



# DAY DESIGN PTY LTD

## Consulting Acoustical Engineers

# ENVIRONMENTAL NOISE



## TUNKS PARK AQUEDUCT

**Working 24 hours per day to refurbish a sewerage Aqueduct posed no noise problems for residents near Tunks Park, Northbridge.**

The Tunks Park Sewer Aqueduct is in a valley with steep slopes leading up through bushland to residences in Northbridge and Cammeray. The park acts like an amphitheatre, funneling noise upwards to the residences. The nearest dwellings, as seen above, are 60 metres away. Acoustic treatment to protect neighbours during the refurbishment process was designed by Day Design.

### Aqueduct Noise Control

The Sydney Water Sewerage Aqueduct at Tunks Park is of reinforced concrete construction, 80 metres in length and 6 metres above ground level, with piers at approx. 20 metre intervals across the park. Corrosion of the steel reinforcing and spalling of the concrete cover on both inside and outside had threatened the structural integrity of the Aqueduct.

To enable a continuous sewerage service to local residences sewerage diversion pipes had to be constructed along the both sides of the concrete aqueduct as shown in the cross section on the next page.

Several optional methods of rehabilitation of the aqueduct were considered and discussed with nearby residents. Noise from the construction equipment and disruption to the scenic beauty of the Park were the two prime discussion points raised by residents. The most intrinsically quiet option was selected.

This option required the aqueduct to be cleaned and repaired mainly from the inside, where any noise will be attenuated by its reinforced concrete walls.

### Aqueduct Rehabilitation Noise Sources

The main sources of noise from this project were the Aqueduct supply ventilation fan, an exhaust fan, a dust collector, a diesel generator and a diesel compressor. These were required to be operated continuously both by day and by night. Other items such as concrete scrabbling tools and concrete core drills were operated for short periods of time mainly in the daytime.

Most of the construction work was carried out during daytime hours when ambient noise levels are slightly higher and noise annoyance less likely. However, some night work was needed to divert and un-divert the sewerage when the flows were minimal.

### Acceptable Noise Level

Background noise levels at night were found to be as low as 34 dBA (quieter than a whisper) at the nearest residence. While an excess of 5 dBA is considered acceptable, Sydney Water agreed that we reduce the noise level to background noise level if possible and which was the basis of our design.

### Dust Collector Silencing

Men carrying out rehabilitation treatment inside the Aqueduct need fresh air. The dust collector has a high pressure centrifugal fan that is used to draw clean air through the Aqueduct and then exhaust to atmosphere. Such fans are very noisy.

The dust collector was mounted on the ground near the northern abutment, galvanised steel ductwork was provided from the access hole in the aqueduct to the air intake on the dust collector. Flanged connections were fitted with gaskets to seal off air and noise leaks. The dust collector was located behind the loaded vinyl curtain, under the Aqueduct to shield the residences from casing radiated noise. The discharge from the dust collector was exhausted horizontally to atmosphere outside of the acoustic enclosure.

Three duct silencers were fitted; one on the intake, one on the exhaust of the dust collector and one at the intake opening at the Southern abutment of the Aqueduct. These were designed to reduce the fan noise emission to an acceptable level for nearby residents and for workers within the Aqueduct.

# TUNKS PARK AQUEDUCT



Acoustic Enclosures on both ends during internal repairs to the 80 m long reinforced concrete Sewer Aqueduct

## Acoustic Enclosure

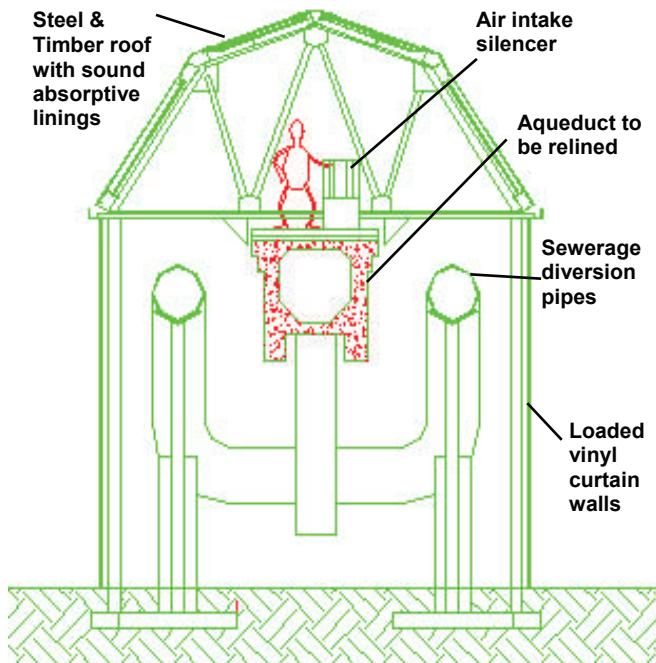
The Southern abutment was approximately 60 metres from residences and the Northern abutment approximately 110 metres from residences. Both abutments were fitted with acoustic enclosures which were steel framed approximately 6 metres wide, 12 metres long and 8 metres high. The roof was of 19mm particle board and waterproofed with Colorbond steel. The underside of the roof was lined with 100mm glasswool to absorb sound and provide thermal insulation for workers.

The walls of both enclosures comprised loaded-vinyl curtains lined with 25mm acoustic foam. They could be pulled aside to allow access for men and machinery. Skylights of 10.4mm laminated glass were fitted in the roof to provide natural lighting in daytime.

## Anecdotal Evidence of Noise Compliance

During a Day Design site visit we asked a local resident in Tunks Park if she had been affected by noise from the Aqueduct Refurbishment. She replied: "I don't think they have started work yet, because I haven't heard any noise at all." Just then two workmen wearing hard hats emerged from the Southern Abutment Acoustic Enclosure, and we were pleased to inform her that work had been going on for over six months.

The Sydney Water Project Manager, John Woodman, confirmed that during the whole year of construction only one noise complaint was received and that was due to a diesel-engined vehicle parked in the wrong place.



Acoustic Enclosure Cross Section

As recommended, the diesel generator and air compressor units were placed on the ground with a fixed enclosure around them. The enclosure had four walls, 6 metres high with an open top and two access doors. Very successful.

**DAY DESIGN PTY LTD** consulting acoustical engineers provide quality acoustical advice to architects, planners, engineers, managers, solicitors, insurance companies, councils, government and the general community. Our staff of professional engineers are ready to resolve your acoustical problems.



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