Summary

Many cities and towns experience adverse local impacts associated with road traffic. To deal with these, knowledge about the environmental and health impacts of road traffic, and the efficacy of measures that deal with the different environmental impacts become increasingly important. What are the important impacts and which measures work?

Oslo East has for 20 years been the target area of an extensive road construction and rerouting programme. The programme has been financed through a financial package where the government, municipal authorities and car users all contribute. The purpose has been to remove bottlenecks and connect major transport corridors. An additional objective has been to reduce the adverse environmental impacts affecting the city area.

Environmental tunnel systems (Vålereng, Ekeberg and Svartdal) have been constructed, local streets closed, and environment friendly streets and other measures employed to upgrade the local road net.

In cooperation with several research institutes, the Public Roads Administration has assessed the environmental impacts of the programme through a series of socio-environmental surveys undertaken in the years 1987, 1990, 1994, 1996, 1999 and 2002. Thereby the environmental auditing for the Public Roads Administration has been accomplished. In addition a research programme was founded that have furnished a knowledge base and competence on local impacts of road traffic. From 17 sub-areas 5 200 residents have been interviewed over the years. The scope of the research and the 20-year long study period are thus unique.

The report documents that the entire programme consisting of environmental tunnels, other road construction efforts and environmental measures has resulted in an improved city environment, and improved conditions as reported by the residents. The improvements in Oslo East are larger than expected and better than for Oslo in general. Local supplementary measures on the local road net are to be credited for this. However, the investments have been costly.

Increased traffic and new dwelling projects bordering onto main roads and tunnel openings possess new challenges to the environmental success of the programme.

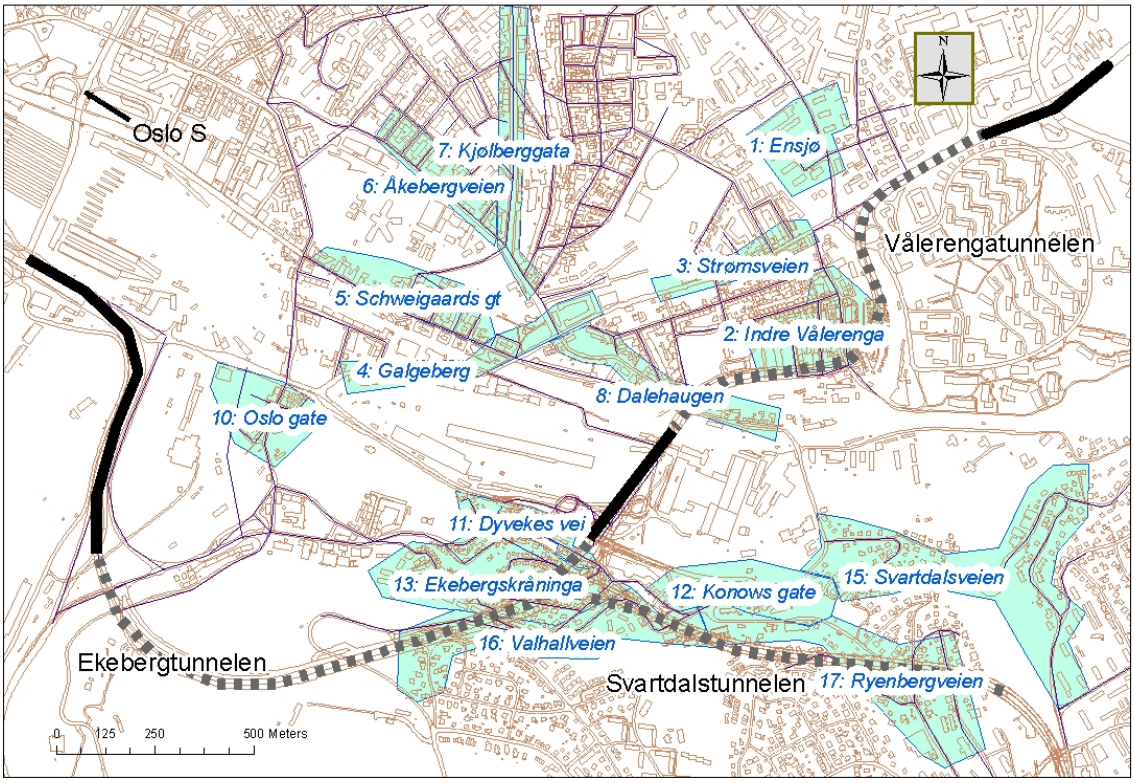

Figure S.1: Oslo East. Traffic system and tunnel projects. Roads and sub-areas in the study area of the Socio-Environmental surveys from 1987 to 2002. TØI report 743/2004

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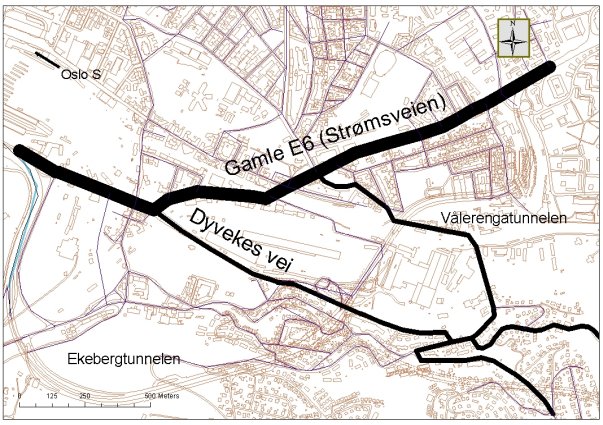
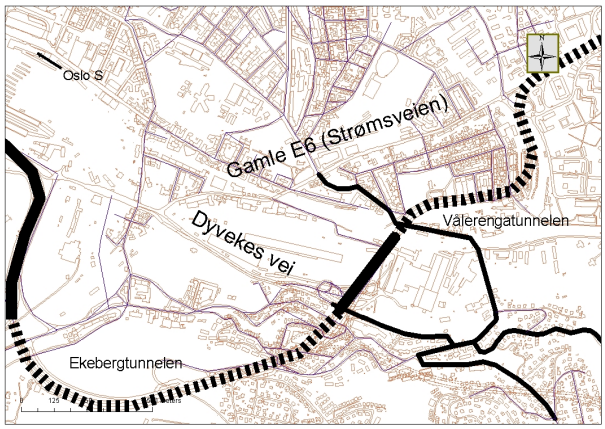
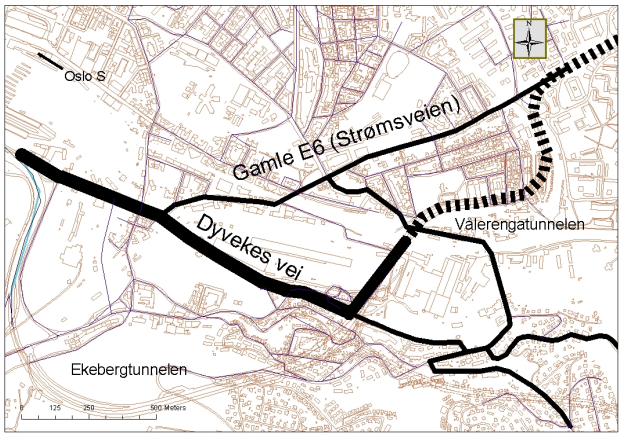


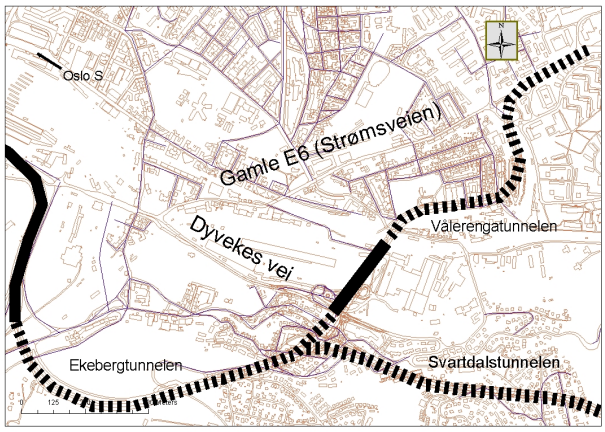
1987. E6 (ADT 37.000) cuts through the urban built up area along Strømsveien/St Halvards gate.



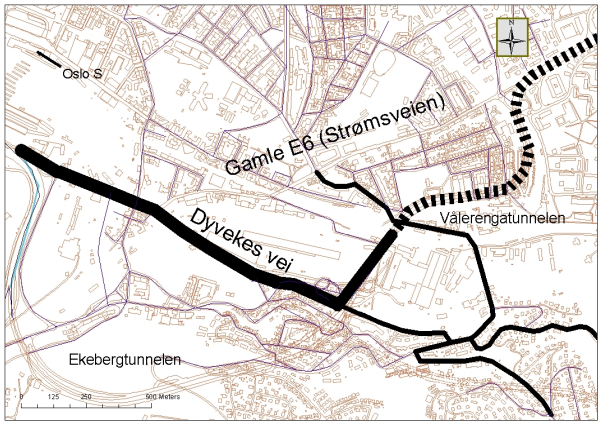
1995. E6 also channeled through Ekebergt unnel. Dyvekes vei allieviated. Loengbrua demolished 1996.



1989. E6 rerouted through the new Vålereng tunnel. From Lodalen follows Dyveks vei towards the city centre



2000. Svartdals tunnel guides traffic from Ryen into the tunnel system. Roads on the slopes of Ekeberg are alleviated of north bound traffic and traffic to the city centre



1992. Strømsveien closed. Through traffic channeled through Vålereng tunnels. Increased traffic Ensjøveien

Figure S.2: Different phases of the traffic re-routing in Oslo East. Miljøundersøkelser Oslo Øst 1987- 2002. © TØI rapport 743/2004. Environmental surveys from 1987 to 2002. TØI report 743/2004

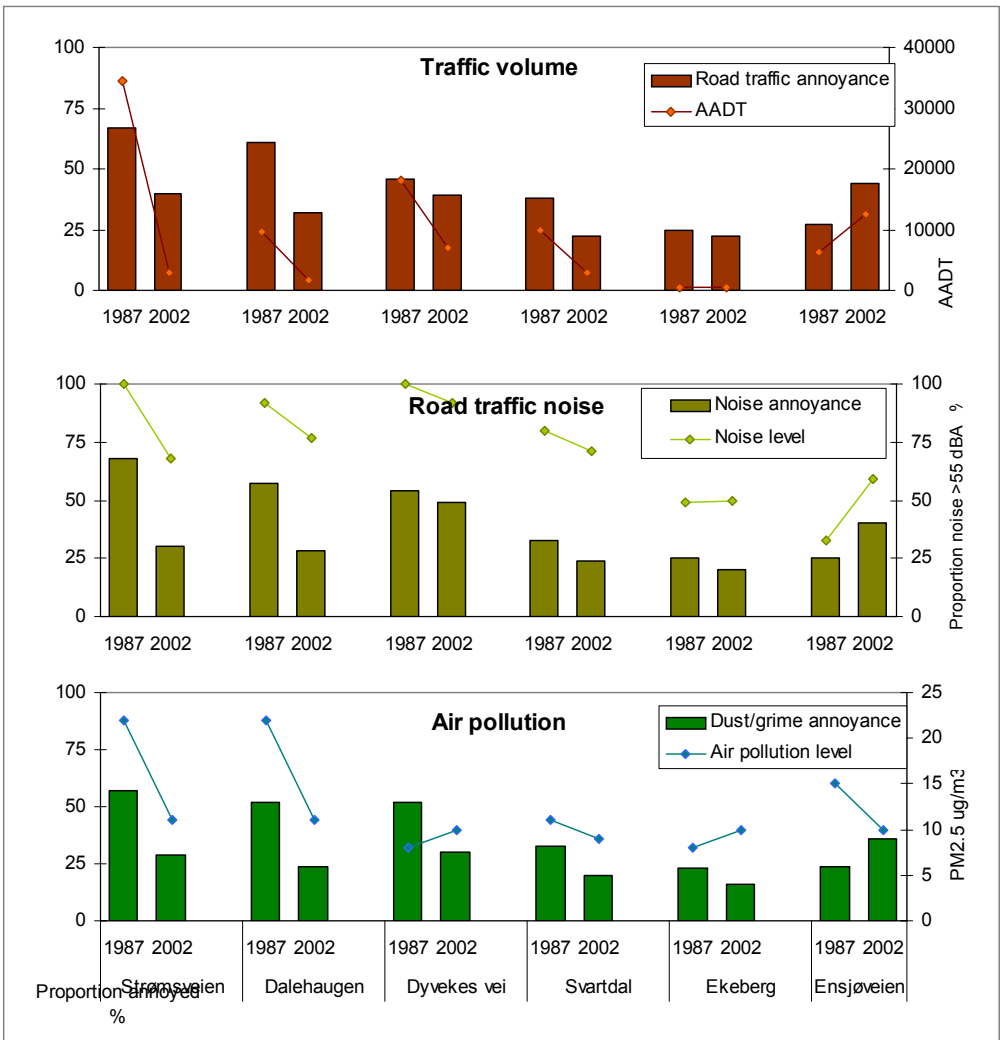


Figure S.3: Changes in environmental exposures, and human reactions 1987 – 2002. Traffic volume AADT. Equivalent Road Traffic noise in dBA og air pollution indicated by periodic means in $\mu g/m^3$. Mean annoyance in percentages. Socio-environmental surveys Oslo East 1987-2002 © TØI report 743/2004

Reductions in environmental load and reactions

The traffic volumes, equivalent noise levels and air pollution indicator values for most of the investigated sub-areas have been reduced. The reduction in air pollution indicators matches that seen for the rest of Oslo, while the noise level reductions are associated with local traffic volume changes. The noise levels are still high. With the exception of the Ensjøveien located at the north tunnel entrance the human reactions to the environmental exposures have been reduced –See figure S.3.

Tunnels have given Oslo East new life

The E6 along Strømsveien og St Halvardsgate in 1987cut through the built up areas in Oslo East - see Figure S.2. Connecting streets were also burdened by high traffic volumes. By means of the new tunnel systems (Vålereng and Ekeberg tunnels) that were opened to traffic in 1988 and 1995, traffic flows were channelled away from the built up areas. Several connecting streets were also alleviated of traffic. The traffic flow reductions made additional environmental measures viable that have transformed the whole area. Oslo East is now a centrally located city area with many environmental qualities. While 1987 saw Oslo East as the area in Norway with the heaviest traffic load, the area is now no worse off than other comparable city areas.

Svartdalstunnel reroutes traffic and provides new opportunities for urban development

The opening of the Svartdal tunnel in the year 2000 interconnects the E6 at Ryen and the Ekeberg and Vålereng tunnels. – See Figure S.2. Dwelling areas on the slopes of Ekeberg, and at Lodalen benefited from the reduction in through-traffic to and from the city centre and to the north. This is reflected in lower degrees of annoyance associated with traffic being reported. That the area is perceived as more attractive is also evident from the plans for rehabilitation and new developments in the area.

Closed street – environmental openings

In addition to preventing road users from using the former main routes, it is also important to prevent the traffic from the E6 from exploiting the city area as a cut through to the city centre. It is therefore required that the Public Roads Administration supplement the main rerouting with other measures.

The socio-environmental survey show that rerouting the traffic through tunnels provides new opportunities for many different types of environmental improvements – not least through measures targeting the local road network. The also show that rerouting the traffic flows not by itself sufficient to improve the environmental quality of the city area.

Measures on the local road network capitalizes on the opportunities provided by the rerouting. In some cases it can be necessary to block streets for through traffic, and ensure that traffic increases don't erode the environmental benefits that have been achieved.

Environmental streets can contribute to traffic flows that to a greater extent conform to the premises laid down by residents, pedestrians and bicyclists. This improvement also makes the burden of traffic easier to bear, and less annoying.

Environmental challenges at tunnel entrances

The rerouting and construction program for Oslo East has resulted in important environmental benefits over-all, but for some areas the environmental load has increased. This is the case for areas near the tunnel entrances and connecting streets to the main road system. The rerouting channels traffic through sparsely populated city areas – however, the pollution levels are high, and it is thus important that new developments in the areas don't result in an increased number of residents becoming the victims of unacceptable environmental loads.

The connecting road of Ensjøveien affecting many residents is especially challenging. These residents are currently the most affected by road traffic in Oslo East, and it would be reasonable that they were next in line for remedial measures.

Authorities' efforts favourably regarded

The residents were asked whether they had benefited or been adversely affected by the efforts undertaken by the authorities in the area. Most residents are satisfied – See Figure S.4. The proportion that is satisfied is highest in the areas where the improvements have happened recently. That is after the Svartdals and Galgebeg tunnels were opened for traffic, allowing Enebakkveien to be closed and alleviating Dalehaugen for traffic. Residents living close to the tunnel entrances are less satisfied. Here there clearly is a need for additional efforts.

What is there to be learnt from Oslo East?

The socio-environmental surveys document that:

- Rerouting can alleviate a road network of traffic
- Supplementary measures are necessary to capitalize from the opportunities this provides
- To prevent through-traffic some streets must be closed down
- With ever increasing traffic sustained efforts are necessary to prevent local traffic increases

It is reasonable that the Public Roads Administration bear the responsibility for these types of supplementary measures. Other challenges for areas that have profited from the investment of large resources to improve the environment are to:

- Improve conditions for those adversely affected by the changes
- Ensure that new dwellings are not located in areas with high environmental loads.

The total number of people that have benefited from environmental improvements far outweigh those that have been adversely affected. In this respect the efforts have been a success. It should however be kept in mind that the rerouting is an extremely costly measure that is not viable for all city areas experiencing environmental problems. It is therefore necessary with additional and alternative strategies for improving the local environment.

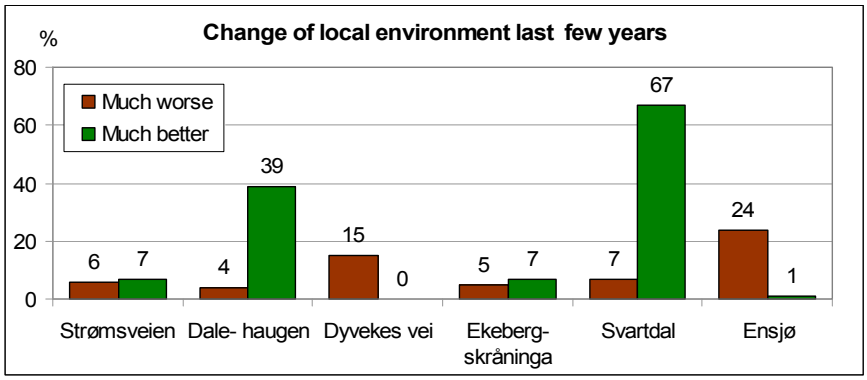


Figure S.4: Experience of changes in the local environment due to local authorities efforts in improving traffic conditions in the last few years. Proportion saying the situation has become much better or much worse, respectively, in some local areas. Percentage. Socio-environmental surveys Oslo East 1987-2002 © TØI report 743/2004