

Integrat

Trees, displacement ventilation and the use of thermal mass all played their part in giving the Green Building of the Year Award to the Ministry of Defence. Ewen Rose gets under the skin of the winning building

A Ministry of Defence office campus near Bristol has won this year's Green Building of the Year Award, jointly sponsored by the *HVCA* and *The Independent on Sunday* newspaper.

Abbey Wood, the headquarters of the ministry's Procurement Executive, covers a 98-acre site and includes 17 separate buildings for 6,000 staff. It is intended to be self-sustaining and employs passive techniques by means of facade design and exposure of thermal mass.

The plan was to integrate engineering concepts with space planning and architectural fabric design through a close-knit multidisciplinary design team, which included staff from consulting practice Hoare Lee.

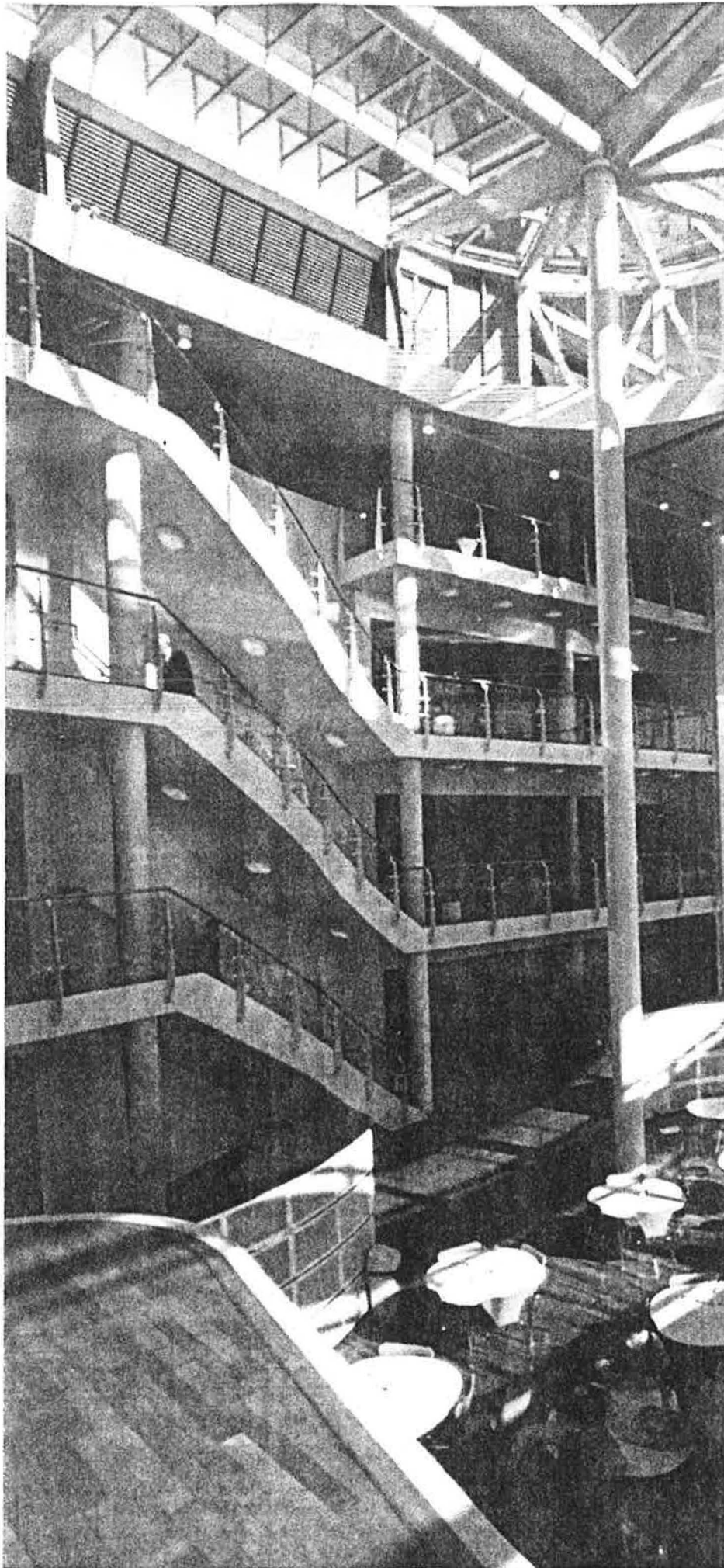
Fresh air

Triple-glazed, openable windows with built-in blinds combine with displacement ventilation to avoid the use of air conditioning. None of the staff is more than 6.5m from a window and an equivalent of 25l/s fresh air per person is supplied without any re-circulation.

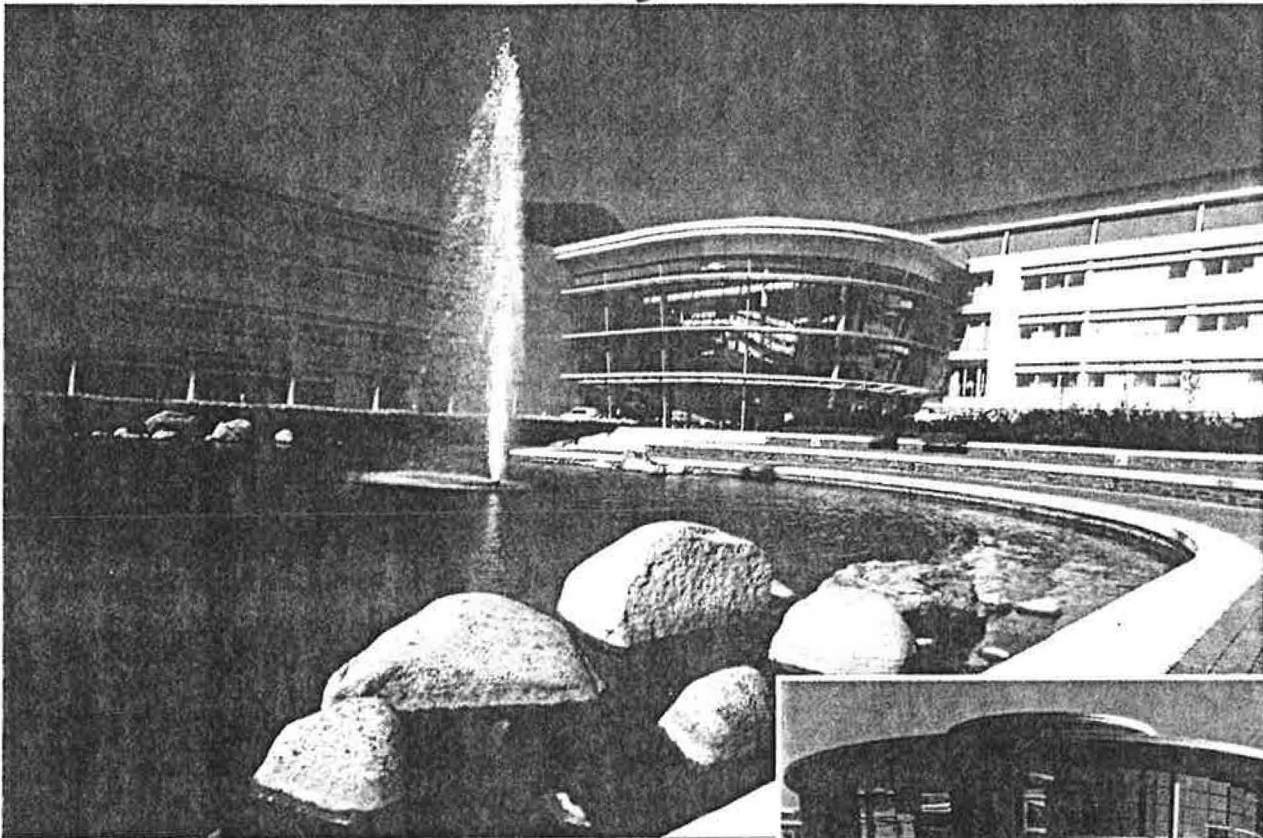
Computer modelling was used to map air-flows, and 16 of the buildings ultimately



5,000 trees and 28,000 shrubs and bushes were planted to absorb CO₂ as well as improve the visual appeal



ed design is winner for Abbey Wood



achieved 'excellent' BREEAM ratings.

The facade design incorporates a 'warm' and 'cold' elevation: the south and south-west faces are built from thick stone and concrete with smaller, well-shaded windows to reduce temperature swings - delaying solar gain by up to eight hours. With no requirement for solar shading on the north and north-east facades, a low mass, insulated curtain wall is used here as well as larger windows.

Air leakage rates were tested and met the requirement for 5m³/hr.m² of facade at 50pa.

Natural lighting is an important aspect, and to this end tall atria have been designed with trees planted on the inside providing pleasant spaces for informal meetings.

This marries with the overall landscape approach, which involved the planting of 5,000 trees, and 28,000 shrubs and bushes to improve the visual appeal, but also to increase absorption of CO₂.

The buildings are all low-rise and

the MoD is claiming an energy consumption of between a third and a sixth of a standard air conditioned office. The air supply systems operate at 19°C supply.

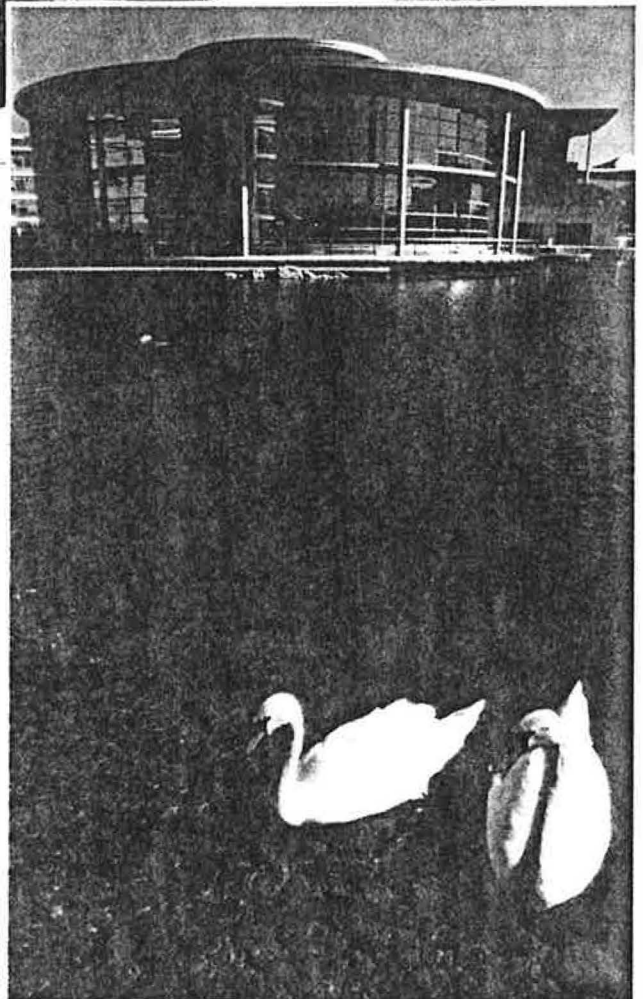
All air handling plant incorporates cross flow heat exchange

Filtered ventilation air is delivered through the floor via personal diffusers - two for each occupant - which displaces heat and contaminants and moves upwards to extract holes in the ceiling slab.

The availability of personal choice for opening windows does not increase the heating load unduly in winter as most of the supply air is heated by free recovered heat and the supply temperature is closer to external ambient conditions than in most conventional systems.

The exposed soffit modifies the diurnal temperature performance of the office space. Night-time pre-cooling is automatically selected by the BMS in summer and the night air is circulated when it is judged beneficial.

In winter, the slab is used as a heat



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The Centre for Understanding the Environment (left and below) uses natural materials such as timber walling and turf roofing.

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store and the ventilation systems do not run at night.

Low glare lighting is used with intelligent luminaires each controlled by individual presence detectors and daylight linked dimming of the high frequency light source.

Chilled water systems supply chilled beams in some parts of the site and receive supply water at 16°C. The designers point out that 19°C is only exceeded for under 10% of the year and so can be provided by direct free cooling. Chilled water can be produced for free cooling coils on all chillers for the most part of the year.

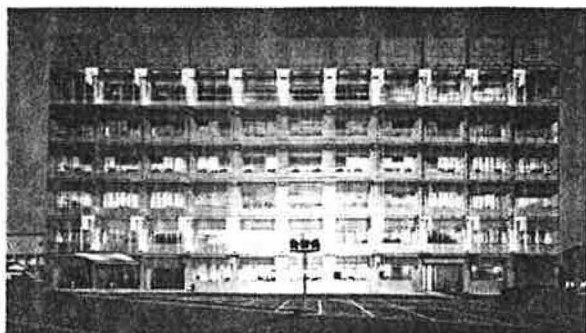
Lifecycle

CHP was considered for the heating load, but the cost of electricity defeated the lifecycle costings. However, harmful emissions are controlled by using low Nox boilers, and all air handling plant incorporates cross flow heat exchange which, by recovery of the casual space heat loads and the low natural heat loss of the buildings, provides free heating for the majority of occupied periods and more economical heating up periods.

One other entry for the award was highly commended: The extension to the Horniman Museum, South London which is used as a Centre for Understanding the Environment.

This was praised for its simplicity of design and use of natural materials such as timber walling and turf and wild flowers for the roof. The Centre is naturally ventilated and also has a 'clerestory' which allows in large amounts of natural light.

Hollow structural columns are linked to roof



towers for air extract, while inlet air is provided through openings in the underfloor void.

Also commended were Bridge House (above), the refurbished Uxbridge headquarters of Xerox (UK); and the Groundwork Eco Centre, which is an office building commissioned by the Ground-

Most of the supply air is heated by free recovered heat

work Trust in Tyneside.

Alan Walker, from the MoD, received a plaque and paper sculpture to mark Abbey Wood's award from HVCA president Bill Belshaw. Certificates were also presented to Jonathan Hines of Architype for the Horniman Museum project; to Carole Townsend of Earthsense for the Groundwork Eco Centre; and to Tim Stockton of Xerox (UK).

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