Historic, sustainable solution for traffic noise reduction in Alverna

Working in close cooperation with local residents and businesses, the Dutch province of Gelderland and the municipality of Wijchen come up with an innovative integrated solution to reduce traffic noise and improve the community

Roman road to major regional link
The 'Graafseweg' has provided a major link to the historic city of Nijmegen since Roman times. Now a busy main road, the N324 runs through the middle of the village of Alverna in the municipality Wijchen, in the Dutch province of Gelderland, connecting Nijmegen with southern villages and towns, such as Grave.

Fig 1: Impression of a Roman road, around 2000 years ago[1]

Major growth increases demand – and noise
Over the past decennia, Nijmegen, Wijchen and the surrounding area has experienced major growth. Several new residential areas have led to a significant increase in traffic levels on local and regional roads. The Graafseweg has been no exception and is used by 25,000 vehicles every day compared with 15,000 10 years ago. With this level of use has come an increase in noise levels and, not surprisingly, a corresponding rise in the number of complaints from local residents. Owners of the road, the province of Gelderland, worked with the municipality of Wijchen to draw up a plan to resolve the problem.
The ideas were first presented to the residents and business owners of Alverna in 2004.
In order to reduce the noise level sufficiently, this original plan consisted of placing four meter high sound barriers on both sides of the road.

Fig 2: Graafseweg, Alverna 2010

[1] Romeinen in Frans-Vlaanderen, **http://projectgrenzeloosgroep20.wordpress.com/**

Fig 3: Old situation

Fig 4: The proposed 4 m high barriers - rejected in 2004[2]

Rejection of initial plans leads to local cooperation

Not surprisingly, the reaction of residents to a four meter high sound barrier in front of their doors was a resounding "No!" The computer image shows why: the noise barriers would not only spoil the appearance of the village, they would also split the small community in two. Consequently, the initial plan, so cleverly calculated behind a desk in county hall, was quickly and firmly rejected. It would be 'back to the drawing board'. Not only was a new solution needed, but also a new approach: it was time for consultation.

Tapping into local expertise provides key to the solution

Over a series of open discussions with the residents and business owners of Alverna, the underlying principles for the reconstruction of the Graafseweg were drawn up. This local involvement was essential, as it is they who know the situation best. Their experience and expertise helped define the following basic aims for the work:

1. Improve environmental aspects, in particular reduce traffic noise and improve air quality
2. Improve traffic flow, reduce congestion
3. Accentuate the 'green' of the surrounding area
4. Preserve the appearance of Alverna
5. Preserve or improve Alverna as an attractive place to live

Fig 5: Alverna, an attractive place to live

[2] Gemeente Wijchen.

Targeted improvement area
The area covered by the project includes 70 homes which had been identified as being in need of noise reduction measures (*saneringssituatie*). In total 90 homes will experience a reduction of over 10 dB as a result of the work being carried out. Details of the calculations are available in the extensive report produced by dGmR in July 2008.

Combined measures reduce noise levels by 10 dB
To reduce traffic noise, five basic measures were adopted which, together, would be as effective as the four meter high sound barriers:

1. Move and reduce the number of lanes of traffic
2. Partly sunken road
3. Low-level sound barriers
4. Use of special 'quiet' asphalt
5. Reduce the maximum speed through Alverna

It is the combination of these measures that leads to a reduction in noise levels of more than 10 dB.

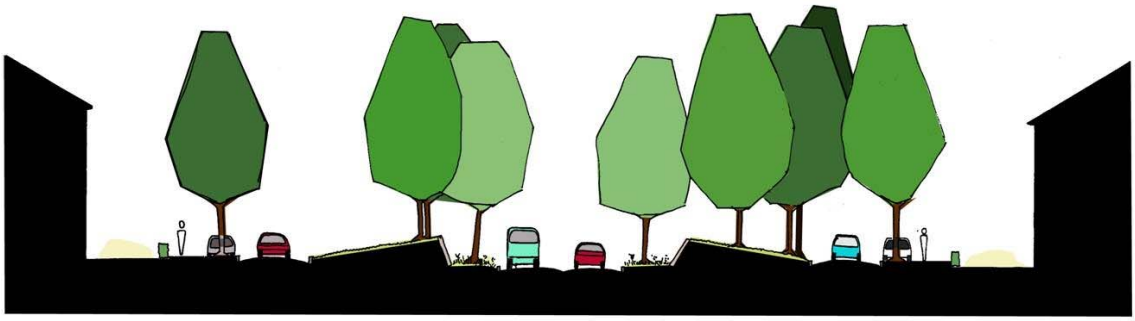

Fig 6: The final design of the Graafseweg is the result of a carefully coordinated, interactive process between the province, the municipality and the residents and businesses of Alverna

Village involvement increases local acceptance
This overall approach, enhanced by the reduction in noise levels is not only making Alverna a more attractive place to live, it is also having other environmental and local benefits. Even though a busy major road runs through the village, the villagers are extremely supportive of the plans which they have been so closely involved in drawing up. The newly created space is enabling the creation of attractive pedestrians' areas for café and restaurant terraces.

A sustainable, attractive solution links past and present
Based on the invaluable input from residents and businesses, the revised aims of the project led to a new design being drawn up by the province of Gelderland and the municipality of Wijchen:

- Traffic lanes are now joined and have been sunken by 0.5 meter
- Low-level sound barriers were designed for both sides of the road
  - unlike the original plans, the new solutions are just one meter high
- The sound barriers have a stone-like surface, a reminder of the Roman road that once traversed the region
- This special historical element has been enhanced by green surroundings, as the sound barriers are covered with earth to enable grass to grow on the banking
- The sustainable plans also include a tree planting scheme
- Energy-saving LED street lighting provides a warm welcome to passes by and locals alike
- Reducing the speed limit from 80 to 50 kilometres per hour not only reduces noise but also CO_2 emissions
- Improved air quality and newly created space is enabling the creation of attractive pedestrianised areas for café and restaurant terraces
- New and enhanced cycle routes link neighbouring countryside with the village and beyond

Fig 7: (Above)The new Graafseweg from the driver's perspective
Fig 8: (Below) Residents, pedestrians and local traffic enjoy a quieter, 'greener' Graafseweg

A cost-effective solution
Whilst some of the new measures could be achieved with few additional financial consequences, compared with the original 2004 plan, the majority of the features required extra budget. Wide support for the new sustainable plan generated considerable interest, and with this interest came a willingness to invest. A new investment consortium was put together, incorporating funds from a local, provincial, national and even European level: the municipality of Wijchen, the province of Gelderland and the Dutch government combined financial resources with money from the European Regional Development Fund to realise this innovative, attractive and sustainable soundscape in the village of Alverna.

Comprehensive research by local university forms basis for acoustic modelling
Researchers from the Radboud University Nijmegen, supervised by leading acoustic professors, and aided by specialists from the province of Gelderland and the municipality of Wijchen, carried out extensive trials prior to work starting.
Standard three-dimensional acoustic modelling software formed the basis for the initial calculations, as is usual in the Netherlands. But project managers were interested in the actual acoustic situation. To discover the noise levels on the ground, students carried out detailed research in to the situation before construction work began. Noise and air quality measurements were therefore taken in various properties along the Graafseweg.
The researches not only provide input for the base-measurement of the 'old' environmental situation, the results were also linked to the effects on heath. The research provided clear justification for the need for improvement. Once reconstruction work is complete, students will return to carry out new measurements, to determine the effects of the chosen approach.

A unique approach
What started out as a standard noise reduction exercise has resulted in a remarkable project which is a success story for everyone involved:

- Extensive interactive process with village residents and businesses
- Excellent cooperation across local and provincial government
- Close involvement of local university
- Comprehensive local, regional, national and European funding
- Integral incorporation of a busy major road through a residential area
- Combination of measures provide comprehensive sustainable solution for optimisation of noise situation and pleasant, green environment
- Prominent historic elements included in the attractive design

Fig 9: Start work. Extensive interactive process with village residents

Sharing knowledge
The potential for replication of this unique combined approach to noise reduction in other regions and countries is considerable. Representatives of those involved in the project have already begun sharing their knowledge and experience with 200 colleagues from government bodies and specialist consultancy companies across the Netherlands.

Evidence of the impact and results so far - Progress report July 2011
Work is well under way and will continue throughout 2011. The metamorphosis of the Graafseweg is taking shape and the final phase of the 'new road' will be opened with local festivities in December, celebrating a real local achievement with the people to whom it matters most - the people of Alverna.

Fig 10: Current situation

Fig 11: Low-level sound barriers

Experienced partners help every step of the way
Plans were drawn up in close cooperation with Dutch environmental consultants dGmR.
http://www.dgmr.nl/en/home/