

## **Environmental Protection**

The Project began by implementing an ISO 14001 compliant Environmental Management Scheme. A dedicated environmental team was charged with developing and implementing a scheme which would achieve these standards. The Environmental Plan defined environmental aspects, legal and other requirements and the control measures used to manage and mitigate the environmental impacts of the project.

The main environmental aspects of the project were identified as;

- Waste water treatment
- Dust mitigation
- Noise and vibration monitoring and control
- Waste recycling and reuse
- Discharge Licence monitoring
- Information network for nearby residents and stakeholders

Environmental monitors were put in place to ensure that predetermined acceptable levels of noise, vibration and dust levels were not exceeded. Vibration and noise generated by the boring machine is the main environmental issue in the bored tunnel section. Despite being over 20m underground a significant amount of noise is heard at ground level when the machine is excavating. The working hours of the rock-tunnelling machine vary depending on whether the machine is working under green areas or under built-up areas. This machine worked between 8.00am and 11.30pm.

The disposal of materials from the TBM excavation is not an environmental issue, since a large proportion of the excavated rock was used on site and the remainder was used in other construction as road base material. Another by-product of the tunnel boring "soft inert spoil" was used to backfill quarries. A range of environmental control measures are in place, including the covering of all trucks to minimise dust pollution and wheel washing from the wheels of all trucks prior to leaving the site

The environmental impacts were assessed with an extensive system of remote monitoring stations for nuisances and by routine sampling for other water quality and effluent. Visual monitoring was required in method statements that addressed environmental impacts, and regular site inspections served to record performance as a basis for corrective action and key performance indicators. Monitoring data, inspection reports, audit findings and any other measures of performance were presented and tabled in Monthly Environmental Meeting