

Evaluating the effects of the installation of a noise barrier outside Bromley by Bow station



University of
East London

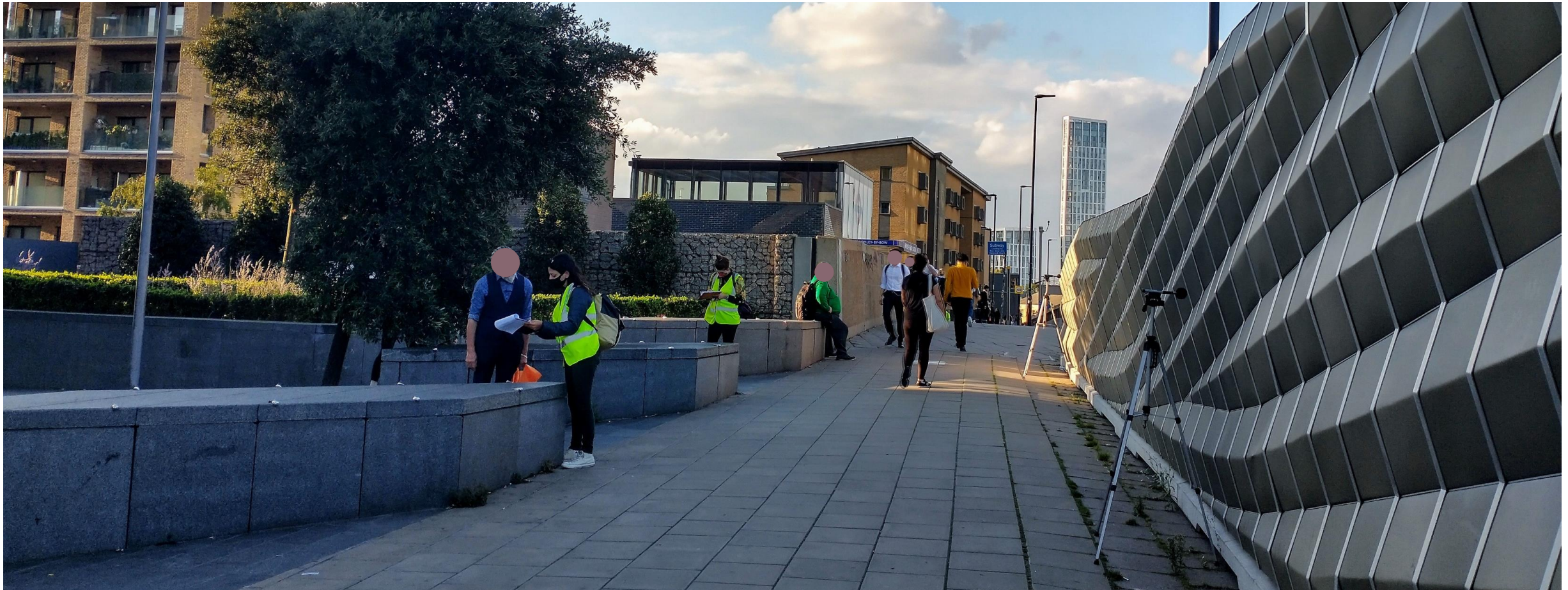


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Commissioned by Poplar Harca

Introduction

This project report focusses on the evaluation of the effect of the installation of a noise barrier located on a small section of the A12, outside Bromley by Bow station. The study comprises a baseline study conducted before the installation of the barrier as well as a follow up study after the barrier was installed. Data on actual noise levels, and public perception were gathered in both the baseline and follow up studies through noise monitoring, street surveying and focus groups.

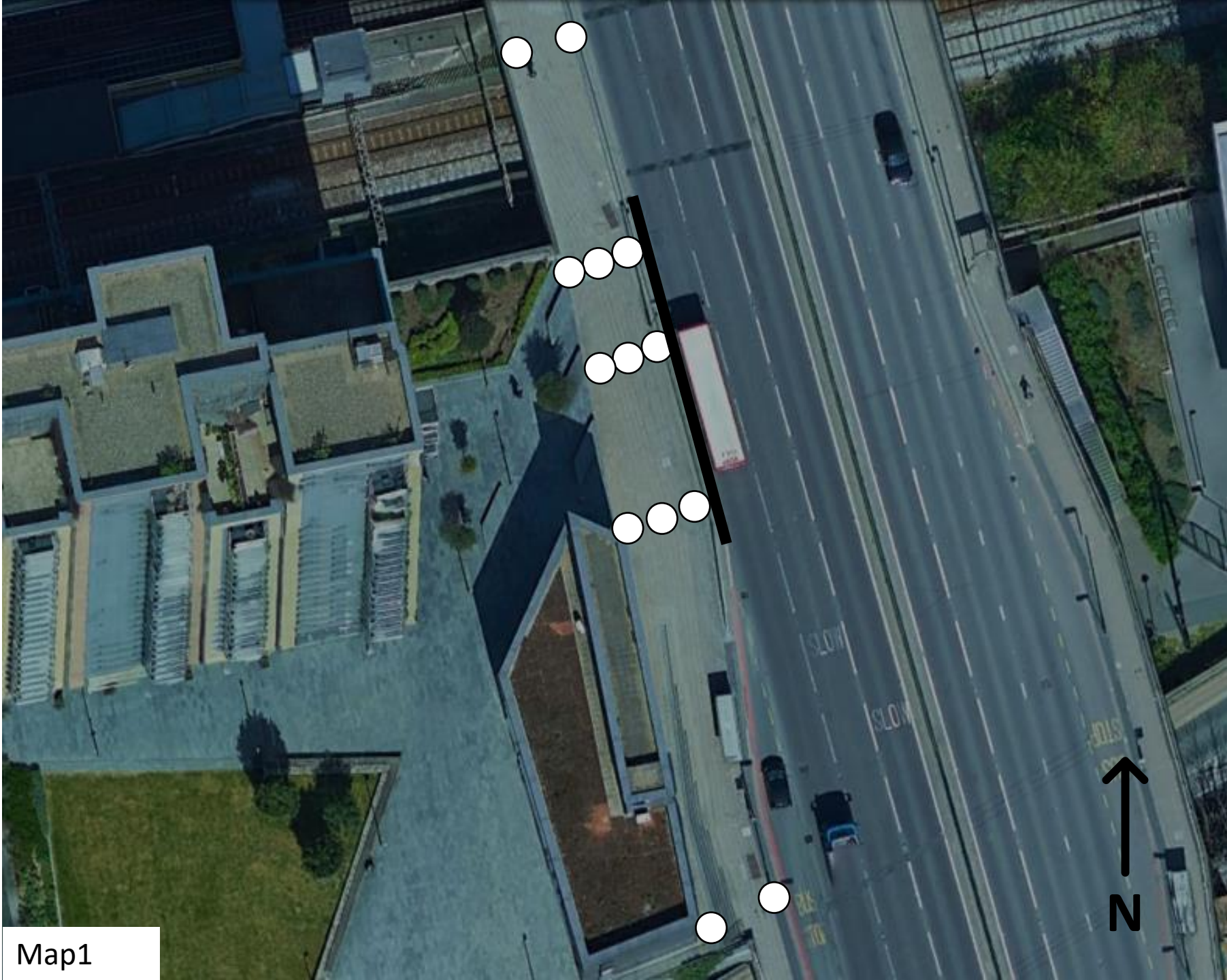


Methodology

Baseline noise levels were collected on Thursday 19/04/2018 and Tuesday 24/04/2018 before the installation of the noise barrier. Follow up noise levels were collected on Thursday 16/09/2021 and Tuesday 21/09/2021, after the installation of the noise barrier. On each day data was collected over three sessions, 9:00 - 10:00, 13:30 - 14:30 & 17:30 - 18:30. The study site was located [outside Sainsbury's](#) near Bromley by Bow tube station.

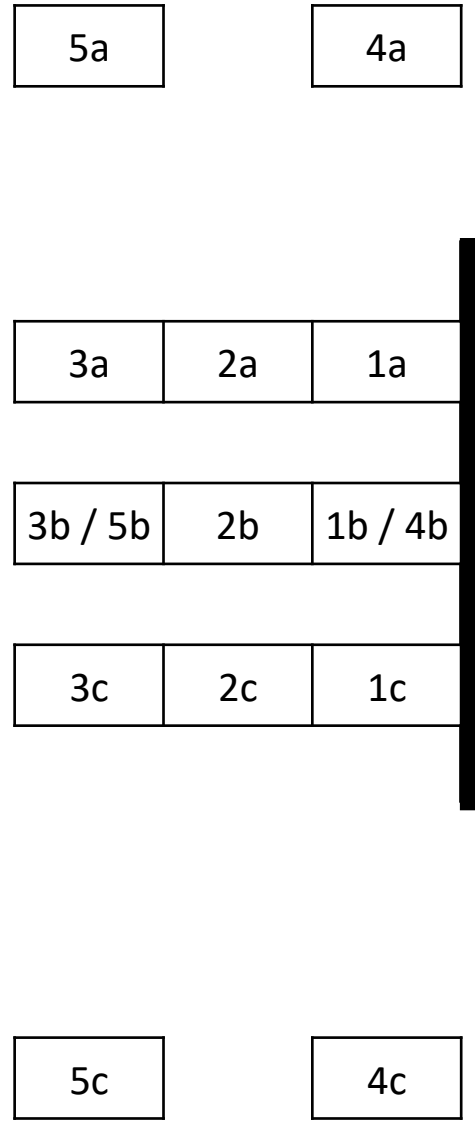
Three noise monitors were used in the monitoring process. In each session they were active for 15 minutes at each deployment site in turn, starting with 1a, 1b & 1c then moving back from the road to 2a, 2b & 2c until the session concluded after completing 5a, 5b & 5c (Map 1). Each noise monitor was placed 1.5m high at the sample sites.

For each 15 minute sample an average A weighted decibel (dBA) reading was recorded (LAeq). An A weighted reading is used to make the decibel reading skewed towards the frequencies which the human ear is sensitive to. This A weighting is commonly used in environmental noise monitoring.



Map1

Site layout





Follow up noise levels

72.3

74.0

67.4

67.5

66.3

70.5

70.2

70.0

75.6

73.1

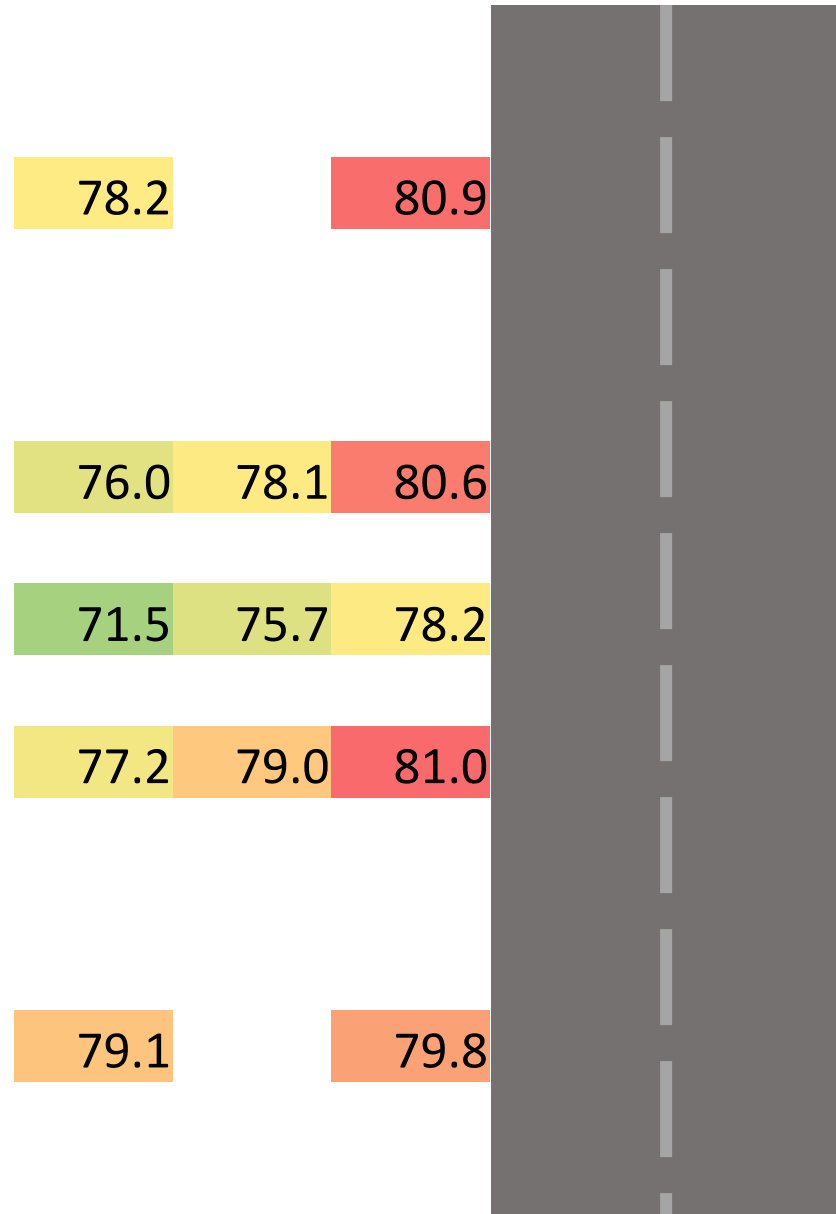
72.5

78.5

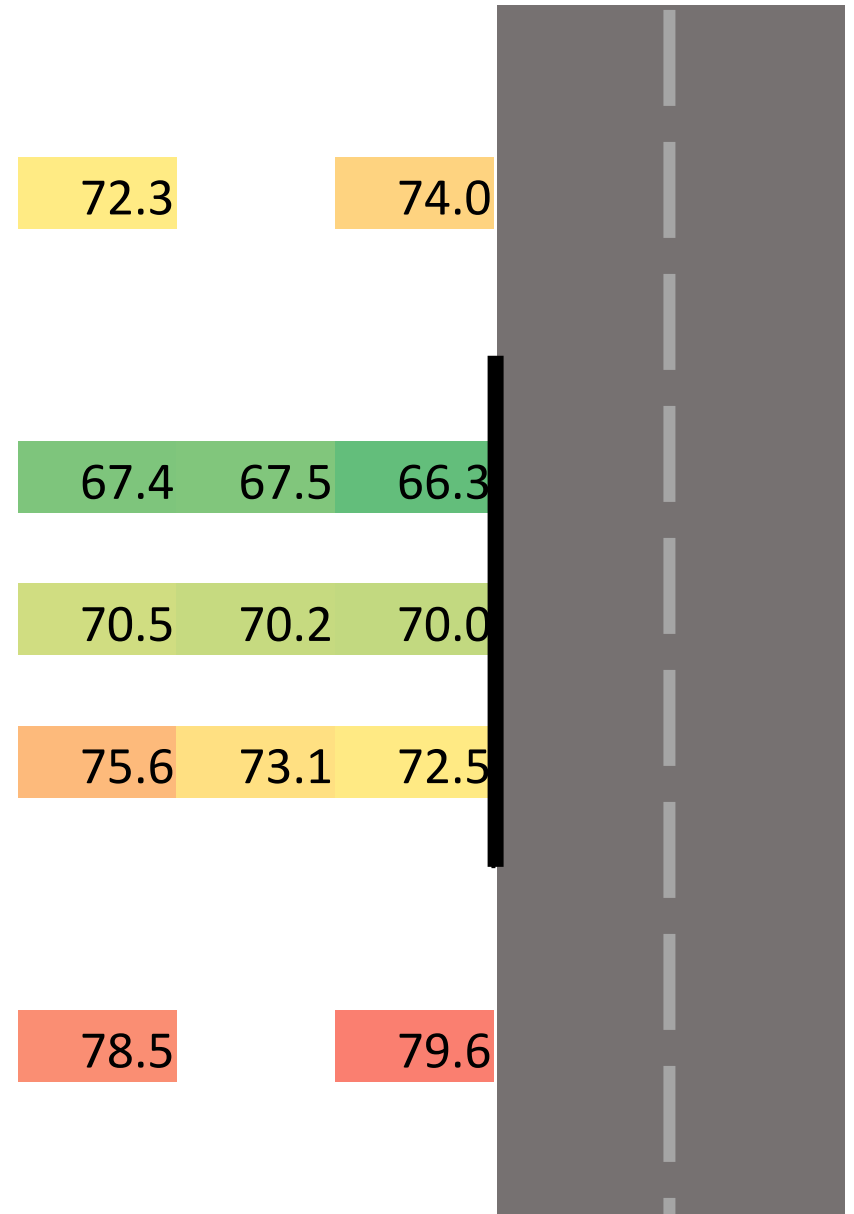
79.6

All noise level figures given are A weighted decibel readings averaged (LAeq) for the sample site over all sampling sessions over both days in the baseline and follow up studies.

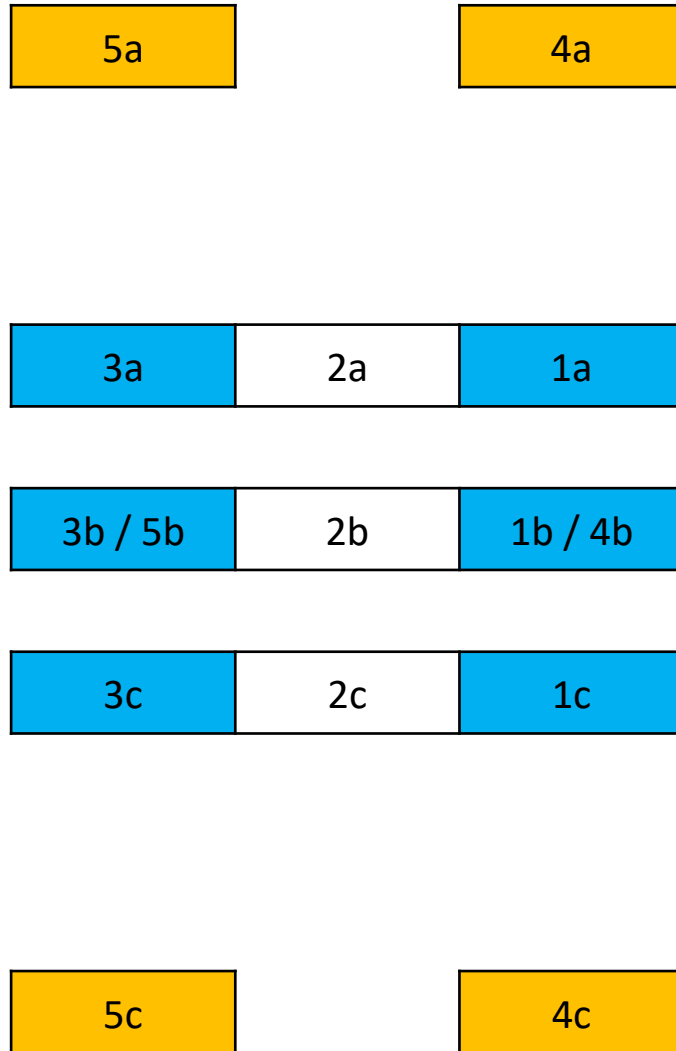
Baseline



Follow up



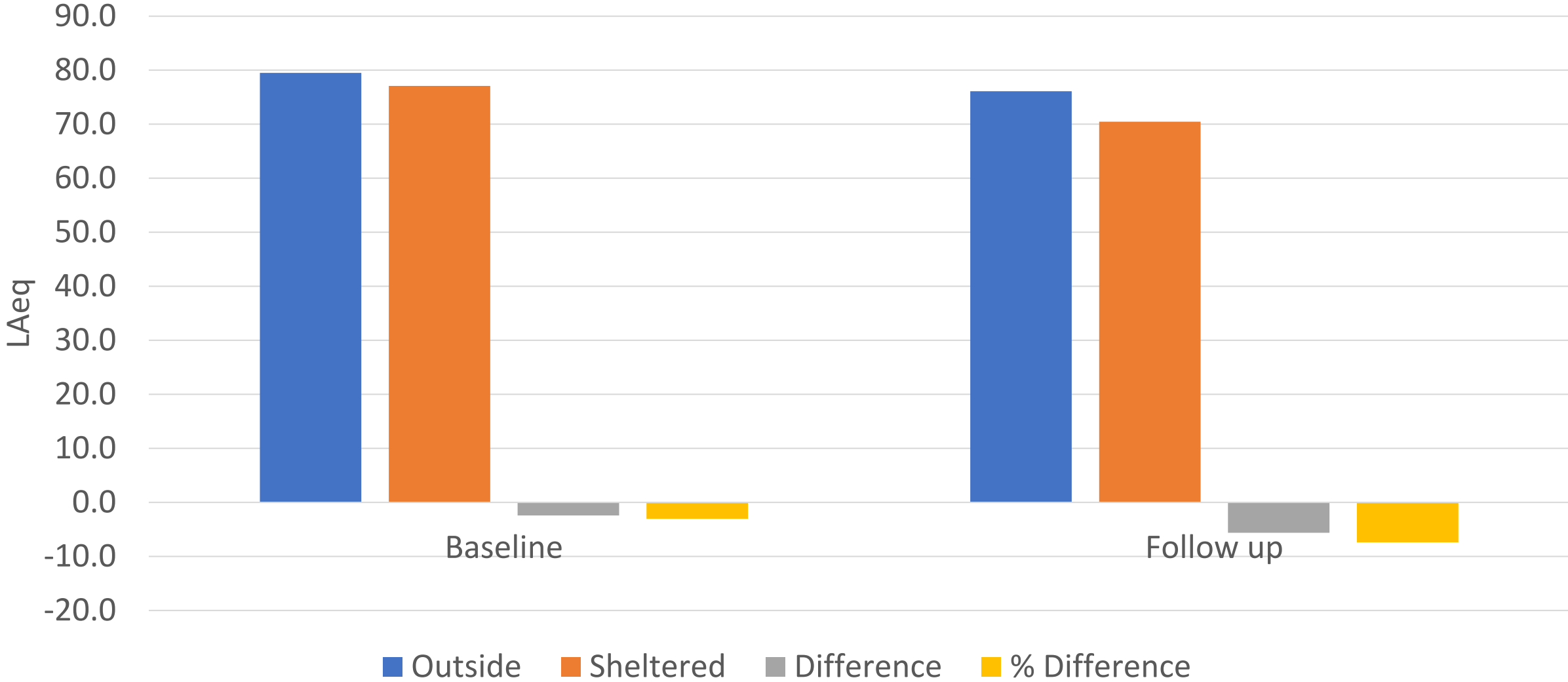
Baseline vs follow up noise comparison



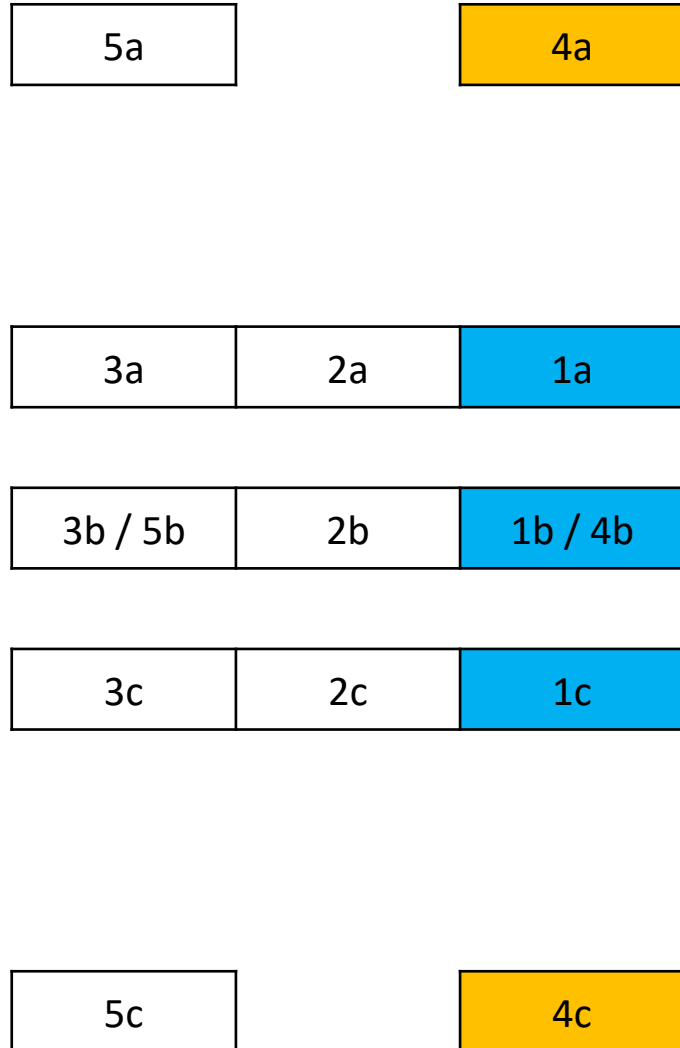
Baseline	
Sheltered	77
Not sheltered	79.5
Difference	2.5 Statistically significant

Follow up	
Sheltered	70.5
Not sheltered	76
Difference	5.5 Statistically significant

Comparison of sites sheltered by the barrier (1a,b,c, & 3a,b,c & 4b & 5b) with sites not sheltered by the barrier (4a,c & 5a,c) before and after barrier installation



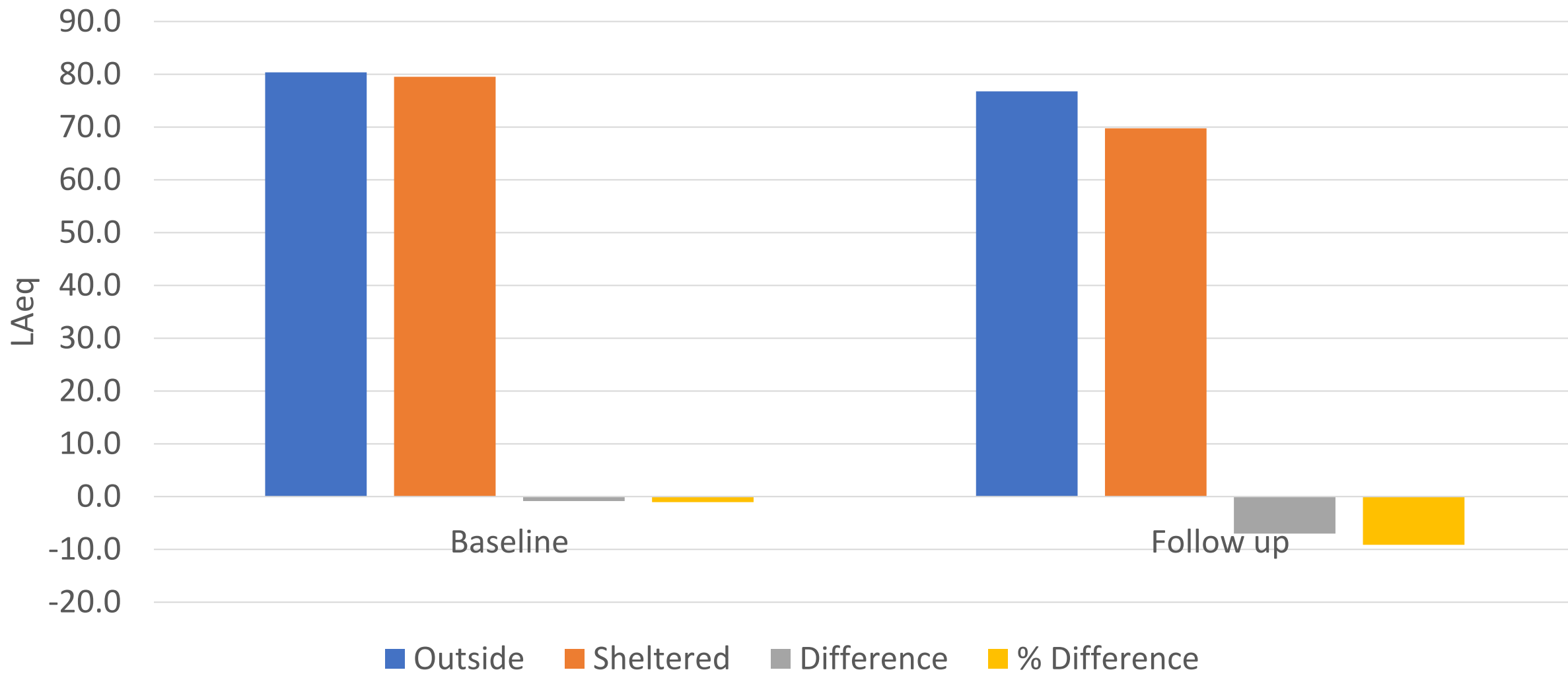
Baseline vs follow up noise comparison next to road



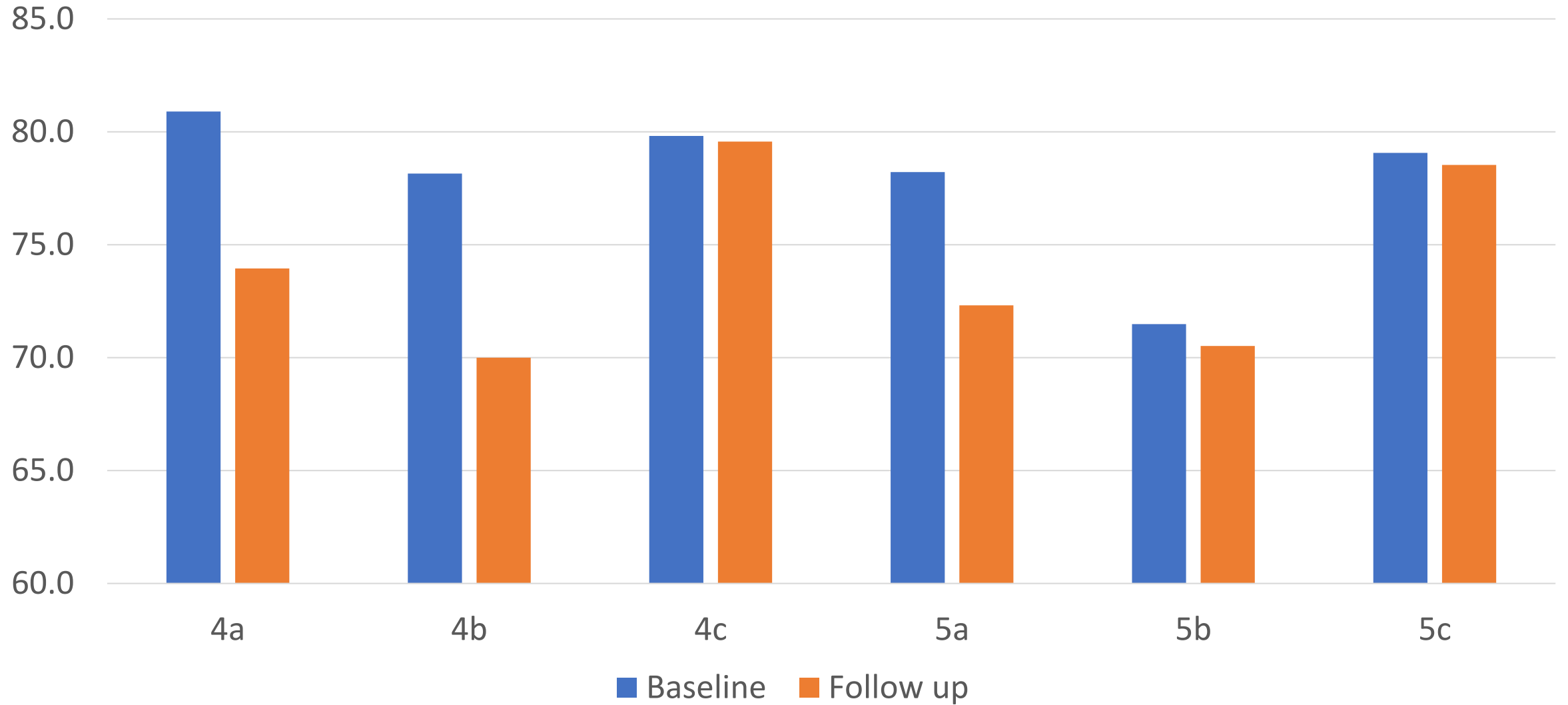
Baseline	
Sheltered	79.5
Not sheltered	80.4
Difference	Difference not statistically significant

Follow up	
Sheltered	69.6
Not sheltered	76.8
Difference	7.2 statistically significant

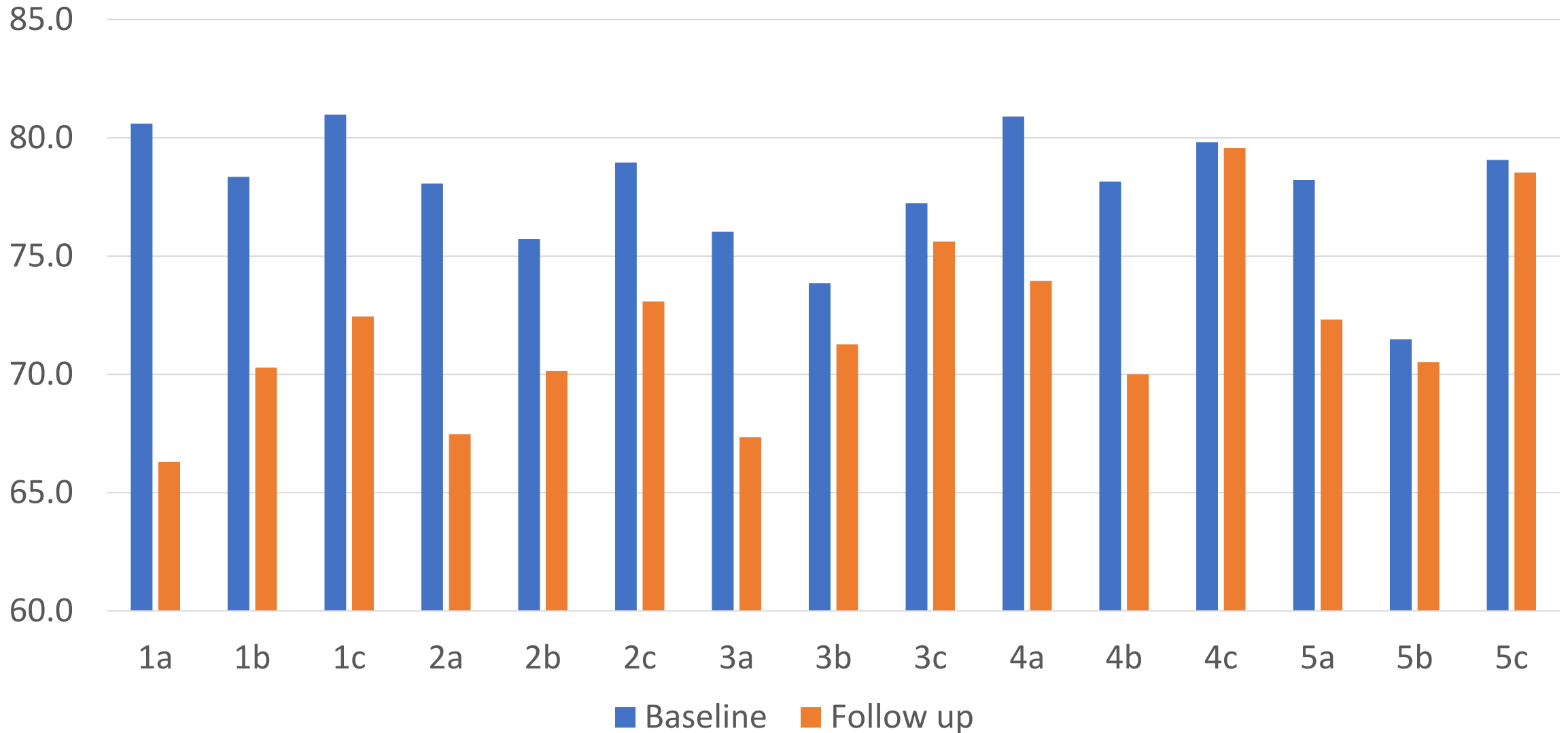
Camparison of sites near road sheltered by the barrier (1a,b,c, & 3a,b,c & 4b & 5b) with sites near road not sheltered by the barrier (4a,c & 5a,c) before and after barrier installation



Average noise level for some sites sheltered and not sheltered by the barrier



Average noise level for each site before and after barrier installation



Noise monitoring results summary

It is difficult to compare the noise results from the baseline and follow up studies directly against each other due to the number of variables other than the introduction of the barrier which influence the readings, such as traffic, construction, weather and people. There has been a reduction in the average noise level of all sites in the follow up compared with the baseline but it is difficult to say how much of this reduction should be attributed to the introduction of the barrier.

Instead, comparisons are made of the sites which are sheltered by the noise barrier (blue) and unsheltered sites far outside the barrier (orange) in both the baseline and follow up scenarios. The comparison is made in the baseline scenario between sites that *will be* sheltered by the barrier once it has been installed and sites which *will still be unsheltered*, far outside the barrier.

When we look at baseline figures in Slide 7 we can see that sites which will be sheltered by the barrier (blue) are significantly quieter than those sites which will be unsheltered (orange). This is surprising and will be discussed on the next slide. The follow up figures also show that it is significantly quieter in sites sheltered by the barrier compared to unsheltered sites.

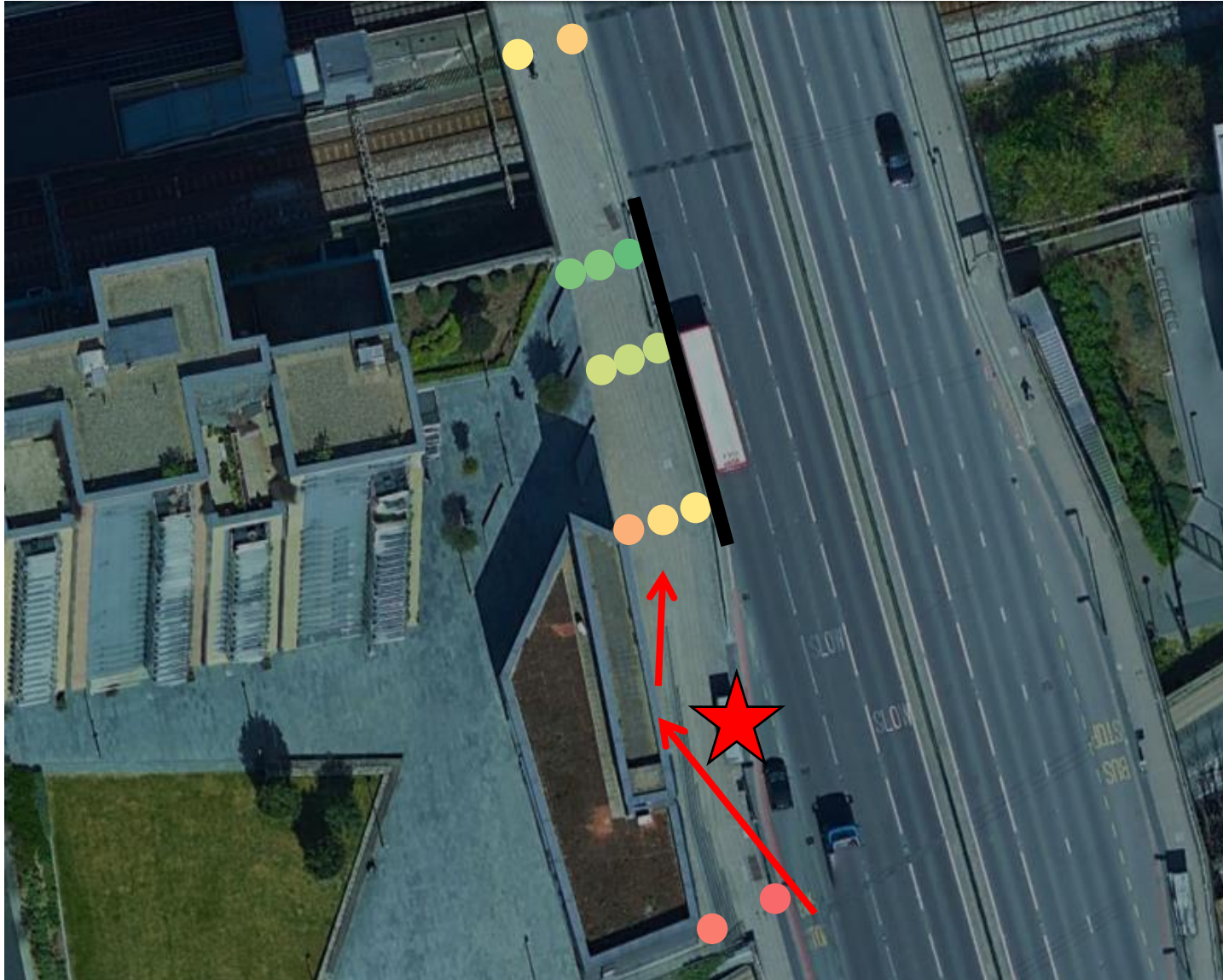
Figures in slide 9 show comparisons of average noise levels in sheltered (blue) and unsheltered (orange) sites in only the sites which are directly next to the road. It shows that in the baseline, next to the road, there is no difference between the noise level at sites which will be sheltered (blue) and unsheltered (orange) sites. In the follow up study, sites next to the road, sheltered by the barrier (blue), are significantly quieter than unsheltered (orange) sites. This shows that the barrier is causing it to be significantly quieter close behind the barrier compared with outside the barrier.

Discussion

In slide 5 baseline figures show that sites which will one day be sheltered by the noise barrier are significantly quieter than sites which will always be unsheltered by the barrier. This is interesting as you would not expect to see a difference as the noise barrier is not in place yet. It is thought that one cause of this could be that directly behind the blue sites there is an open space with a few trees. This means that sound from the road passes into this area and diffuses, with some being absorbed by the trees. In the orange sites there are solid walls directly behind. This causes the sound to reflect off these walls back onto the recording equipment, increasing the readings in orange sites somewhat.

When we only look at the baseline results, in slide 5, for the sites which are directly next to the road there is no significant difference between blue and orange sites. This contributes to the idea that sound diffusion and absorption are contributing to low noise levels in blue sites far back from the road compared with orange sites far back from the road.

Discussion



Sites located towards the south of the study area are more noisy than those in the north, particularly in the follow up study. There are a number of possible reasons for this.

- There is a junction to join the A12 sixty metres south of the southern monitoring sites. Cars are accelerating from this junction and making more noise to the south
- There is a hill going from the south up to the north. This means vehicle engines are working harder to go up the hill while travelling north which creates more noise. The crest of the hill is reached around the northern most study sites.
- There is a bus stop marked by the red star. Buses are stopping and then accelerating, creating more noise around this location
- The high wall of the community hub creates a surface for extra noise discussed above to reflect onto the study sites and create higher readings towards the south as show on the map in red arrows.

Street survey

Methodology

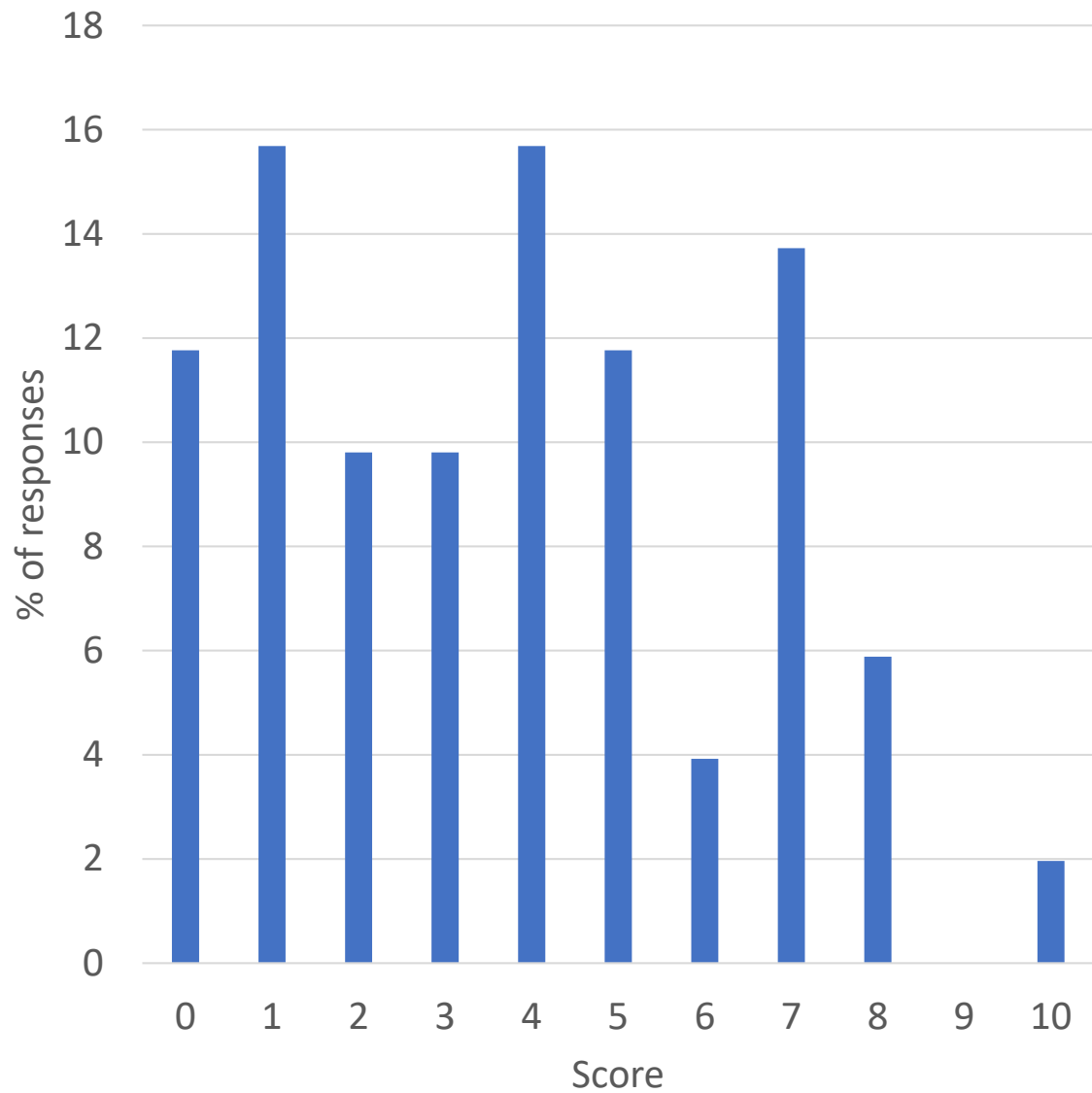
A street survey of adult passers-by was undertaken at the same time and location as the noise measurements were being carried out. The survey was designed to reveal perceptions of noise levels currently experienced at the site of the proposed noise barrier as well as of the broader environment. It is important to know people's perceptions of overall environment and landscape because people tend to find it difficult to focus on and evaluate one environmental factor. They can more easily assess and evaluate the total experience. There may be a slight bias introduced from the unintended effect of us having a preference to approach certain types of people or certain types of people being more likely to engage with us. This is acknowledged in the results and the bias should have a minimal effect on the outcome. The aim of these surveys was to add another dimension to the assessment of the noise barrier, taking into account aesthetics and the overall effect it may or may not have on peoples experience of the area. 51 responses were collected in the baseline study and 57 in the follow up.

Comparison of average responses between baseline and follow up street survey
 (Baseline 51 responses, Follow up 57 responses)

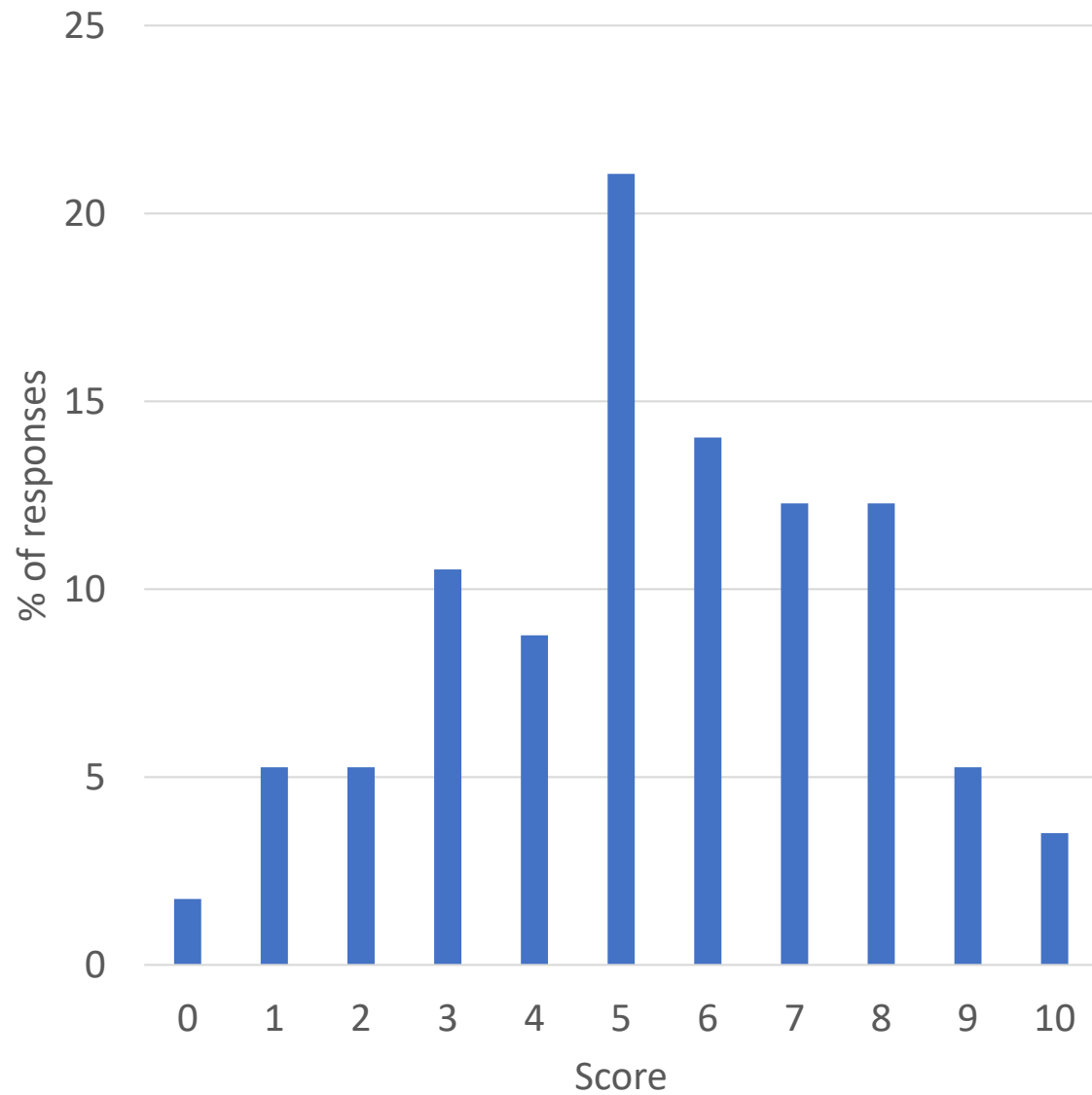
Question	Baseline Ave (1-10)	Follow up Ave (1-10)	Difference	Statistically significant difference?
How pleasant do you think the overall environment is here?	3.7	5.4	1.7	Yes
How pleasant do you think the visual environment is here?	4.1	5.9	1.8	Yes
How loud is the soundscape here?	7.7	8.2	0.5	No
How much does the soundscape bother you?	5.9	5.5	-0.4	No
How loud is the road?	8.1	7.1	-1	Yes
How much does the road noise bother you?	5.7	5.6	-0.1	No

How pleasant do you think the overall environment is here?

baseline

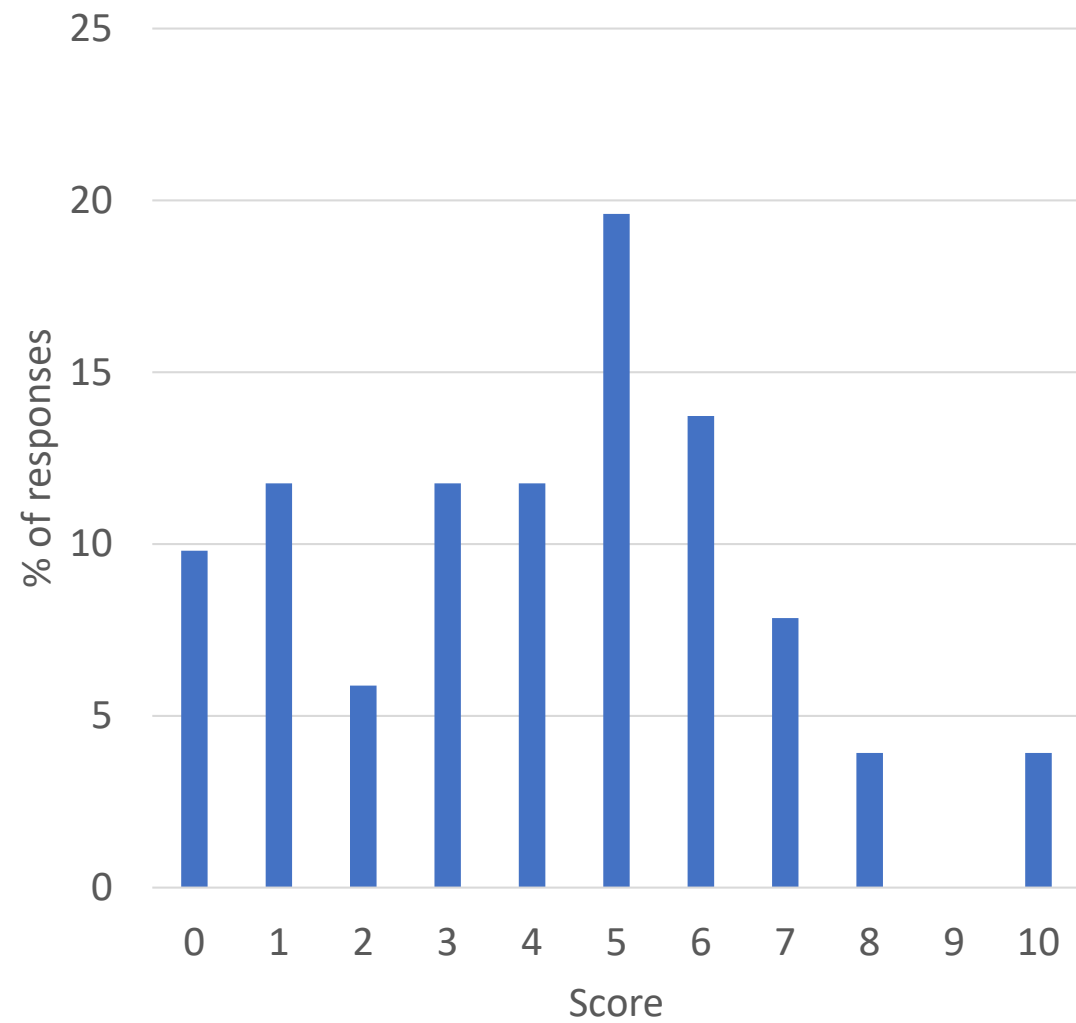


Follow up

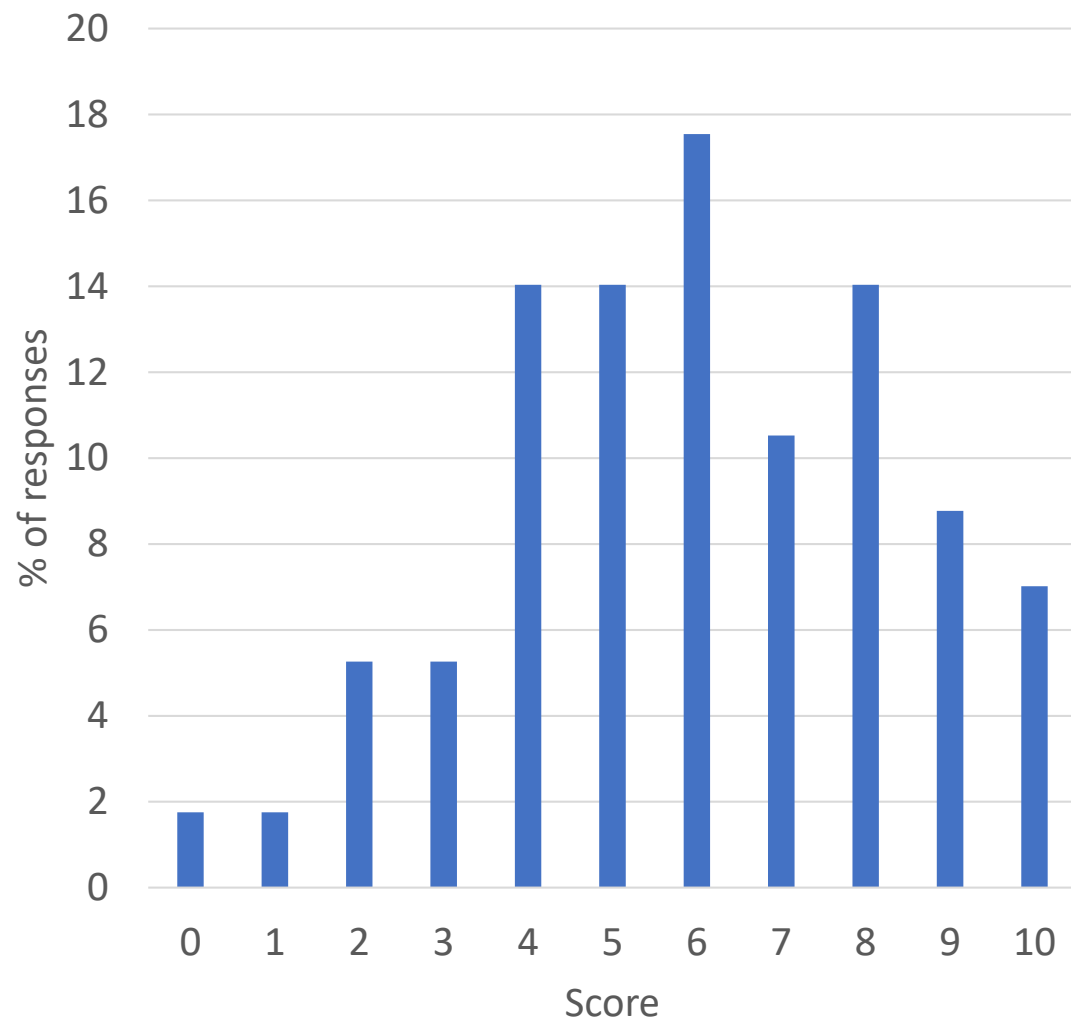


How pleasant do you think the visual environment is here?

Baseline

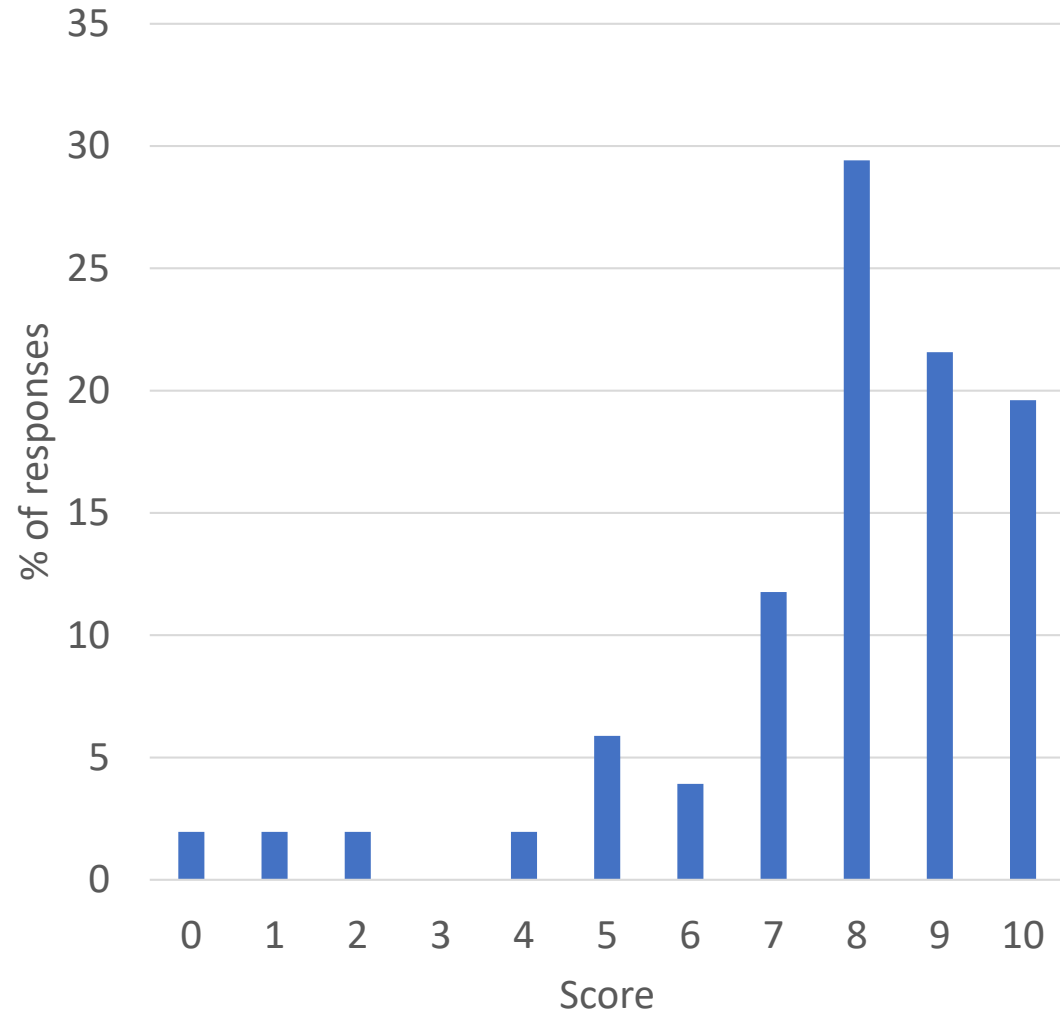


Follow up

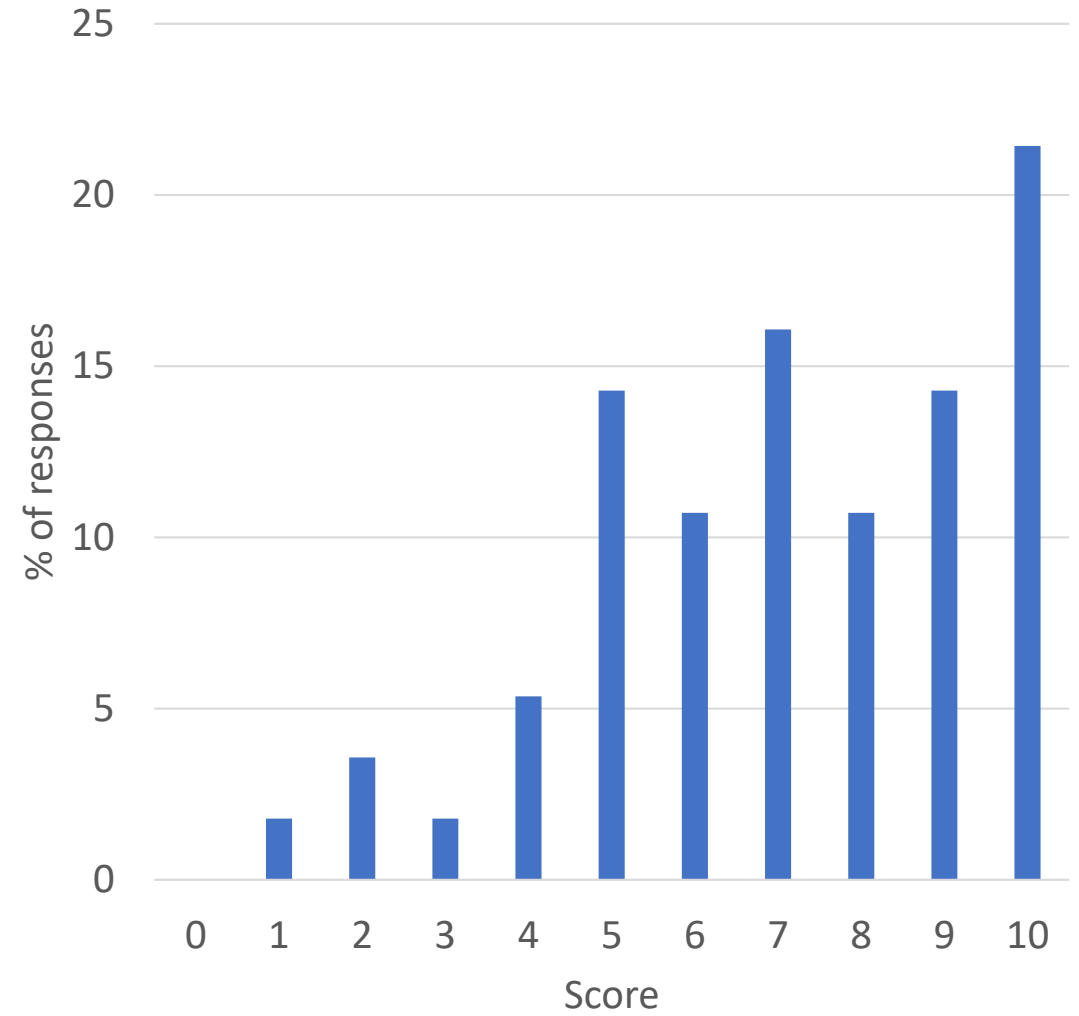


How loud is the soundscape here?

Baseline

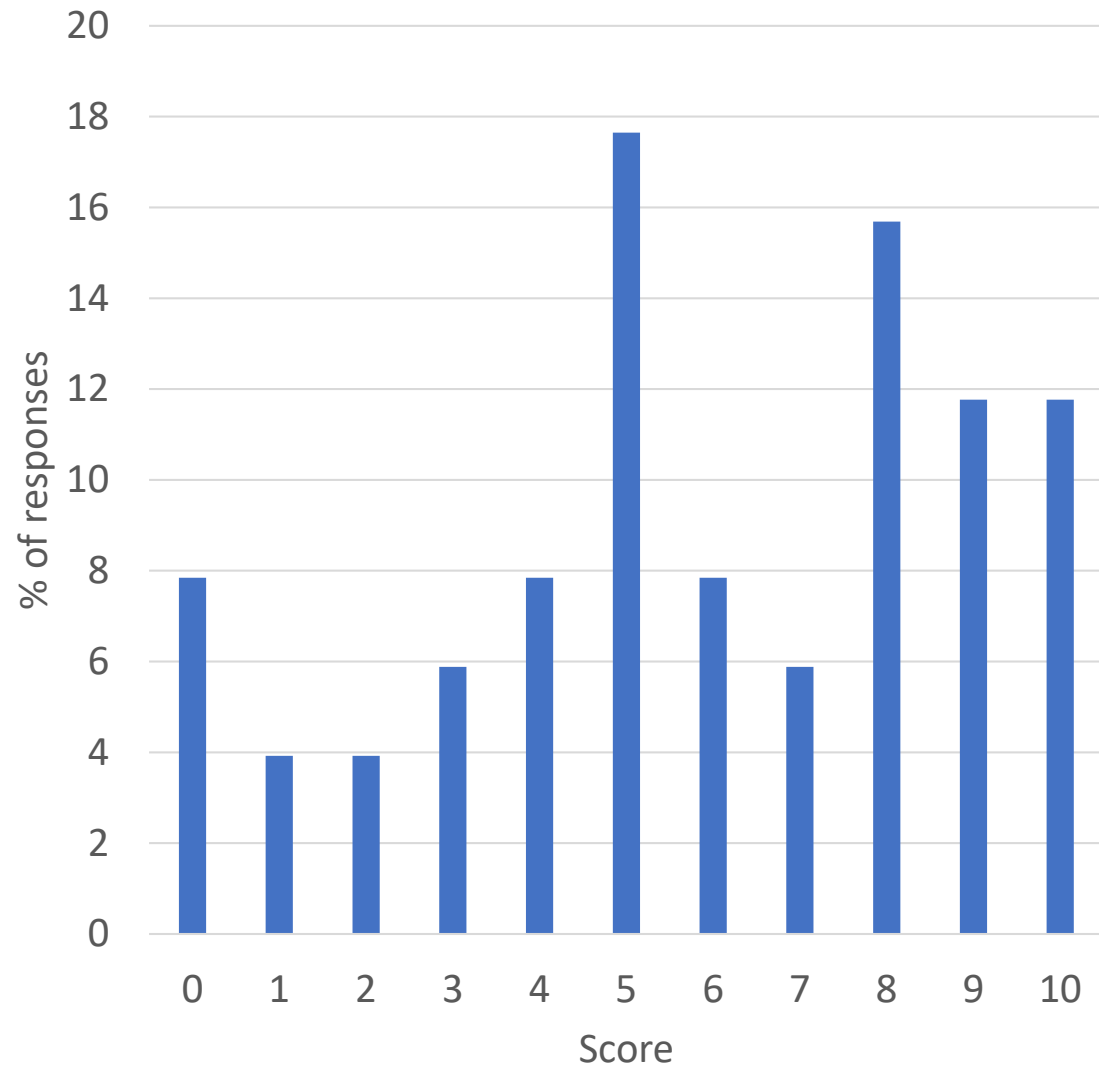


Follow up

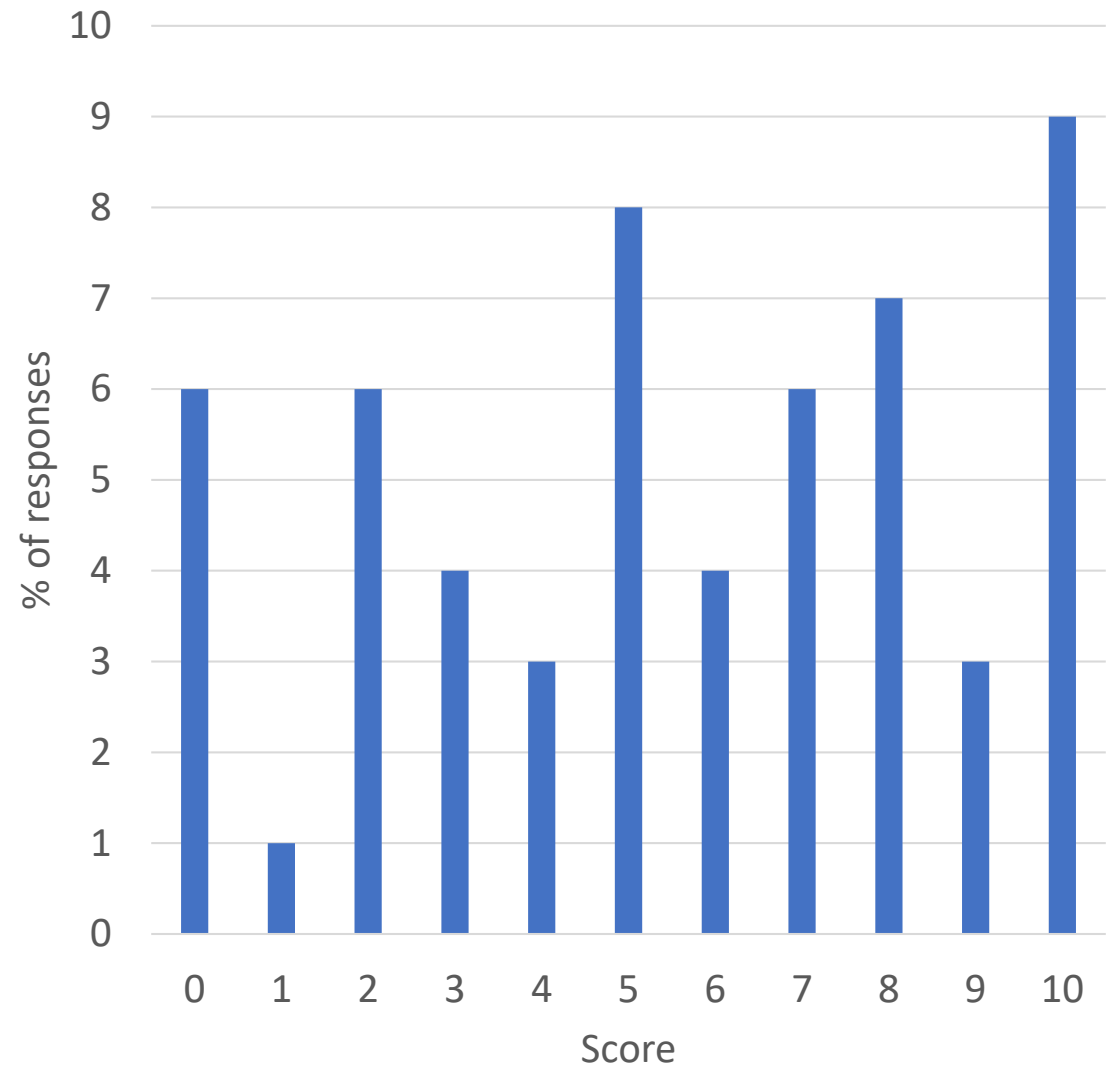


How much does the soundscape bother you?

Baseline

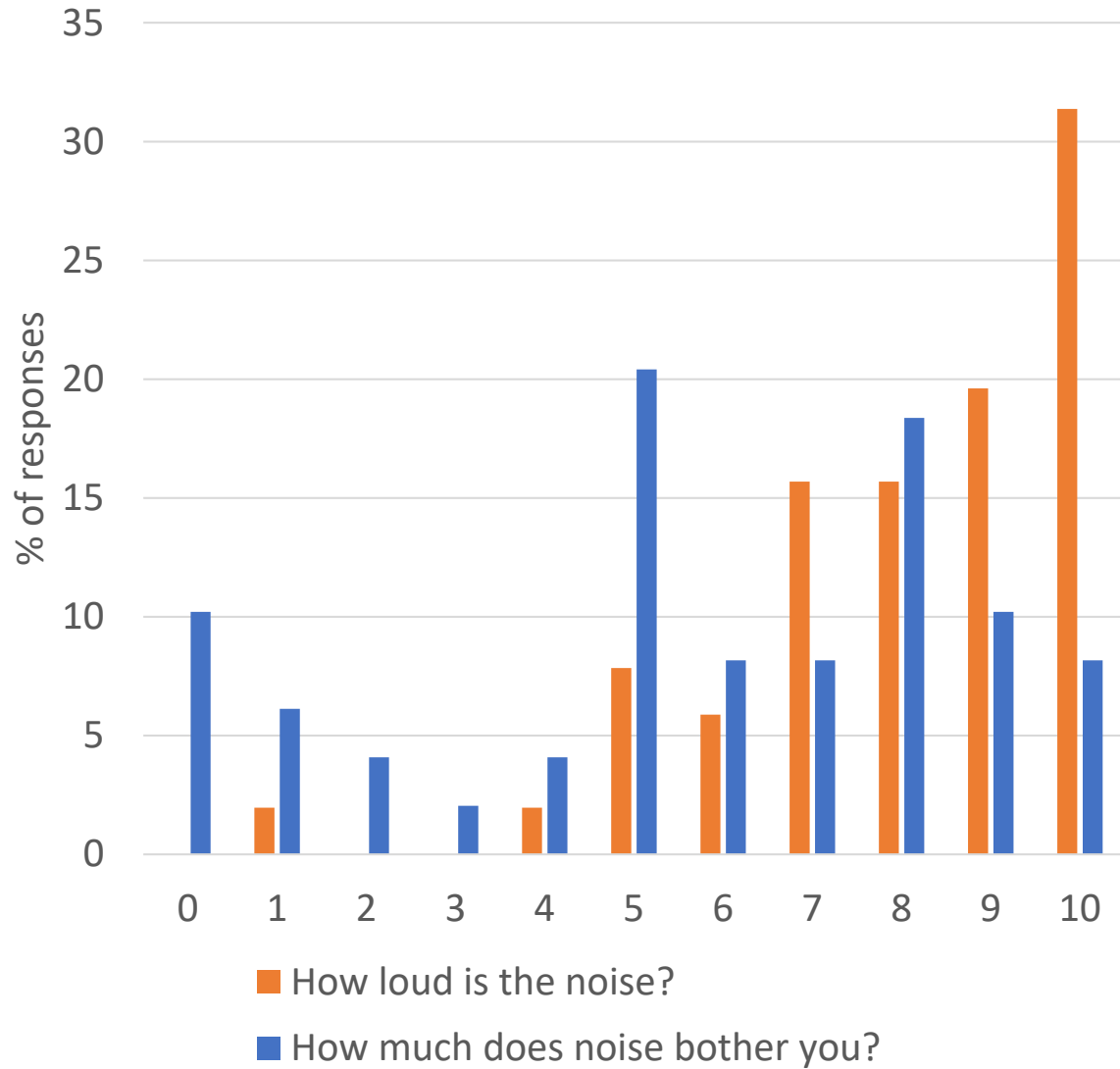


Follow up

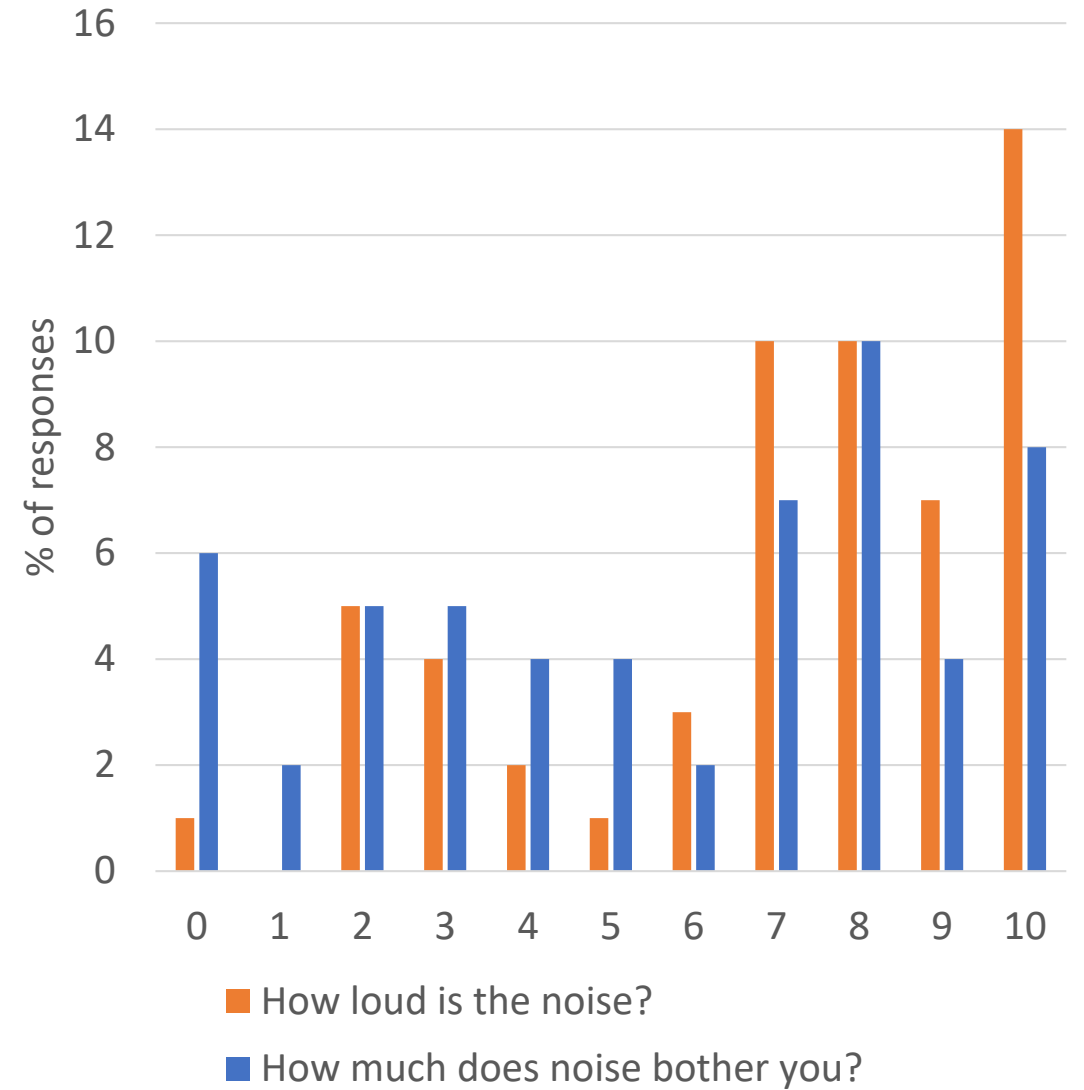


Road noise perception

Baseline



Follow up



Street survey results summary

Comparison between the baseline and follow up survey results shows that it is statistically significant that since the barrier has been installed:

- People say the overall environment is more pleasant
- People say the visual environment is more pleasant
- People say the road is less loud

The fact that these findings are statistically significant means that the change in opinion from baseline to follow up is not likely to be from random response variation, and takes into account the number of responses and the responses themselves. The change can be understood to be representative of the wider population.

There were other opinion changes from the baseline to the follow up which did indicate a change but they are not sufficient to be confident that the change is representative of the wider population. These are:

- People said the soundscape was louder overall
- People said the overall soundscape bothered them less
- People said the noise from the road bothered them less

Discussion

From spontaneous conversations between researchers and survey participants and other members of the public, anecdotal evidence suggests those people are pleased that the barrier has been installed, that it makes them feel safer and the immediate environment is quieter and more pleasant. They also wish the barrier ran along a longer stretch of the road and that they would like that to happen in the future.

“I feel safe”

Sound *“Spills over”* once you get to Sainsbury’s

Provides *“relief”* from the noise

“It really makes a difference”

“You should put it all the way along”

Focus Group

Methodology

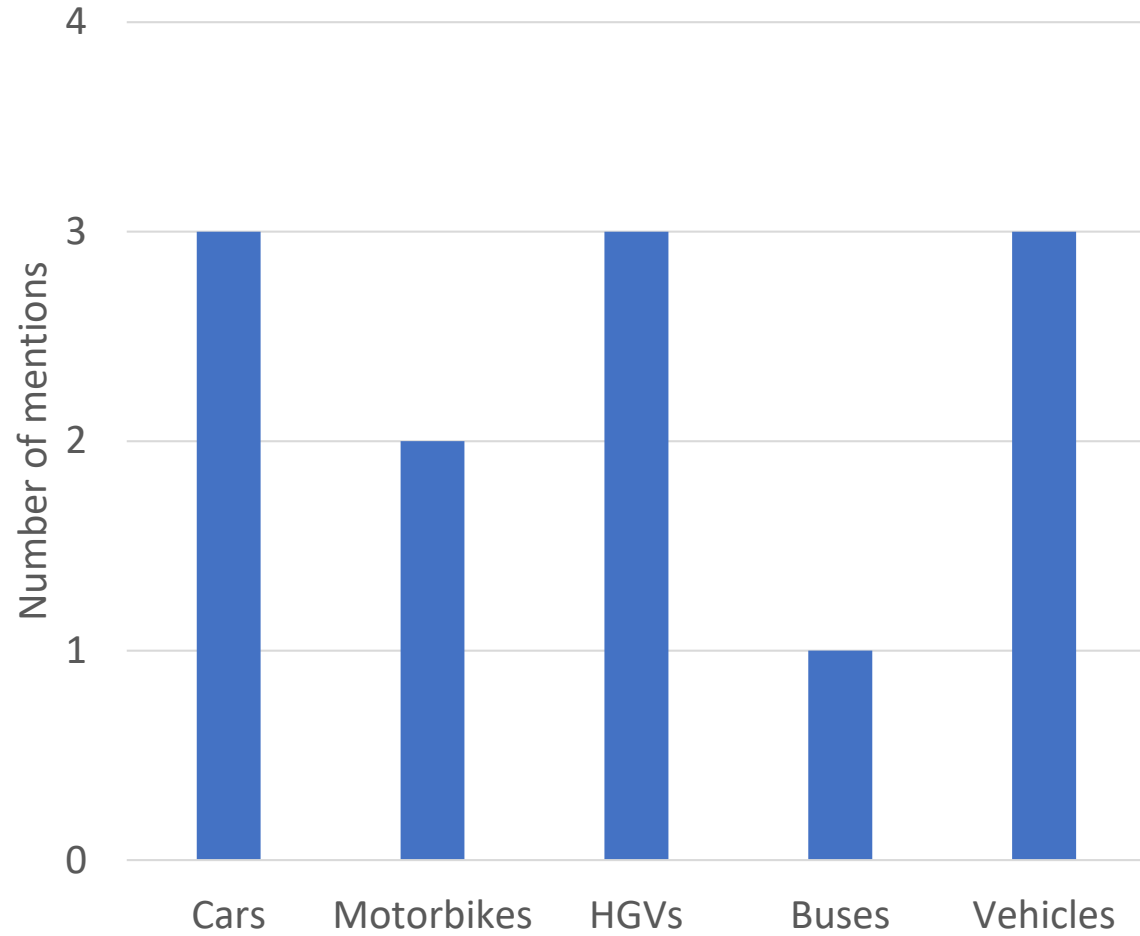
In conjunction with the street surveys, focus groups were also conducted using an in depth questionnaire with 4 -9 residents in same location as the noise monitoring and street surveying but at a different time to help gauge perceptions of noise levels as well as of the broader environment. These were undertaken at a different time to the other measurements purely for practicality purposes. One difference compared to the street survey is that in the focus group the participants are the same individuals in both the baseline and follow up study, whereas in the street survey it is assumed that the people participating are different in the baseline and follow up. 9 people attended the baseline focus group and 4 attended the follow up. It is likely that the long time between the baseline and follow up taking place made it difficult to get participants to attend the follow up session. All participants who attended both the baseline and follow up sessions received a £25 gift voucher.

Comparison of average responses between baseline and follow up focus group
 (Baseline 9 participants, Follow up 4 participants)

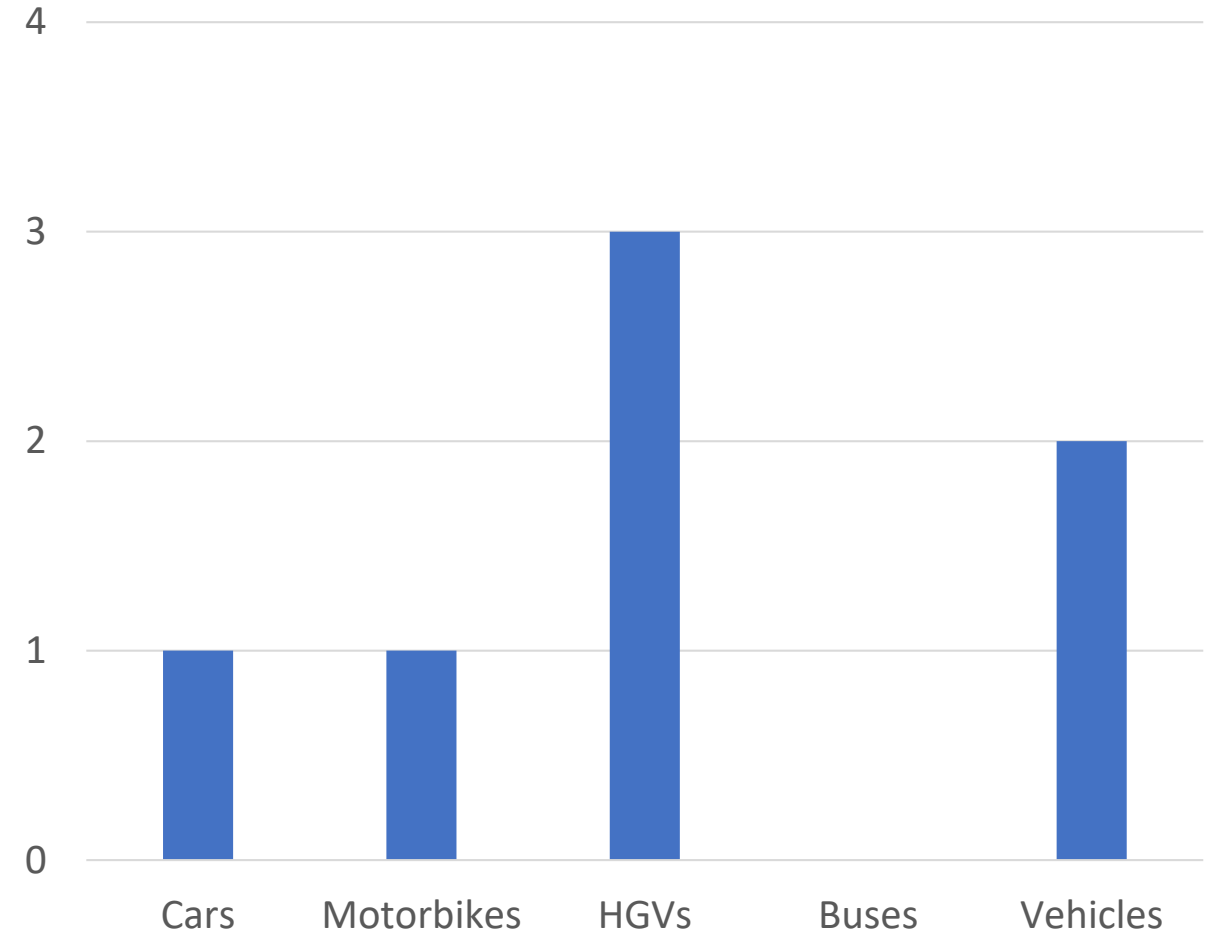
Question (using verbal scale)	Baseline Ave (1-5)	Follow up Ave (1-5)	Difference	Statistically significant difference?
How pleasant do you think the overall environment is?	2	4	2	Yes
How pleasant do you think the visual environment is?	2.1	3.3	1.2	No
How much do the smells bother you?	3.7	3	-0.7	No
How loud do you think the acoustic environment is?	4.6	3.5	-1.1	Yes
How much does the noise bother you?	4.4	4	-0.4	No
How loud is the road noise?	4.6	4.5	-0.1	No
How much does the road noise bother you?	4.7	3.8	-0.9	No

Which sources of noise can you hear and clearly identify now (open question)?

Baseline (9 participants)



Follow up (4 participants)



List all the effects that you expect from the barrier
(from baseline focus group)

Positive	Negative
Less noise X 4 Less air pollution X 2 Overall environment improvement X 1	Maybe unsightly X 1

List all the positive and negative effects after the barrier was built
(from follow up focus group)

Positive	Negative
Safe to walk X 1 Can talk on the phone X 1 Less noise from traffic X 1 Looks better X 1	Too short X 2 Rubbish and weeds between barrier and road X 1 Pollution X 1 Dust X 1 Noise X 1

Focus group results summary

Comparison between the baseline and follow up focus group results shows that it is statistically significant that since the barrier has been installed:

- People say the overall environment is more pleasant
- People say the overall acoustic environment is less loud

There were other opinion changes from the baseline to the follow up which did indicate a change but they are not sufficient to be confident that the change is representative of the wider population. These are:

- People say the visual environment is more pleasant
- People say smells bothers them less
- People say the noise bothers them less
- People say the road noise is less loud
- People say the road noise bothers them less

Participants in the follow up focus group said that the positive effects of the barrier were that the area had been improved as a result of less noise from traffic, being able to talk on the phone, feeling safer to walk and the look of the area being improved. They wanted it to be longer.

Through unstructured conversations with the participants it was clear that they thought the barrier had made a difference to the area, making it quieter, safer and a more hospitable and attractive environment. They wished the barrier was longer, extending at least to Bromley by Bow tube station.