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Simon Fullalove, *Editor*

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Green municipal engineering for sustainable communities

P. M. Condon and K. Isaac

Proceedings of the Institution of Civil Engineers—Municipal Engineer, 2003, **157**, March, 3–10

The East Clayton Neighbourhood Concept Plan, initiated in January 1999, had the vision of planning a community where sustainability policies were applied to the design of a site in the form of tangible practices. This paper details the design and function of the East Clayton green infrastructure plan, focusing on stormwater management, pedestrian and bicycle movement and lowered infrastructure costs, and illustrates the vital and expanding role of the engineer in the move towards liveable, affordable and ecologically sound communities.

Use of alternative fuels in the UK road haulage industry

A. K. C. Beresford, G. D. Smith, S. J. Pettit and P. Nieuwenhuis

Proceedings of the Institution of Civil Engineers—Municipal Engineer, 2003, **157**, March, 11–17

The market share of alternative fuels in UK road freight transport is less than 1%, despite several promotional initiatives. However, the use of fuels other than diesel in heavy goods vehicles is potentially one of the key methods of improving the environmental performance of transport and therefore making it more sustainable. This paper investigates a number of factors that affect the actual and potential adoption of alternative fuel technologies within the UK road haulage industry. The study focuses on the political and commercial environment surrounding the uptake of alternative fuels and suggests how the distribution network structure may determine the level of penetration of alternative fuels into the road-based

freight transport sector. UK policy initiatives such as Powershift are important in this context.

A review of the UK cycle network

R. J. Blackwell

Proceedings of the Institution of Civil Engineers—Municipal Engineer, 2003, **157**, March, 19–24

There are hundreds of thousands of new bikes sold in the UK every year but until recently the number of people cycling has fallen every year for the last 20 years. This paper explores some of the reasons for this decline in use and reviews the role the National Cycle Network in trying to reverse the trend. The provision of funding and the maintenance requirements of cycle routes are also explored.

Why restore inland waterways?

A. J. M. Harrison and R. D. Sutton

Proceedings of the Institution of Civil Engineers—Municipal Engineer, 2003, **157**, March, 25–33

Most of the inland waterways of England and Wales were constructed in the late eighteenth century for the carriage of freight; they are now mainly used for amenity and recreational purposes. This paper describes the campaign of the Inland Waterways Association to retain the waterways threatened with closure and to promote the restoration of those that were derelict. Although the income generated from waterways covers only about half the operational and maintenance costs, substantial economic benefits to the adjacent communities justify their restoration. The paper discusses the restoration process and the changing sources of funding. With the advent of The Waterways Trust and British Waterways' new freedom to engage in restoration work, the pace of waterway restoration has quickened. Whether that pace will be maintained now depends largely on the availability of funding.

Urban street tree plantings: identifying the key requirements

S. Pauleit

Proceedings of the Institution of Civil Engineers—Municipal Engineer, 2003, **157**, March, 43–50

Trees fulfil important aesthetic, social and environmental functions in urban areas. However, tree life is increasingly

under stress, leading to poor vitality and tree decline, particularly in urban streets. The requirements for healthy tree life are broadly known. Criteria for the design of planting sites in streets, choice of tree species and maintenance requirements are outlined in the paper. However, a European survey reveals the wide variance of tree planting and management practice. UK cities and towns performed poorly against criteria such as level of expenditure for trees, street tree quality and site preparation. Evidently, trees are very much undervalued and only an afterthought in the process of planning, design and management of streets. There is an urgent need to develop and apply comprehensive concepts for sustainable urban forests and specifically for street tree plantings. Standards for site planning, as well as increased knowledge of suitable tree species and tree quality standards are key to achieving this goal. Information on best practice needs to be more widely disseminated. The European pilot survey was a first step towards establishing an information network across Europe to collect the information needed for this purpose. There is a need for close collaboration between civil engineers and landscape architects from a very early stage to integrate tree plantings into the design of streets, in order to maximise their benefits and avoid potential conflicts with traffic and utilities.

On the move: by foot

R. Huxford

Proceedings of the Institution of Civil Engineers—Municipal Engineer, 2003, **157**, September, 159–161

This briefing sheet is a summary of *On the move: by foot*, a discussion document published by the Department for Transport, 30 June 2003. The aim is to contribute to a strategy document on walking that will contribute to the broader liveability agenda being developed by Government. The full document can be downloaded from: <<http://www.local-transport.dft.gov.uk/consult/walking/>>

Evaluation and visualisation of risk to water resources

N. McIntyre, M. Lees, H. Wheeler, C. Onof and B. Connorton

Proceedings of the Institution of Civil Engineers—Water and Maritime Engineering, 2003, **157**, 1–12

A traditional difficulty encountered in water resource planning is the inherent uncertainty in demand and supply capability. Over recent years this uncertainty has increased for the UK water industry, owing for example to forecasts of climate change and impending directives from Europe, and in the face of such uncertainty it is no longer justifiable to design water resource systems in a deterministic fashion. Design objectives should be risk-based, and it is likely that both investors and regulators will soon request formal risk evaluation prior to major investment or strategic decisions. Consequently, there is a need for probabilistic, or risk-based, approaches to water resource assessment. A methodology for evaluation and visualisation of risk to security of water resources is presented, based on hydrological frequency of occurrence and uncertainty-based analysis of headroom (that is, the difference between supply capability and demand). The methodology makes it possible to calculate and visualise the probability of system failure for particular hydrological conditions or the probability of system failure in an arbitrary year, and to make

preventive planning or operational decisions. The proposed approach is illustrated with a case study.

Swabi salinity control and reclamation project

M. Donaldson, H. D. Bangash and D. B. Stacey

Proceedings of the Institution of Civil Engineers—Water and Maritime Engineering, 2003, **157**, 83–92

At the beginning of the last century, in the tribal territory of India's North West Frontier Province, British engineers constructed the Upper Swat Canal system. The project comprised diversion works on the River Swat to provide 2400 cusec (68 Mm^3/s) via a canal network to irrigate over 300 000 acres (121 400 ha) of fertile rainfed land. The civil engineering is bold and imaginative, incorporating tunnels, multi-span aqueducts in stone masonry, steel siphons under major river gorges and notch fall structures, all superb examples of the engineering excellence of that era. This paper describes the rehabilitation and upgrading of the system which was carried out by the Government of Pakistan between 1991 and 1999 under a US\$162 million project, funded by the Asian Development Bank.

Vulnerability of coastal defences to climate change

J. Sutherland and B. Gouldby

Proceedings of the Institution of Civil Engineers—Water and Maritime Engineering, 2003, **157**, 137–145

Climate change will alter wave and water level conditions and hence affect the vulnerability of coastal defence structures. The likely changes in vulnerability are important to the stakeholders in new and existing coastal defence structures, as decision-makers may reasonably be expected to include the probable effects of climate change in their planning processes. Time series of present and future waves and water levels were generated using a climate model. These were used to calculate the changes in overtopping rates and in the longshore drift of sediment in front of sea defences. The results indicate that there will be considerable increases in overtopping rates if present-day defences and beaches are unchanged by 2075. However, the inclusion of sea level rise predictions in design calculations should account for the majority of the predicted change in overtopping. The work also indicates that future changes in longshore transport are unlikely to be greater than current levels of uncertainty, and these should be considered in the normal course of sensitivity testing. Qualitative and quantitative differences in future changes in vulnerability were found between the five sites examined, as they had different tidal ranges, wave climates, surge levels and joint probabilities.

Sustainability starts to become a reality

S. Wood

Proceedings of the Institution of Civil Engineers—Civil Engineering, 2003, **157**, February, 4

Two years ago a group of 43 young engineers came up with 47 recommendations to make the profession more sustainable. The author says a follow-up report due out this month shows the tide really is beginning to turn.

Downland gridshell—an innovation in timber design

R. Harris, O. Kelly and M. Dickson

Proceedings of the Institution of Civil Engineers—Civil Engineering, 2003, **157**, February, 26–33

Innovations in timber construction are relatively rare these days. However, a modest utility building at an open-air museum in Sussex has attracted worldwide attention for the novel features of its double-layer timber gridshell roof. Apart from being the first such structure in Britain, it was the first built with 'optimised' green oak, the first designed in accordance with the new timber Eurocode and the first to use a new patented node joint system. It sets a new benchmark for lightweight sustainable, cost-effective construction.

ICE launches sustainable development charter

J. Ekins

Proceedings of the Institution of Civil Engineers—Civil Engineering, 2003, **157**, August, 99

The Institution of Civil Engineers has launched a new charter which obliges civil engineers to avoid compromising society's future.

Cuilleig—a benchmark for future hydropower schemes

M. Seaton and N. Sandilands

Proceedings of the Institution of Civil Engineers—Civil Engineering, 2003, **157**, August, 124–129

Despite being a source of renewable energy, hydropower schemes are not particularly popular with planners due to the significant impact they can have on their immediate surroundings. However, a small run-of-river plant recently completed in Scotland—the country's first hydro project for 40 years—shows that such schemes can be both profitable and practical to build, as well as having a negligible environmental impact. This paper describes the planning, design and construction of the 3 MW Cuileig scheme—a benchmark for what looks set to be a renaissance for hydropower.

Conserving with CARE

I. Hume

Proceedings of the Institution of Civil Engineers—Civil Engineering, 2003, **157**, November, 149

Maintaining the UK's built environment now accounts for half of all construction expenditure. The author reports on the new ICE/IStructE accreditation scheme he chairs, which is designed to ensure that the conservation elements of such work are properly engineered.

Willow engineering: a greener option for slopes

I. Richards

Proceedings of the Institution of Civil Engineers—Civil Engineering, 2003, **157**, November, 150

Live willow offers engineers an exciting and sustainable solution to slope stability problems. It starts off as simple piling but soon grows into a substantial ecological protection system.

Time for action on waterways

M. Kendrick

Proceedings of the Institution of Civil Engineers—Civil Engineering, 2003, **157**, November, 151

Waterways have long been recognized as offering sustainable transport solutions but they remain low on worldwide political agendas. The author reports on a new call for action and some promising developments in the UK.

Halley-at the edge of ice-station design

D. Blake

Proceedings of the Institution of Civil Engineers—Civil Engineering, 2003, **157**, November, 168–174

Halley, the 50-year-old Antarctic survey station where the hole in the ozone layer was discovered, is by necessity in one of the most inhospitable parts of the earth. Its resident staff are exposed to temperatures down to -55°C and winds up to 150 km/h. Everything they build eventually gets embedded in a moving ice shelf. As such, the first four stations were abandoned after ten years or so. The current station, Halley 5, is radically different from the previous designs in that it uses a mix of jackable and ski-mounted structures. However, there is still room for improvement, particularly in regard to energy use, and Halley 6—already on the drawing board—is likely to be a further major step forward in sustainable ice-station design.

Highway bridges and environment-sustainable perspectives

K. Steele, G. Cole, G. Parke, B. Clarke and J. Harding

Proceedings of the Institution of Civil Engineers—Civil Engineering, 2003, **157**, November, 176–182

Civil engineering infrastructure is generally maintained in accordance with safety, economic and technical issues. But what of the environmental impact of such activities? Regular maintenance can have a significant environmental impact—particularly in the case of bridges, where closure can result in traffic jams and lengthy detours. Higher cost but lower maintenance components and transfer of structures to lower-grade sites are possible answers which, until now, have been difficult to assess. This paper reports on a life-cycle assessment method developed to factor environmental impact into bridge maintenance strategy. Though developed for bridges, it has potential application throughout the facilities management sector.

Channel Tunnel Rail Link: Cobham Ashenbank management scheme and Rail Link countryside initiative

D. Standen

Proceedings of the Institution of Civil Engineers—Civil Engineering Special Issue, 2003, **157**, May, 59–64

The package of environmental compensation and mitigation that accompanies the construction of the £5.2 billion Channel Tunnel Rail Link is widely seen as a model for future major development projects. The success of two innovative compensation schemes, agreed during the Parliamentary hearings,

demonstrates the value of compromise and the partnership approach.

Channel Tunnel Rail Link section I: an environmental route

T. Allett and J. Mitchell

Proceedings of the Institution of Civil Engineers—Civil Engineering Special Issue, 2003, 157, November, 12–15

Environmental considerations were at the heart of the route selection process for the Channel Tunnel Rail Link. Decisions were seldom clear-cut, but, with section 1 now built and operating, the majority seem to have proved right in environmental terms. With the benefit of ten years' hindsight, this paper reviews the environmental input to route selection and how it worked in practice—particularly the tough choices relation to Ashford, Boxley Valley and Medway.

Channel Tunnel Rail Link section I: environmental management during construction

P. Johnson

Proceedings of the Institution of Civil Engineers—Civil Engineering Special Issue, 2003, 157, November, 16–20

The first 74 km section of the £5.2 billion Channel Tunnel Rail

Link is entirely in Kent—the 'Garden of England'. This paper reports on the environmental management system that was set up to minimise the potentially huge environmental risks and impact of the scheme throughout its design and construction. In addition to management issues it reports on the approaches taken to relocating wildlife and controlling noise and vibration.

Channel Tunnel Rail Link section I: landscape design

T. Armour

Proceedings of the Institution of Civil Engineers—Civil Engineering Special Issue, 2003, 157, November, 54–59

Landscape design and planting the first 74 km section of the Channel Tunnel Rail Link was a vast and sensitive undertaking. It involved placing and shaping 10 million m³ of fill around the track to help it blend into the landscape and then planting 1.2 million trees and shrubs and 245 ha of grass and wildflower seed. This paper reports on the many innovative techniques that were used in addition to the great care used in plant and seed choice.