 dB LAeq threshold is not an appropriate noise limit in the context of the Project assessed but provides an indication of overall effects in addition to the quantitative assessment undertaken. Most PPFs currently experience similar or higher noise levels from existing roads, and the Projects enable the design and implementation of mitigation.

Based on the above, most of the Projects provide for low noise road surface either as part of the project or as a mitigation option. In addition, it is recommended that the noise contours identified through our assessment:

- A. Be appended to the conditions of the designation for information purposes to assist developers of adjacent land; and
- B. If possible be uploaded to the Auckland Council GIS/AUP:OP viewer so that this data is publicly available to both land developers and potential home buyers.

We consider that the availability of the noise contours will assist in future land use integration with road infrastructure by informing future development of likely noise levels.

Future urban development (of which the Project will be a component of) will result in a change in noise environment especially where the Project constitutes a New Road in accordance with NZS 6806. Where a new noise source is introduced into an area that is currently not (or only little) affected by continuous man-made noise sources such as traffic, effects may be more pronounced. While the

noise levels can generally be reduced to a reasonable level with the mitigation proposed, the change in character will be clearly noticeable and may cause annoyance to people in the area. In addition, noise levels will increase above existing levels. However, where the area surrounding these Projects is earmarked for development (e.g. FUZ or structure plans), existing noise levels may not accurately represent the future situation when the road will be built. Future residents may have different expectations as they will move into a different environment.

Nevertheless, future uses in the FUZ or similar development area must take account of the traffic noise levels and manage them appropriately. Noise contour maps and a table showing relevant responses to traffic noise levels that can be used by developers when planning their development are included in Appendix 1.

Another aspect of people's reaction to a Project relates to habituation, i.e. "getting used to" the change and level in noise environment. This occurs over time. Any change in environment due to the introduction of a new road or moving of a road source from one location to another, may cause initial disturbance to people. However, over time, people become accustomed to the sound (both level and location), pay less attention to it and the response will diminish.

### **Annoyance effects**

Annoyance can be caused by several aspects of a project, e.g. the change in the character or level of noise, potential loss of quiet, people's perception of a project, and people's ability to give feedback and influence a project, amongst others. Annoyance Assessment Graphs are included in Appendix 2 for each Notice of Requirement (except NoR 2a Redhills – East-West Arterial – Dunlop Road where there are no PPFs). The graphs show two aspects of the annoyance assessment:

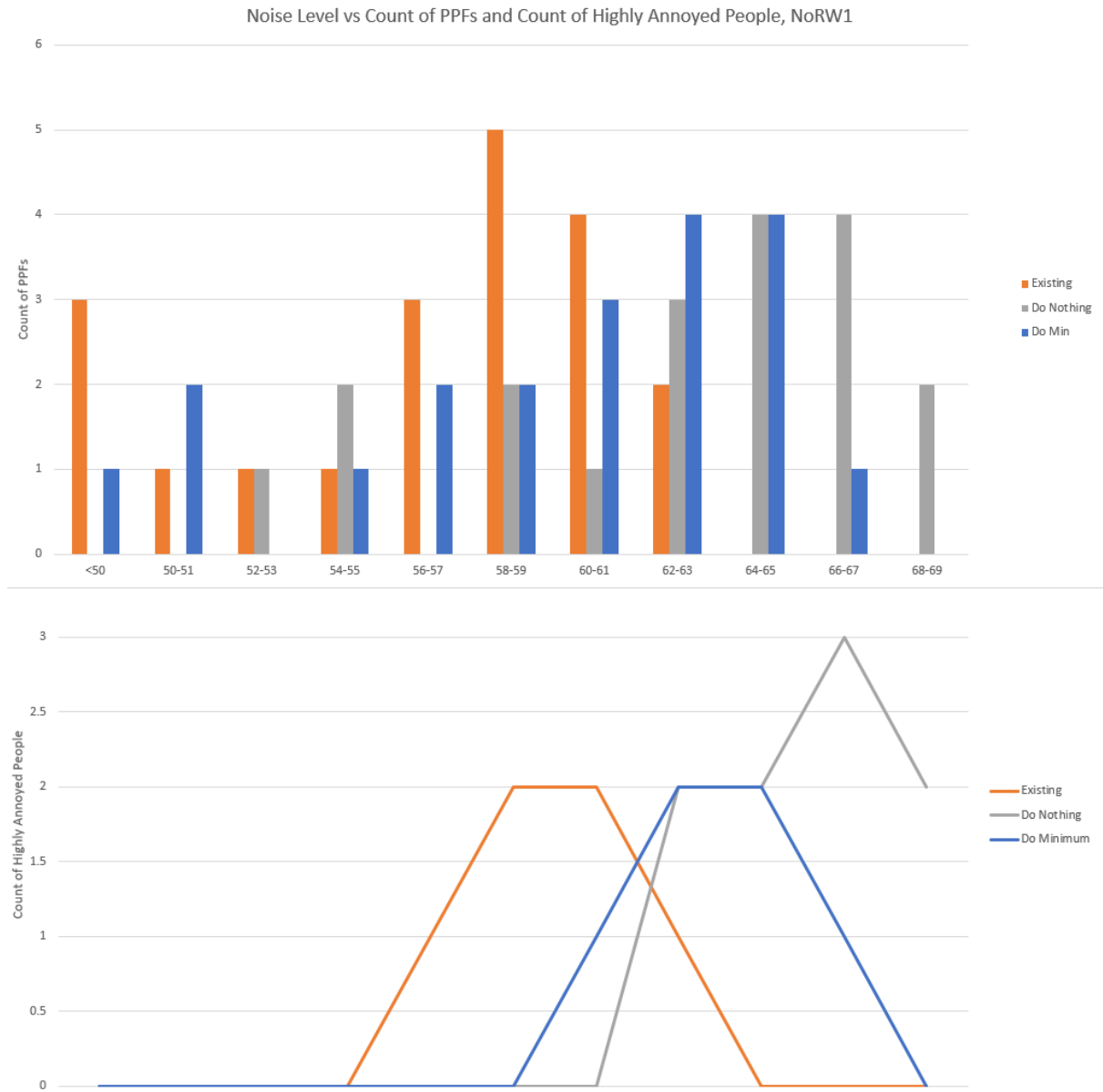
- the number of PPFs in each narrow noise band, and
- the number of people potentially highly annoyed.

Since a higher percentage of people may be highly annoyed at higher noise levels, this may result in more people being annoyed despite a smaller number of PPFs being in the high noise bands. The graphs show the shift of the number of PPFs without and with the Project and the redistribution of number of people highly annoyed.

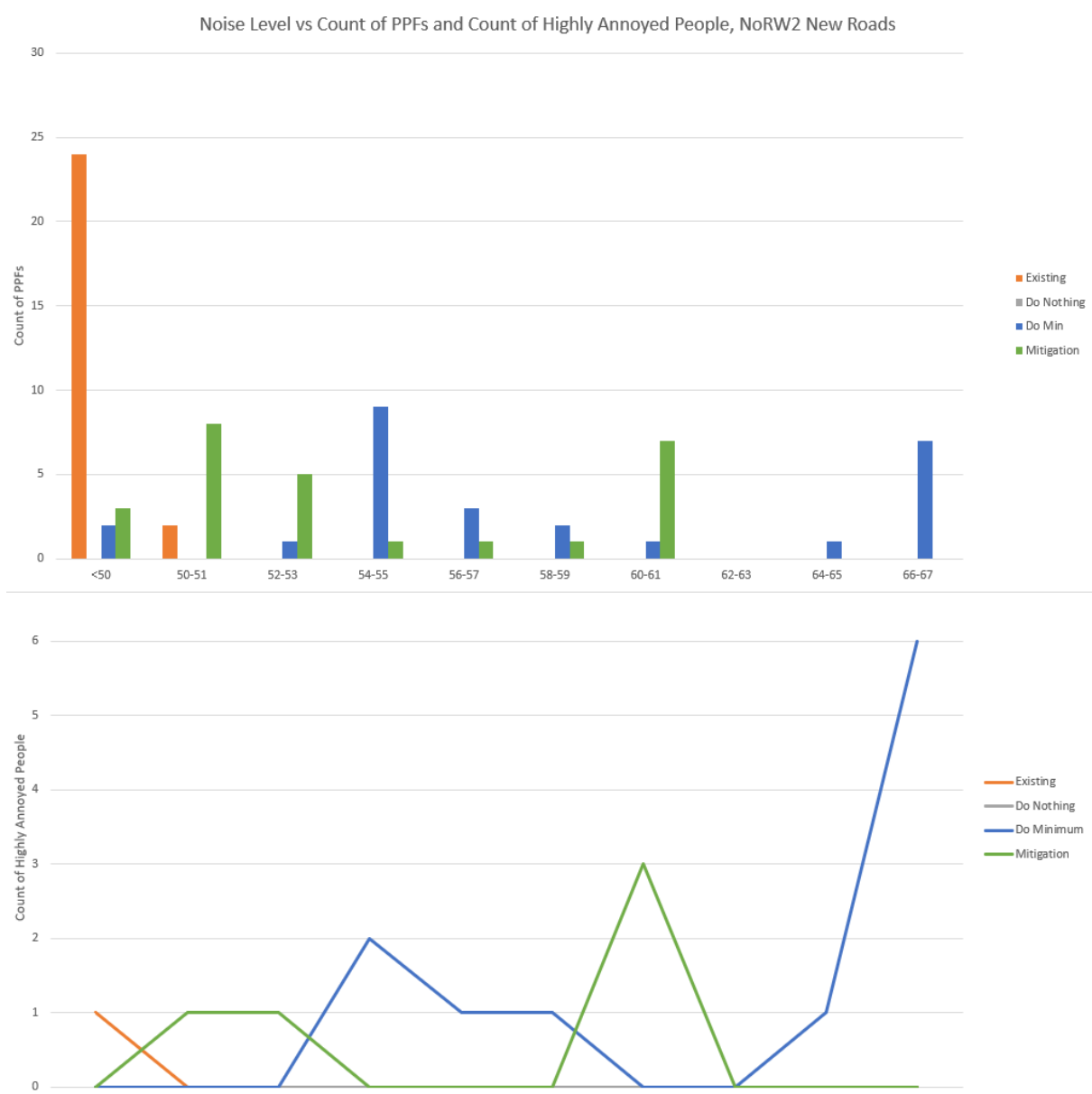
Appendix 1 Noise Contours Map

Appendix 2 Annoyance Assessment Graphs

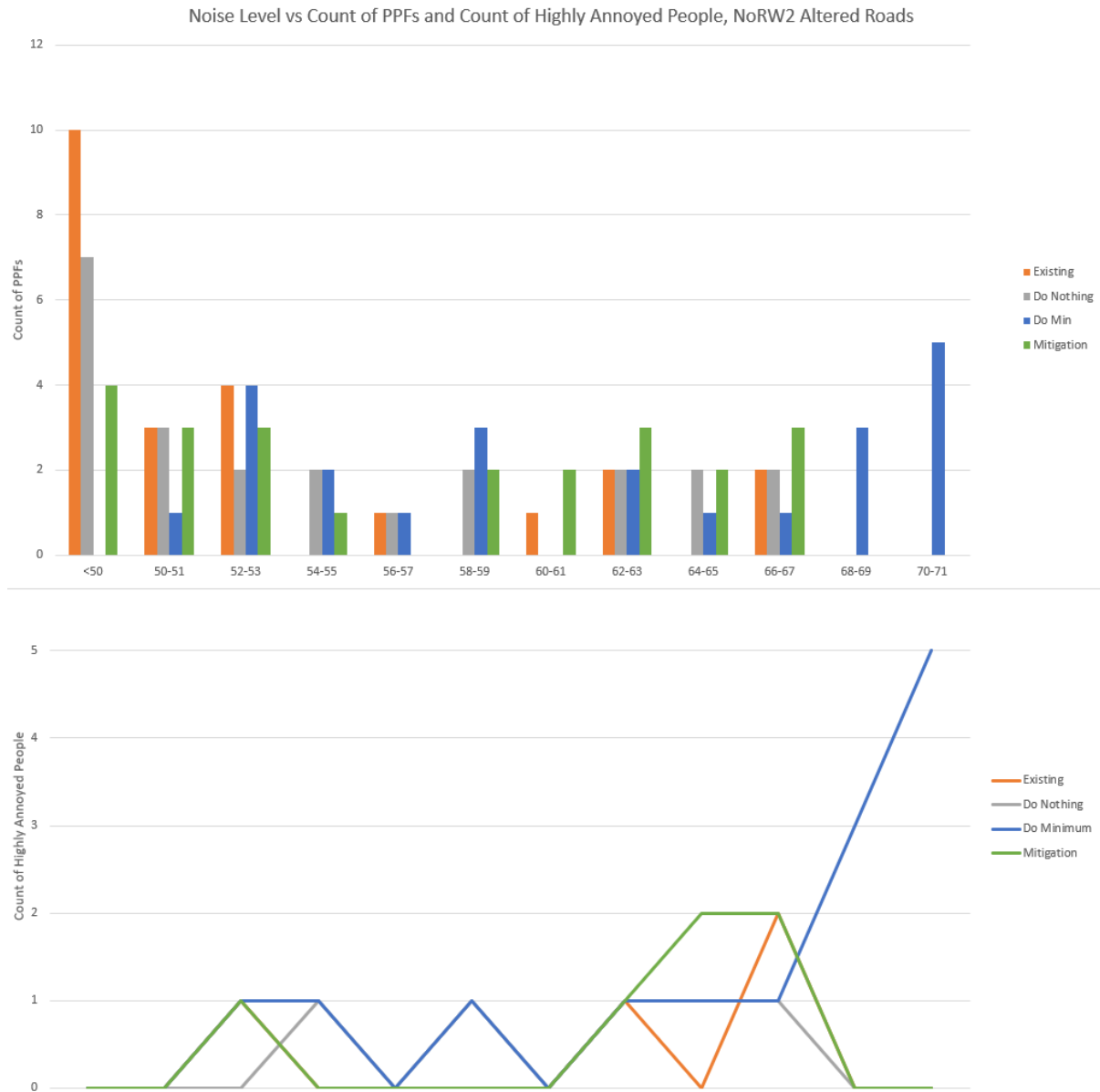
Figure 1 NOR W1 Trig Road (North)



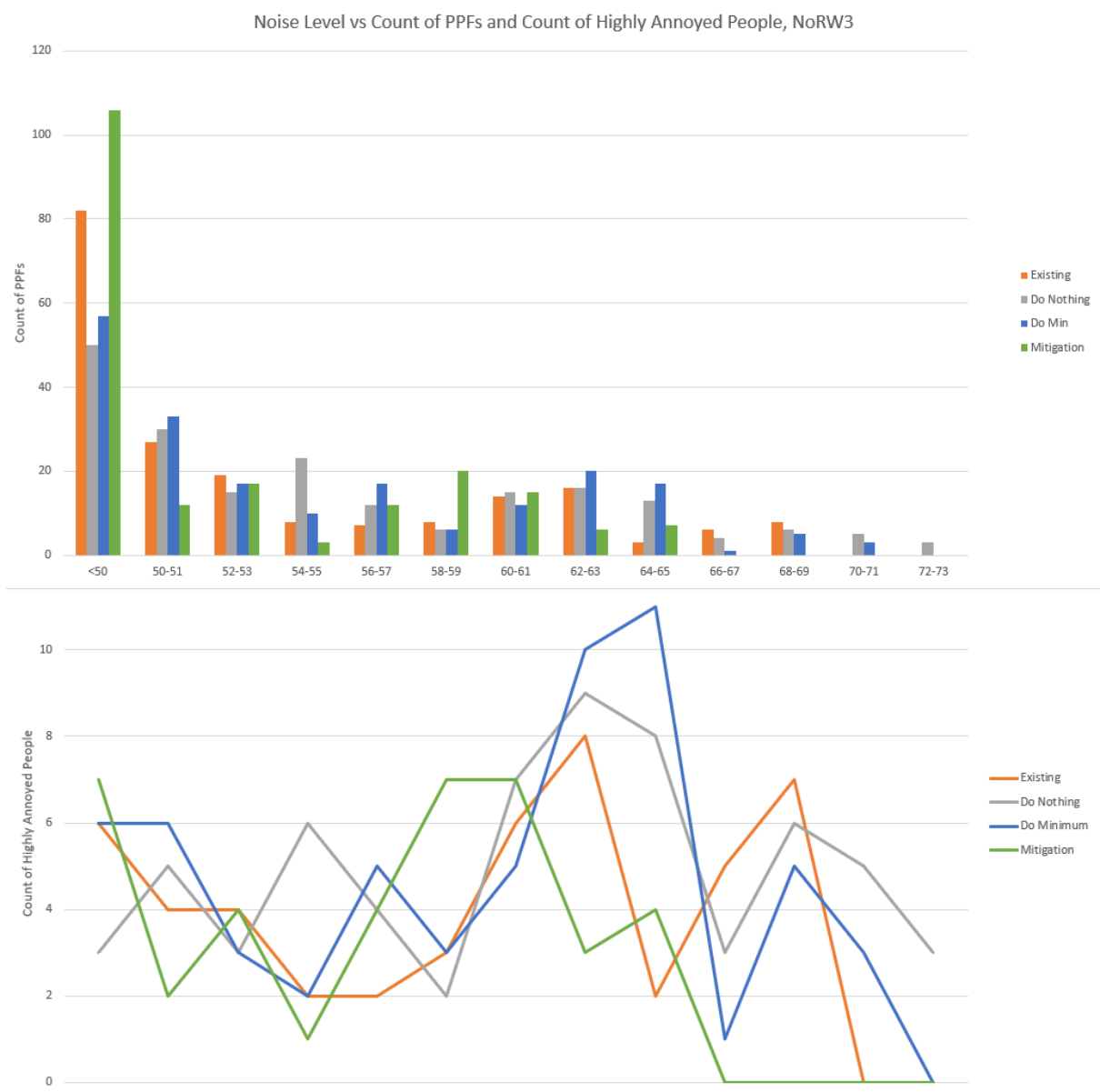
**Figure 2 NOR W2 Māmari Road**



**Figure 3 NOR W2 Māmari Road**

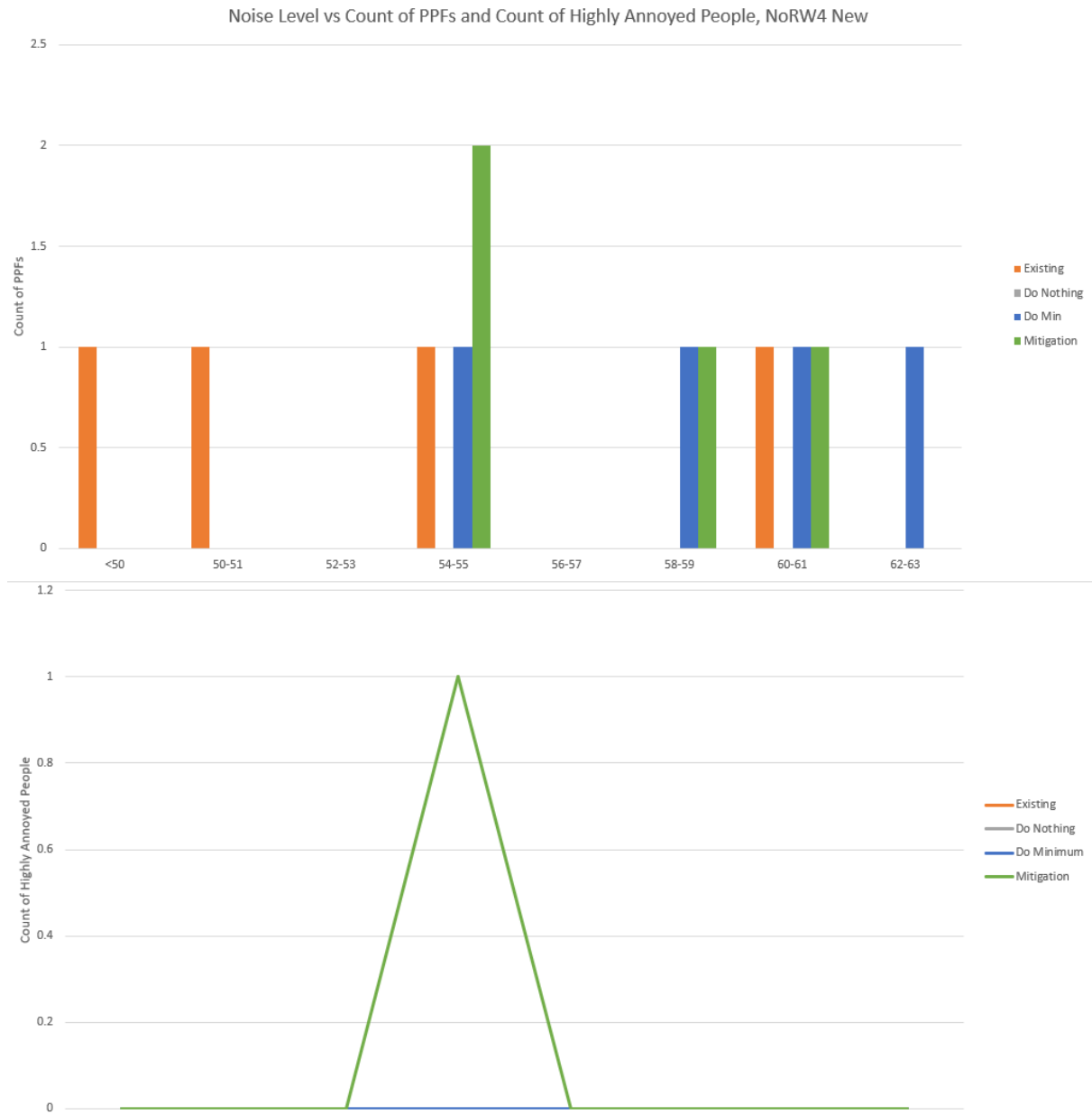


**Figure 4 NOR W3 Brigham Creek Road**

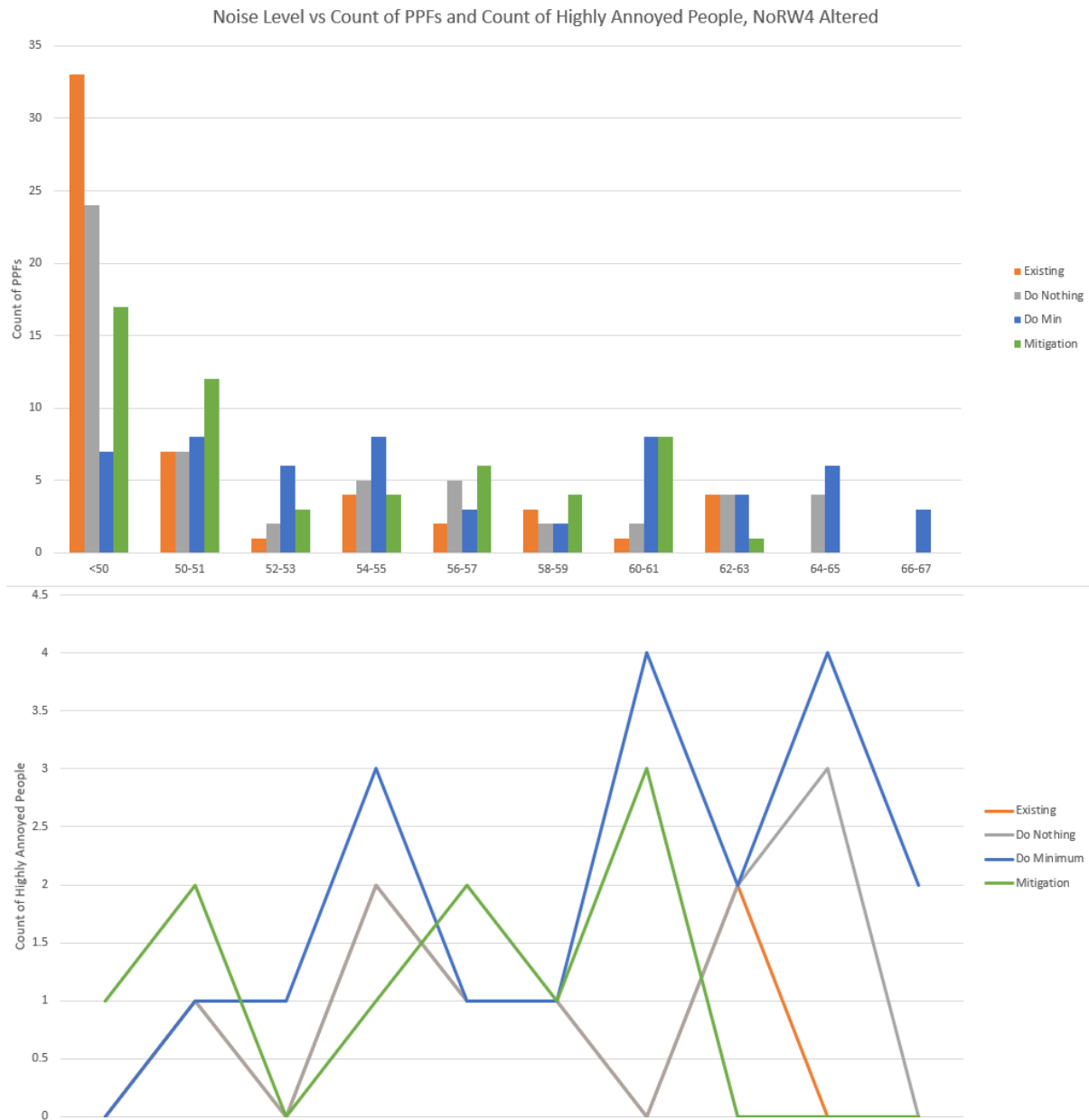




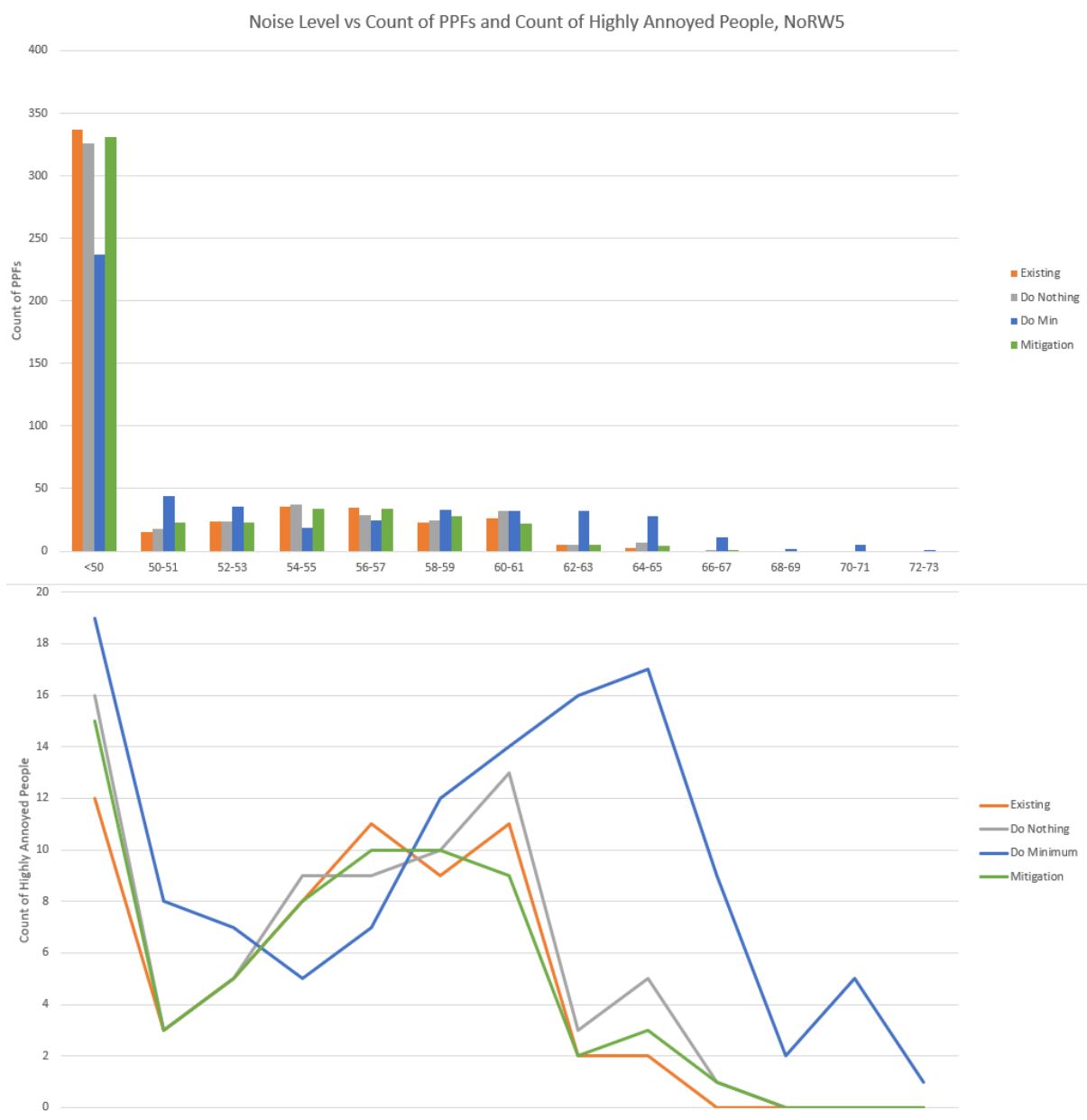
**Figure 5 NOR W4 Spedding Road**



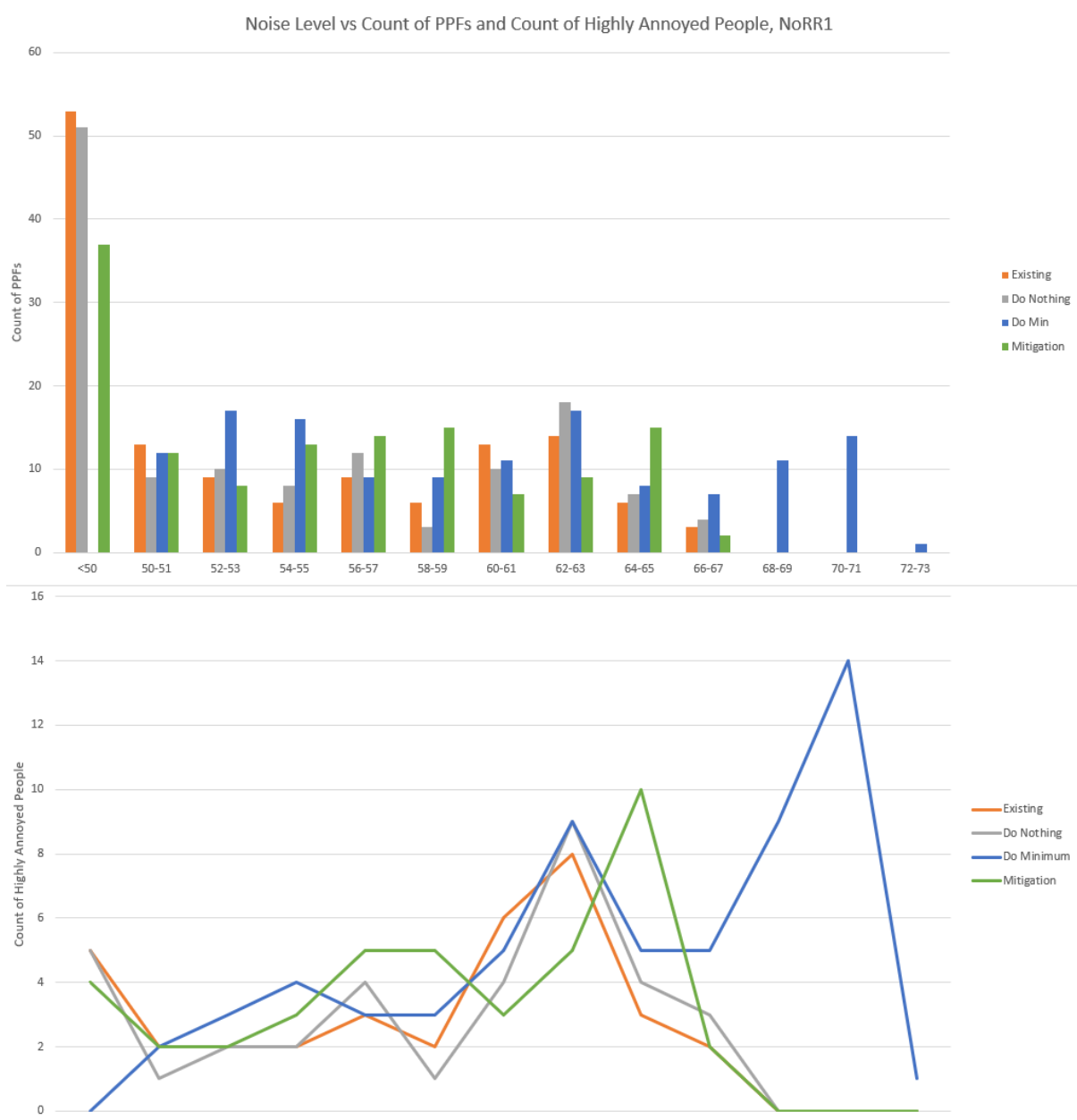
**Figure 6 NOR W4 Spedding Road**



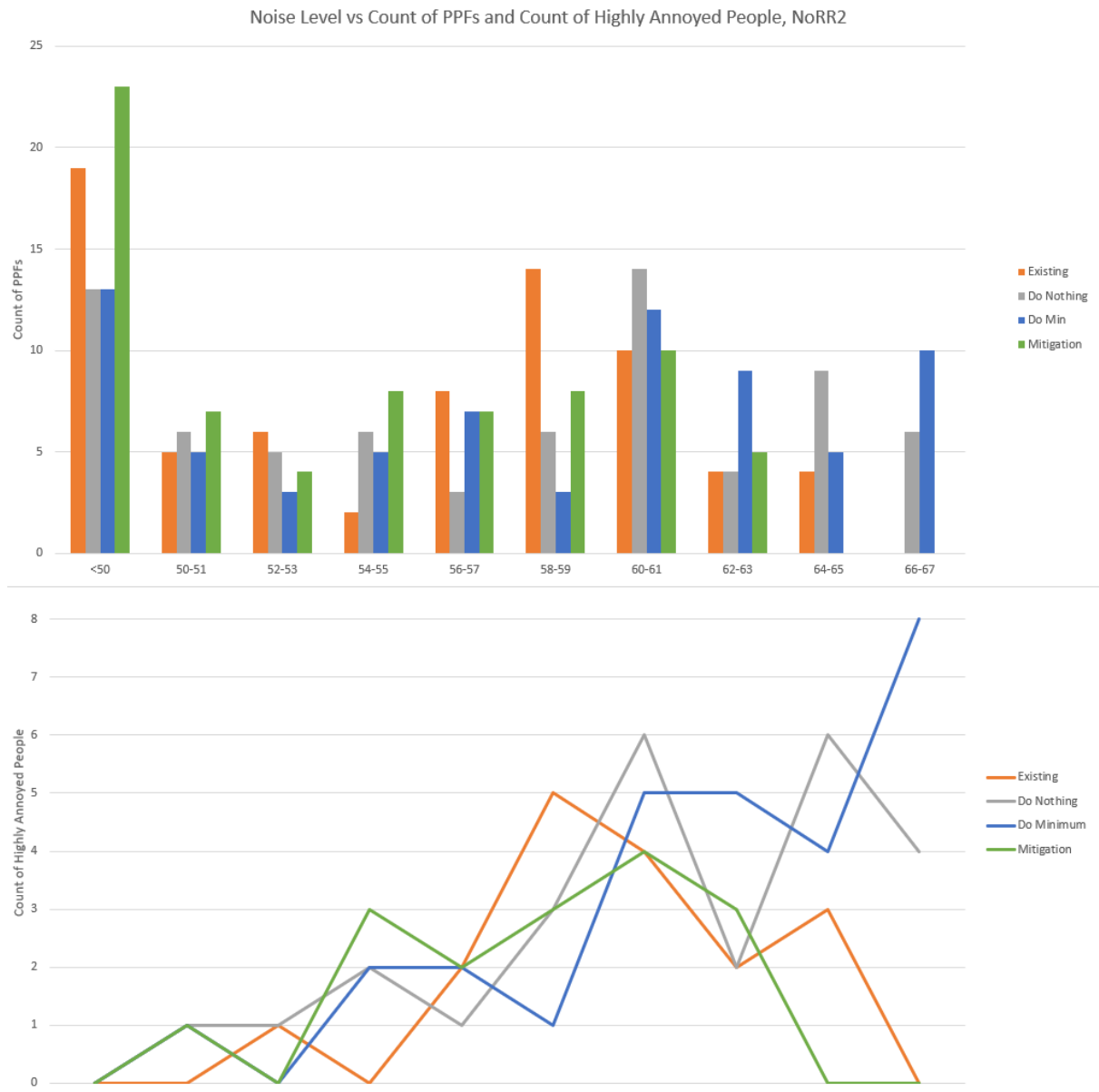
**Figure 7 NOR W5 Hobsonville Road**



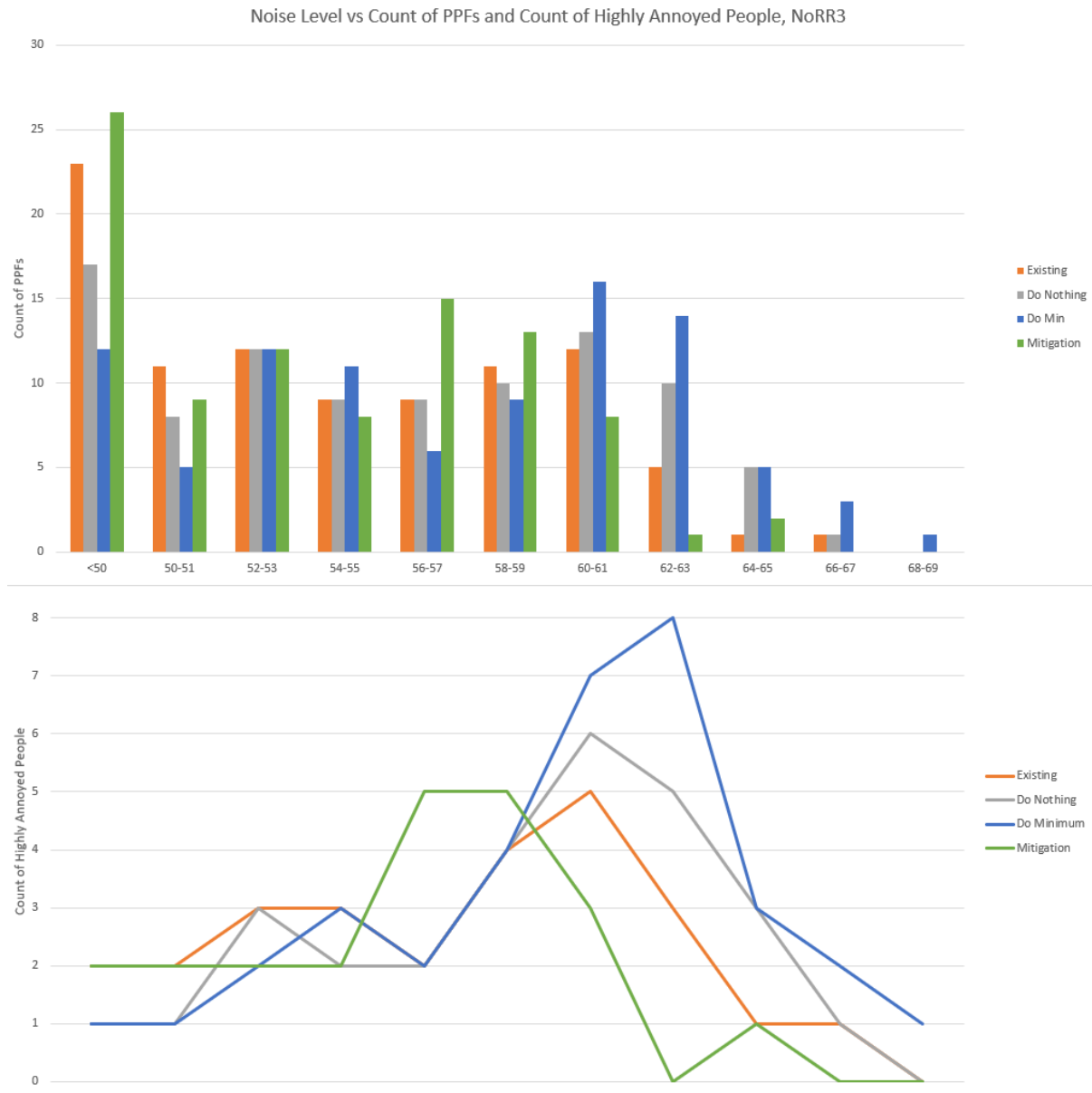
**Figure 8 NOR RE1 Don Buck Road**



**Figure 9 NOR RE2 Fred Taylor Drive**



**Figure 10 NOR R1 Coatesville-Riverhead Highway**



**Figure 11 NOR 1 Redhills – North South Arterial**

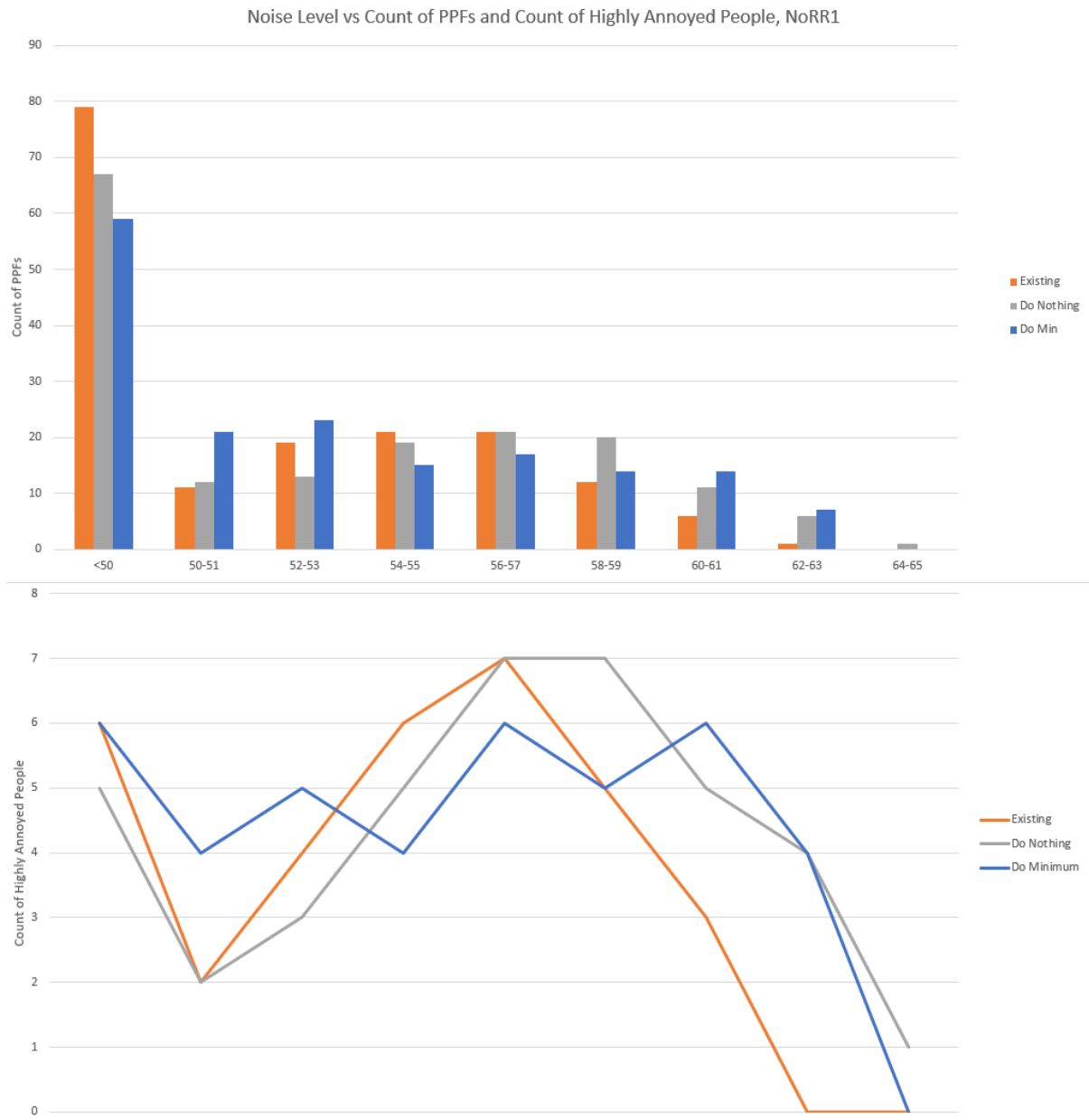
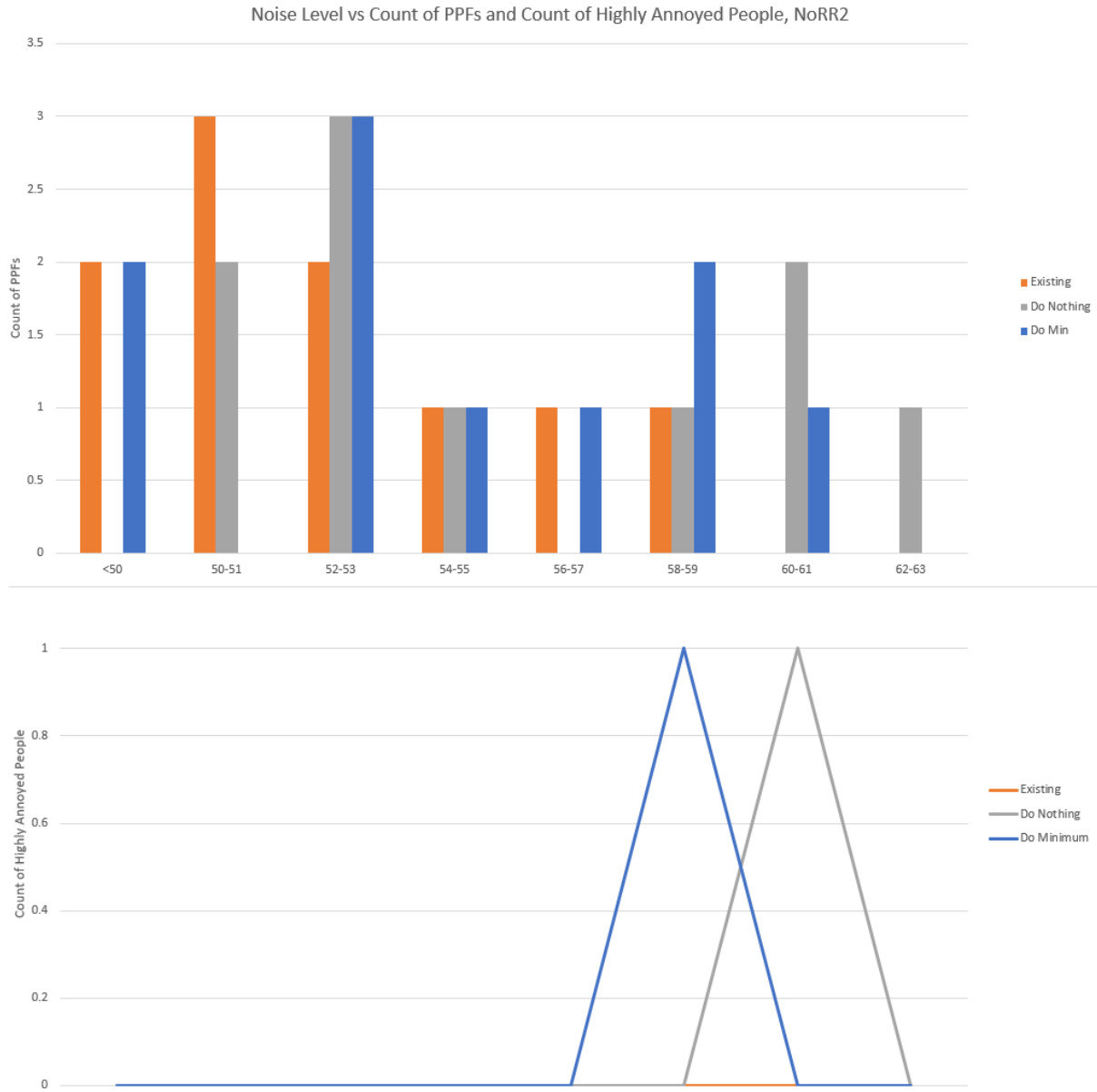
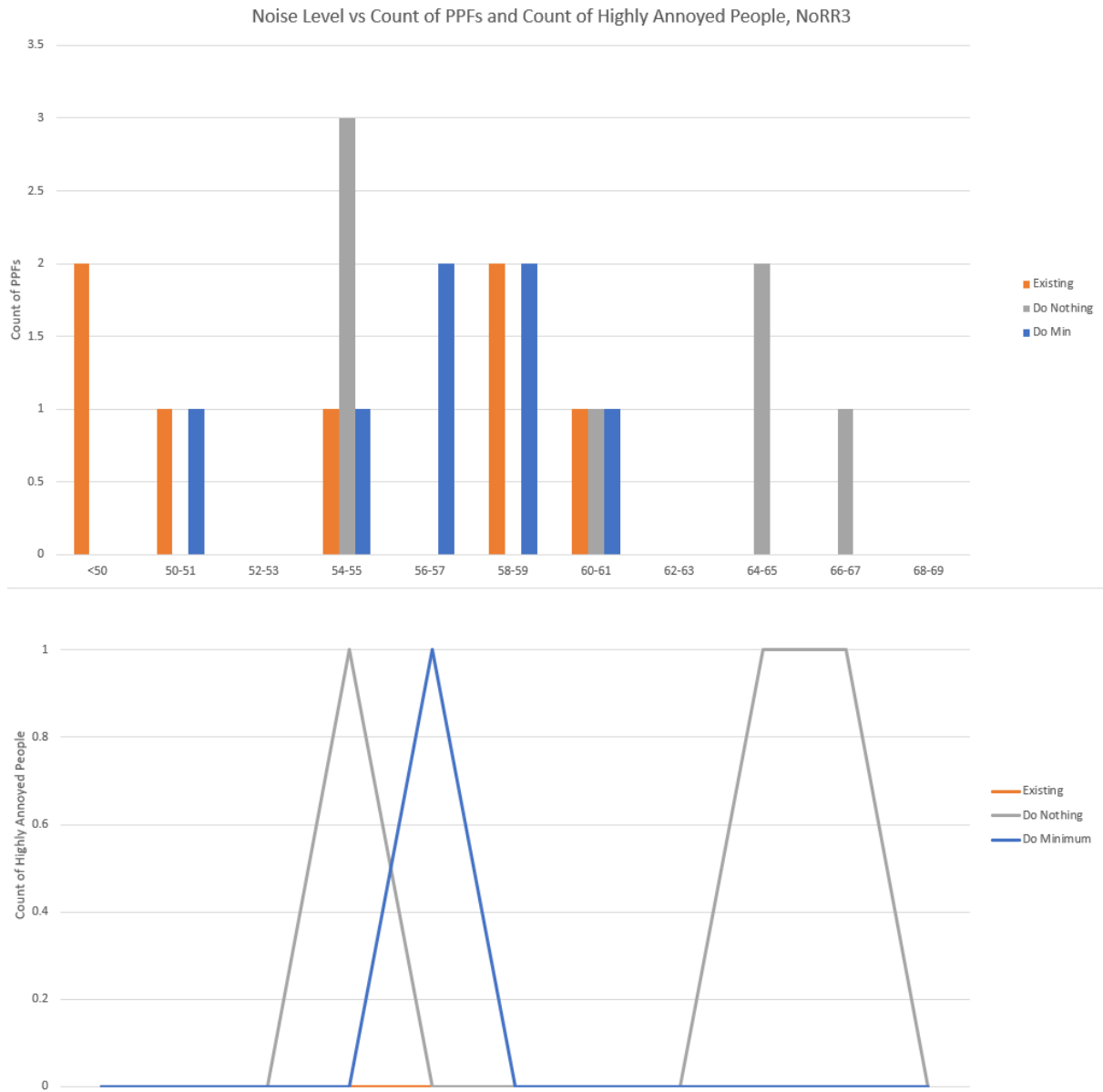


Figure 12 NOR 2b Redhills – East-West Arterial – Baker Lane





**Figure 13 NOR 2c – East West Arterial – Nixon Road**



**Figure 14 NOR Trig Road (South)**

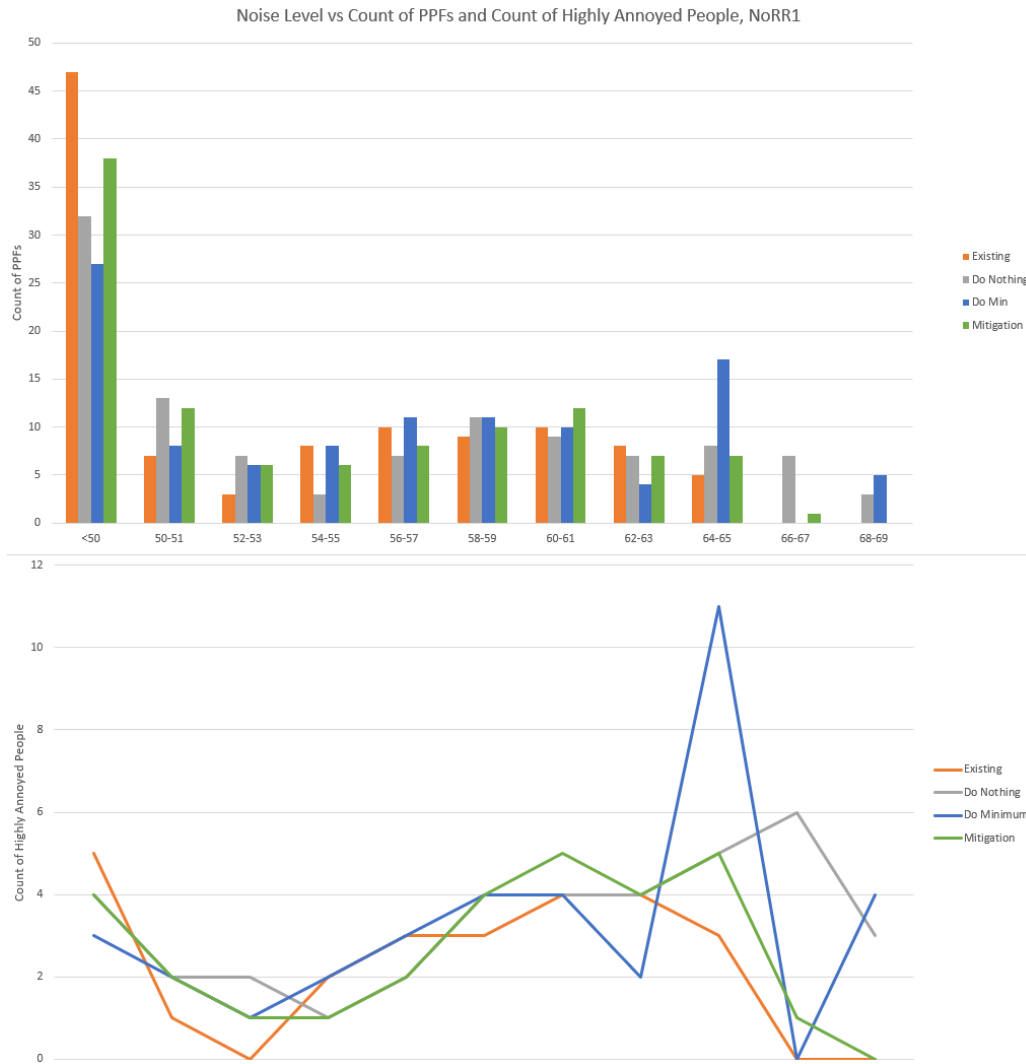


Figure 15 NOR S1 Alternative State Highway

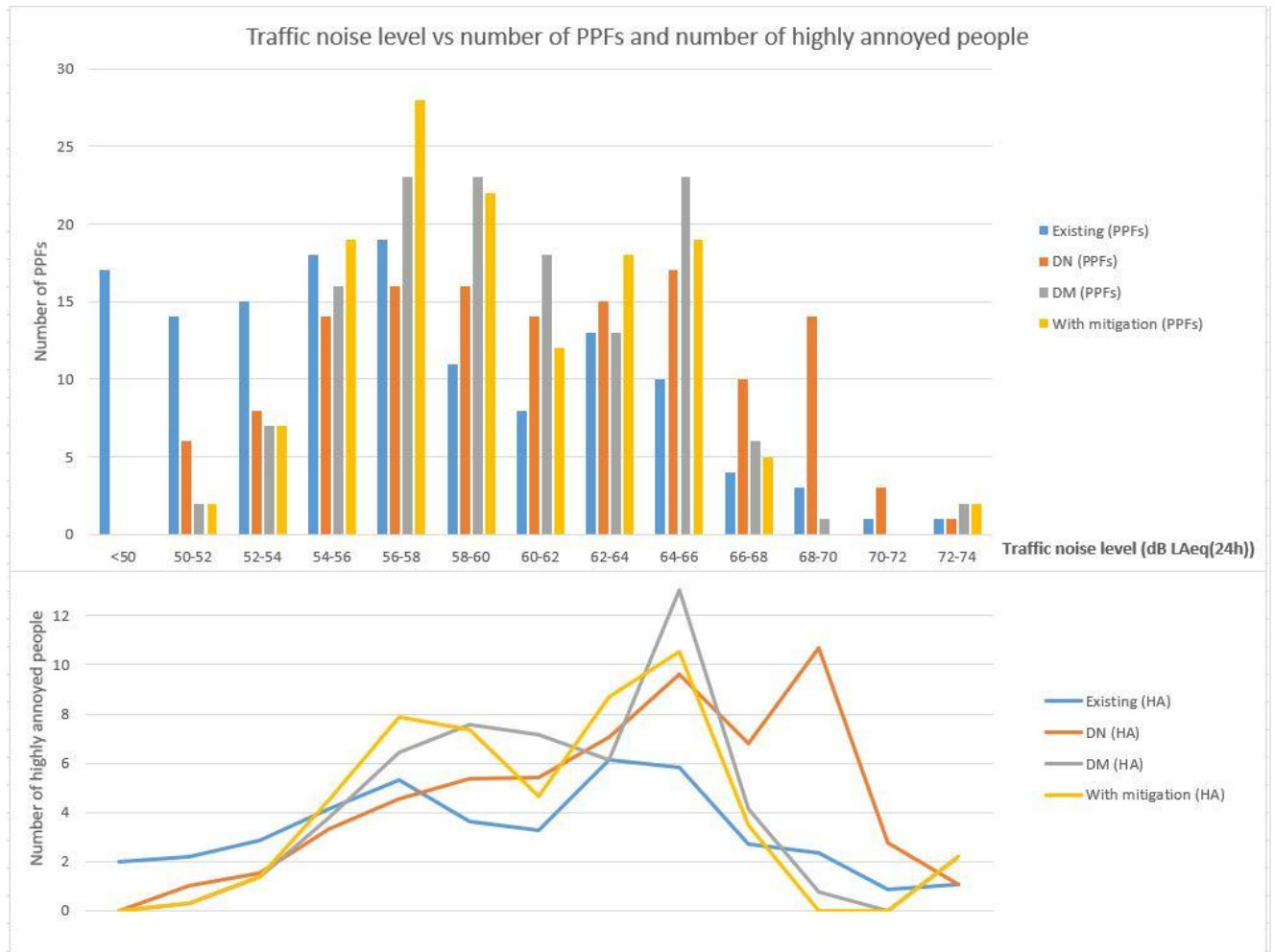


Figure 16 NOR S2 Upgrade of SH16

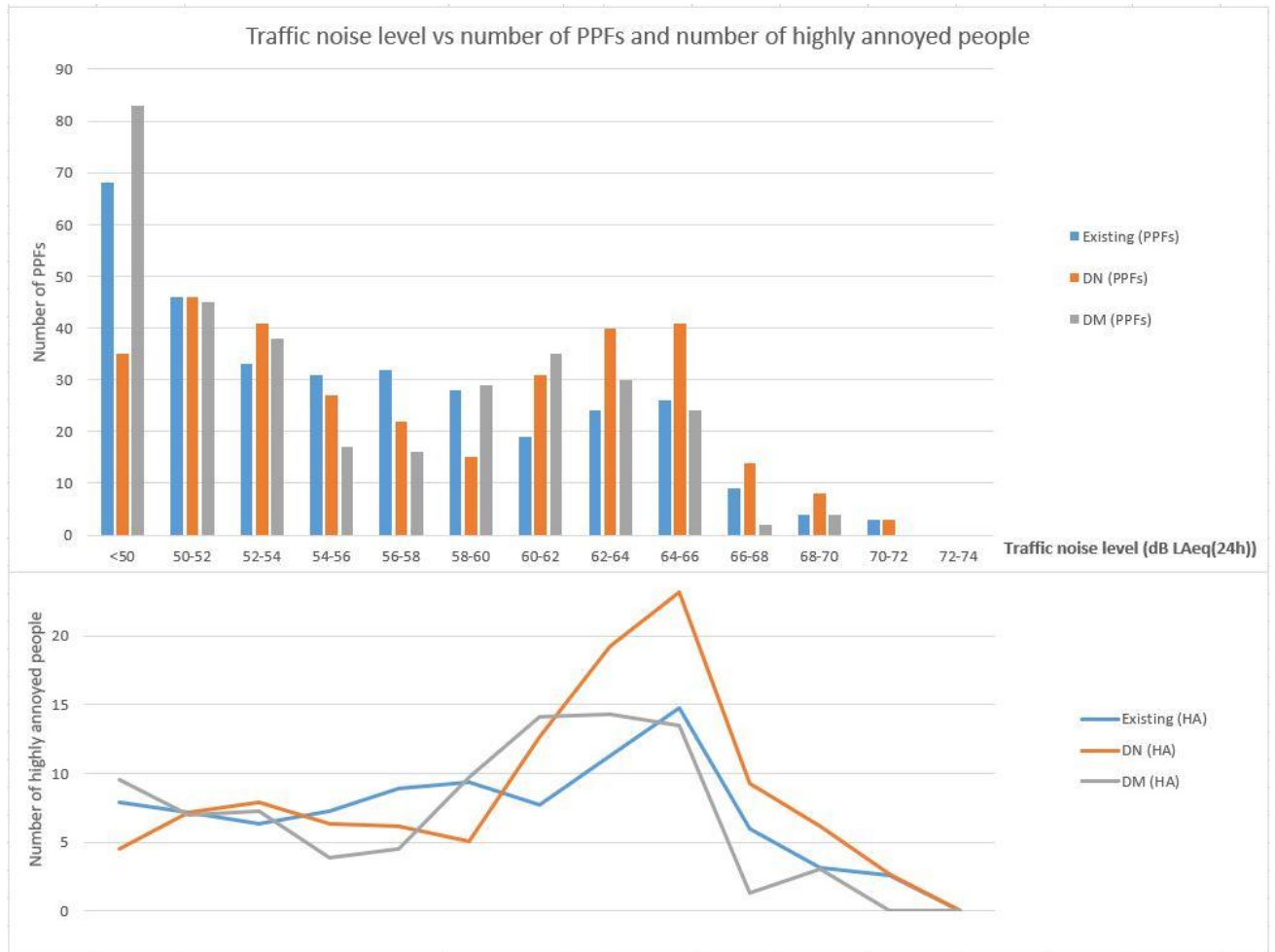


Figure 17 NOR S3 Rapid Transit Corridor

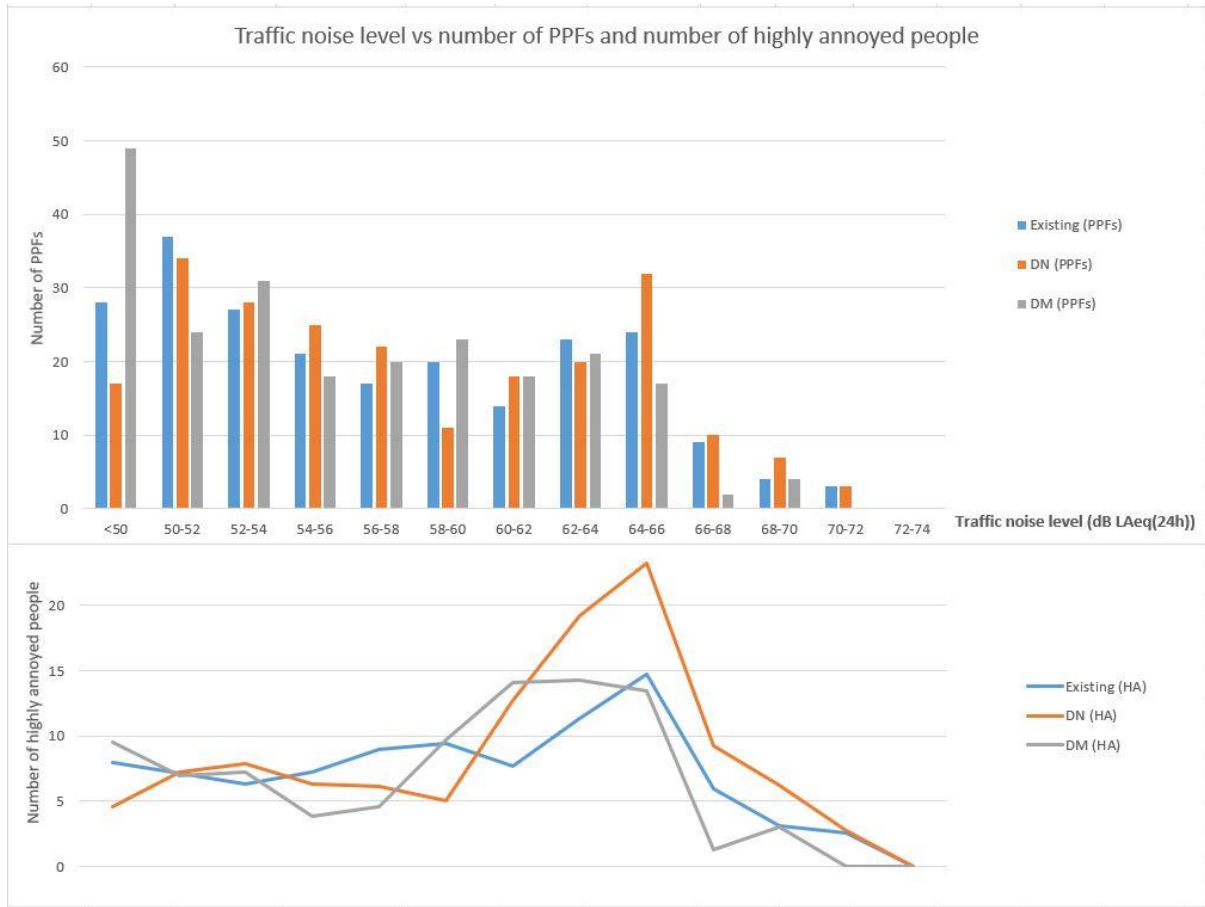


Figure 18 NOR S4 Access Road

