

Transport noise Visual design issues



NZ TRANSPORT AGENCY
WAKA KOTAHI

NOISE BARRIER CASE STUDY 13

August 2013



Walmsley Road noise barriers

State Highway 20 – Walmsley Road

The State Highway 20 (SH20) Walmsley Upgrade works were undertaken by the Manukau Harbour Crossing Alliance (MHX) in 2011. Works involved adding a third southbound lane from under the Walmsley Road overbridge to just south of the Hall Avenue footbridge. This was to prevent a bottleneck situation occurring prior to the split of SH20 and SH20A to Auckland Airport (posing safety and congestion issues). The Walmsley Road on-ramp has been realigned and lengthened and a safety barrier added next to the on-ramp to prevent vehicles from crossing to SH20A. The Hall Avenue footbridge has been lengthened to fit over the widened motorway and a noise barrier installed adjacent to the southbound carriageway.

This case study examines the visual appearance of the noise barriers, the impacts of an existing overland flow path on noise barrier design and attenuation, and additional safety measures installed on top of noise barriers to prevent public access.

Overland flow path

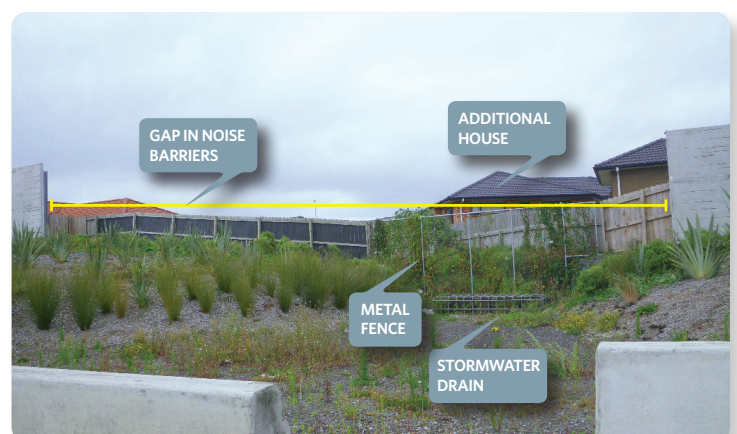
An existing noise bund was present between the residents in this area and the southbound carriageway before the works. A 20 metre wide gap had been left in that bund due to an overland flow path that drains from the residential properties in a southwesterly direction towards the motorway. Noise modelling was undertaken to determine mitigation required to comply with the Transit Guidelines noise criteria set within designation conditions for the new works. It was established that a 1.5 – 3.5 metre high, 800 metre long noise barrier was needed between the residents and the southbound carriageway. The approximate cost of the noise barriers was \$2,000 per linear metre.

The initial solution for the overland flow path was to leave a 20 metre gap in the noise barrier to allow the current open flow path through to the motorway. 3.5 metre high sections of noise barrier adjacent to this gap meant the noise criteria would still be achieved, even with the reduced performance due to the break in noise protection.

A gap in the barrier was not seen by the project team or community as the ideal solution. As a result, several options were investigated to eliminate the gap, whilst still allowing for the flow of water through/ under the barrier. One option proposed was to install a steel beam along the bottom of the noise barrier over the flow path and then provide a culvert for the water underneath. The cost of this design was deemed too expensive with respect to the benefits achieved. Eventually it was decided to proceed with a gap in the noise barrier.

The final design of the noise barriers has abrupt ends at the edge of the gap, with a lower height (non-acoustic) wooden fence in place of the noise barrier to prevent trespassing onto the motorway. An existing wire metal fence is also present over the top of the flow path. Overall, the final urban design/visual appearance of this specific area is poor.

Since the initial noise assessment was undertaken, an additional house has been constructed immediately behind the gap in the noise barrier. The noise criteria in the designation conditions do not apply to new houses, but this house will be exposed to noise levels that would have been reduced if the gap had been closed. For new residential developments requiring resource consent adjacent to state highways, the Transport Agency requests noise mitigation to be incorporated within the subdivision or to individual houses ('reverse sensitivity controls'). However, in this instance the Transport Agency had not sought reverse sensitivity controls.



The gap in the noise barrier has resulted in poor visual appearance and noise exposure to a new resident



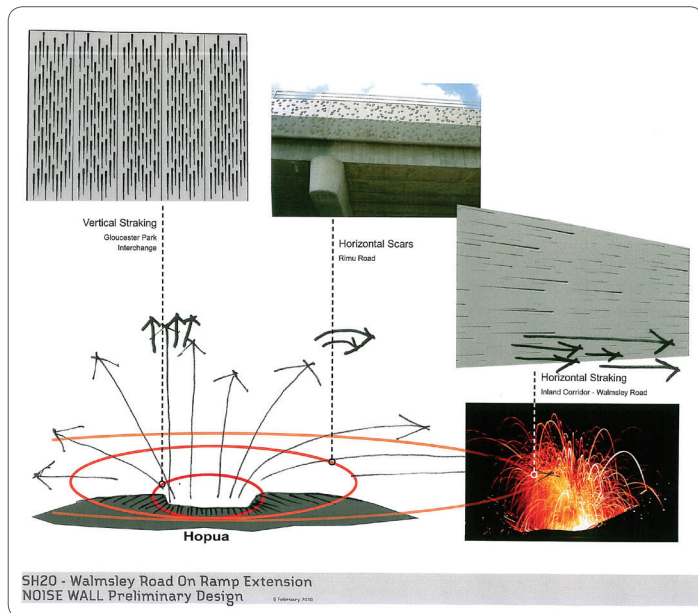
Noise barrier panels are a good example of simple but bold form and texture

Panel design

From an urban design perspective, the final noise barrier panel design of the noise barriers is a good example of using simple but bold form and texture, and has been well integrated with landscaping. Artworks should be integral to the overall design of noise barriers, and should be well founded as part of the architecture of the noise barrier.

Additionally, panel design needs to consider the fleeting view of road users, and as such designs should consider this perspective by using appropriately bold designs.

The design of the Walmsley Road noise barrier panels are based upon the concept of SH20 passing through a volcanic field, and in Onehunga, directly through an explosive crater – the Hopua Tuff Ring. As such, the noise barrier panels have been embossed with an embedded scooped stroke mark to give the impression of the effect of an explosive volcanic impact on the wall.



Noise barrier panel designs are based upon volcanic field concepts

Safety

During the construction phase of the project, the risk of people climbing on the top of the noise barriers from the Hall Avenue foot bridge was identified. This resulted in triangular metal plates being added to the top of the noise barriers adjacent to the foot bridge to make it difficult for people to stand on the top of the noise barrier.

While the metal plates achieve their intended purpose, they are not well integrated within the overall barrier design.



Triangular metal plates have been added to noise barriers to prevent public access from the Hall Avenue footbridge

Lessons learnt

- Design solutions for noise barriers such as at overland flow paths should involve a multi-disciplinary approach in order to determine the best practicable option (BPO). This should include consideration of visual/landscaping, noise, community and costs. This BPO methodology is a requirement of the noise standard NZS 6806, which replaced the Transit Guidelines used in the designation conditions for the Walmsley Road project.
- Overall the noise barrier panel design at Walmsley Road is a good example of simple but bold form and texture. This subject is discussed in detail within Section 3 of the Transport Agency state highway noise barrier design guide. However, the visual appearance of barrier ends, including at breaks/gaps, should be appropriately designed. Refer to the Transport Agency's Noise Barrier Case Study 5 – Barrier Continuity, for further discussion on this issue.
- Public access on top of noise barriers should be considered during the design stage and integrated into the noise barrier design.
- Noise effects at new houses built near to existing state highways should be managed through reverse sensitivity controls.

Contact details

Rob Hannaby
NZ Transport Agency, Environment and Urban Design Manager
Telephone: 09 928 8761 - rob.hannaby@nzta.govt.nz



NZ TRANSPORT AGENCY
WAKA KOTAHI

New Zealand Government