THE IMPACT OF ECOLOGICALLY SUSTAINABLE DEVELOPMENT (ESD) INITIATIVES ON TRADITIONAL LOCAL GOVERNMENT ENGINEERING

Anthony Collins[1], Alasdair Guthrie[2] and Robert Rajca[3]
[1]Environmental Scientist, Hornsby Shire Council
[2]Principal, Guthrie Consulting (Former Executive Manager, Environment Division, Hornsby Shire Council
[3]Manager, Design & Construction Branch, Hornsby Shire Council

Abstract

Hornsby Shire Council (HSC) has undertaken a large number of programs aimed at protecting the local natural environment and pursuing the concepts and principles of ecologically sustainable development (ESD). Whilst the original programs focused on issues such as water quality, pollution control, habitat protection and integrated environmental management, the initiatives of ESD have also significantly impacted on the traditional local government engineering programs of Council's Works Division. Examples of local government engineering works which pursue ESD and works directly and indirectly affected by ESD from Hornsby Council's perspective, are presented in this paper. These case studies will give local government engineers and managers a better insight into the challenges that ESD poses into the new millennium.

Key Words: ecologically sustainable development, local government, civil engineering, integration, asset management

Introduction

In 1994, Hornsby Shire Council established a corporate structure of five divisions. The structure includes the Works Division which has a principal responsibility of managing and maintaining the Shire's infrastructure and a Planning Division having responsibility for strategic planning and assessing development applications. In recognition of the growing threats to the valuable environmental assets of "the Bushland Shire", the structure also includes a Environment Division with specific responsibility for integrated management of the Shire's natural resources and the impacts upon them. The full rationale and advantages of this structural model has previously been described (Guthrie, 1996).

For the past five years, scientists in Council's Environment Division have been conducting a suite of programs designed to pursue ecological sustainability and the principles of ecologically sustainable development (ESD) as defined in *the National Strategy for Ecologically Sustainable Development* (Commonwealth of Australia, 1992a). This is not being done in isolation, however, with other divisions fully focused in an integrated approach to ESD. For example, Council's environmental scientists in-conjunction with professionals from other divisions have researched best practices for pursuing sustainable water management which in turn, have been used by the planners to develop appropriate planning instruments. Whilst these planning instruments are primarily for controlling private developments, they are also used to guide Council's own engineers and operations including general civil design, construction and asset maintenance works.

Council's structure provides the opportunity to integrate the consideration of environmental issues into Council's strategic and other corporate management processes directly, and without compromise, at executive management level. Council's executive management team can then plan its strategies and operations in the full

knowledge of all relevant environmental and sustainability issues.

Statutory Imperatives and Corporate Support

With the commencement of the *Local Government Amendment (Ecologically Sustainable Development) Act 1997* on 1 January, 1998, Councils are now expected to adopt a strategic approach towards the incorporation of ESD principles when carrying out their functions. The amendments have created linkages between Council's environmental charter, its approval function, its management plan, annual report and State of Environment (SoE) report (Department of Local Government, 1997). The implementation of ESD in the New South Wales environmental planning system and natural resource management legislation has been also been variable to date (Bradbury, 1997).

Through the pursuit of a sustainability management approach to its activities, development of quality systems initiatives and the establishment of a Local Agenda 21 Committee, Hornsby Shire Council is working towards ensuring that all sections of Council take environmental considerations into account when addressing their operational and regulatory responsibilities. Council's Corporate Improvements Programme (1998) identifies sustainability as one of its key underlying principles. The programme describes sustainability as 'the manner in which Council undertakes its activities as to not diminish the quality of life of future generations'. It recognises that this can be achieved by:

- encouraging community participation
- protecting the natural environment
- being safe and accessible
- conserving resources
- pursuing social equity, and
- facilitating a diverse local economy.

In formalising a Sustainability Strategy, Council has confirmed the need to link its overall strategic direction and operational programmes, in the context of sustainability. Council's Management Plan (1998a) promotes development in the Shire that has a minimal environmental impact. Initiatives such as Council's Energy Efficient Housing Policy, Sustainable Water Development Control Plan (DCP), Waste DCP and Sensitive Urban Lands controls are but a few examples. Council has adopted a Housing Strategy which improves housing choice in locations close to existing transport and amenities, while preserving the attractive character of local suburbs.

Council Programs to Pursue ESD

Among Council's programs to pursue ecological sustainability and ESD, there are many that are related to, or have an impact on, traditional local government engineering. The implications of achieving sustainable economic and social development in local government whilst maintaining ecological integrity has placed new demands on the roles of engineers and scientists. Understanding the framework of sustainable development and the process working towards it's implementation requires different qualities from those expected of traditionally educated professionals (Harding, 1998).

The current ESD initiatives of Council's Environment Division have directly influenced the activities and decisions across other Council divisions as well as at the Councillor level, whereby the environment is now a key consideration in the decision-making process. Some of these initiatives include:

- Long Term Water Quality Monitoring Program - a comprehensive grab and load water quality monitoring strategy established to gauge the effectiveness of ESD initiatives (HSC, 1997b).
- Environmental Audit of Industrial Areas and Commercial Activities **-** A program of environmental audits is underway of the Shire's three major industrial complexes.

Commercial activities have also been targeted and include marinas, boatsheds and slipways, nurseries and sediment and erosion control on construction sites.

- Catchment Remediation Capital Works - A program has been in place since 1994 to construct wetlands, gross pollutant devices, creek rehabilitation and leachate and sediment control works. (HSC, 1997a). Council has also increased its source litter control and targeted its street sweeping activities most specifically to minimise the transport of rubbish, other gross pollutants and nutrients from leaf litter into its stormwater system.

- Strategy to Pursue Water Sensitive Urban Design - Council has prepared a Sustainable Water Development Control Plan (DCP), with a manual of best management practices, to promote water sensitive development and practices within the Shire. (HSC, 1998b).

The establishment of these programs in the pursuit of ESD has had a positive influence on the core Council responsibilities incorporating engineering works. The traditional areas of design, construction and asset maintenance have all been either directly and/or indirectly affected by these programs.

A Change for the Better

Hornsby Council's Works Division is responsible for the provision and maintenance of Civil and Building infrastructure including: roads and footpaths, drainage systems, traffic and car parking, community buildings and facilities (including foreshore facilities and aquatic centres). The Division also provides inter-divisional support through the design and construction of civil works associated with water quality remediation and parks.

Engineers within the Works Division now play an important role in supporting the move towards implementing ESD initiatives through their work, innovation, decision-making and acceptance of the corporate push which facilitates sustainable outcomes.

In the process of implementing ESD initiatives the Works Division has taken a number of steps to ensure its works fully integrate ESD principles, These include:

- ***Consultation and review***
  Improved consultation and review processes. This process not only optimises the opportunity for the community to have there say in the planning of projects but also ensures that the advice from other disciplines from within Council such as environmental scientists, landscape architects and heritage planners, is sought and taken into consideration. This allows projects to be constructed beyond best "engineering" practice by fully integrating a diverse range of perspectives and initiatives and allowing further transparency into the decision-making process.

  Customer surveys carried out at the end of projects allows for project review and continuous improvement.

- ***Material recycling***

The reuse of material resources through recycling. In this regard the Works Division is establishing a materials handling facility which will enable the recycling of most material back into civil works. Traditionally those materials would have gone to landfill as hard waste. Council's nursery currently handles all green waste generated from Council works in the Shire. This material is re-used as mulch for landscape purposes in Council recreation areas and at water quality remediation sites.

- ***Protection of Flora and Fauna***

Council is ensuring the protection of both flora and fauna through improved project planning, design, and construction techniques. Close liaison with internal tree preservation and bushland officers at both the design and construction stages, has ensured the provision and maintenance of tree protection barriers, minimal disturbance to existing wildlife during construction, the consideration of threatened species legislation and the appropriate indigenous plant selection for

project sites. We not only pay close attention to above ground features but also assess the impact on subsurface conditions from the proposed works - eg. concern was raised on one project that the construction of a wall with a deep footing on the uphill side of significant trees may starve these trees of a natural water supply. A subsurface drainage system was constructed through the footing so that the water table flow regime was not significantly altered as a result of the works.

The environmental effects of each work activity is considered and methods of ensuring minimal disturbance and enhancing the natural environment is integrated into the design and construction techniques used. These are documented to ensure clear communication to staff, contractors and community.

- ***Plans of Management***

Practical plans of management are undertaken which endeavour to take a holistic approach to asset management. These plans include generic stormwater management plans for major catchments (as directed by the NSW EPA), more detailed sub-catchment plans which integrate both modelled water quality and quantity, a Rural Road Management Plan, and environmental management plans for Council's depot operations and operational tip site.

- ***Staff education and training***

The training and education of both Council's indoor and outdoor staff has raised the profile of 'best current practice' for general civil works. Training in the areas of soil and water management at work sites and occupational health and safety, have lead to a greater awareness of the issues and progress towards changing traditional 'poor practice' behaviours.

- ***Change in Design Philosophy***

Changes have been made to design principles, to incorporate initiatives outlined in Council's Sustainable Water DCP. This includes incorporating ecological considerations into projects such as minimising newly constructed impervious areas, maximising infiltration and focusing on the construction and reconstruction of more natural systems with consideration for habitat creation and preservation, and the aesthetics of completed projects. Watercourses are now rarely piped, grass swales have been trialed in some streets as a substitute for traditional kerb and gutter design, construction of porous pavements have been trialed, and improving water quality is now an integral part of the design philosophy. This new philosophy is now part of our new design specifications for civil infrastructure (HSC, 1999).

- ***Quality Assurance (QA)***

Incorporating environmental check lists and writing procedures for major work activities is all part of a quality approach of "getting things done right the first time", therefore minimising wastage of resources.

- ***Asset Management Systems***

Asset Management systems have been developed to ensure the most efficient and effective use of resources to maintain civil infrastructure. These systems cover buildings, roads and footpaths, drainage systems, and signs. Programs are then developed based on validated output from these systems.

- ***Water Quality Remediation Works***

The majority of these works are designed in-house enabling close liaison with environmental scientists and landscape architects (Collins & Guthrie, 1997). The works include the design, construction and maintenance of gross pollutant devices, wetlands, sediment basins, stream rehabilitation and leachate containment works (financed by a Special Rate under the *Local Government Act, 1993*). Whilst these could have been put out to consultants, it was seen that major advantages were available through our own staff becoming more aware of the broader issues of ESD by working through these projects with a multi-disciplinary team. The implementation of ESD principles through these projects

has enabled a “reality check” on some of the concepts that were developed and designed to enhance our environment. As engineers, we are no longer designing large concrete structures as a design solution but now we are using natural materials, concerned about creating and preserving habitats for various fauna, and minimising the impact of the works for future generations.

Conclusion

The traditional engineering focus of Council’s Works Division has been re-directed towards pursuing and incorporating the concepts and principles of ecologically sustainable development. Hornsby Shire Council has undertaken a large number of programs aimed at protecting the local natural environment which has been made possible through both corporate strategies and integrated management at the divisional level. It is hoped that the case studies presented will give engineers and managers a better insight into the challenges that ESD poses local government into the new millennium.

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Author Biography

Anthony Collins has been an Environmental Scientist in the Water Catchments Team of Hornsby Shire Council for the past 5 years. Hornsby is located approximately 25km north-west of Sydney. He holds professional qualifications in Science and Education with postgraduate qualifications in Environmental Planning.

Anthony currently coordinates Hornsby Council's Catchment Remediation Program which involves the design, construction, monitoring and maintenance of water quality remediation structures. He is also coordinating Council's Stormwater Management Plans for its major catchments which are being prepared and implemented under the direction of the NSW Environment Protection Authority.

Postal Address: Anthony Collins, Water Catchments Team, Hornsby Shire Council, PO Box 37, Hornsby, NSW Australia 1630.

E-mail: acollins@hornsby.nsw.gov.au

Robert Rajca has an Honours Degree in Civil Engineering and a Masters in Business Administration (Macquarie University). He has 15 years experience in Local Government Engineering and 5 years experience with private consultants. Robert holds the position of Manager Design and Construction in the Works Division of Hornsby Shire Council.

Robert is responsible for the design and construction of Council's Civil Works Improvements Program. This includes infrastructure such as local roads, drainage, traffic facilities, footpaths and cycleway, carparks, and catchment remediation works. He is also responsible for contract management for the Works Division.

Postal Address: Robert Rajca, Design & Construction, Hornsby Shire Council, PO Box 37, Hornsby, NSW Australia 1630.

E-mail: rrajca@hornsby.nsw.gov.au

Alasdair Guthrie has over 30 years professional experience, having graduated initially in civil engineering. This was followed with degrees in science and arts within which he studied environmental and socio-economic subjects. He has practised, principally, in pollution control engineering, environment science and socio-economic geography. In recent years he has set out to apply his knowledge and experience to the pursuit of ecological, social and economic sustainability.

In 1994, Alasdair suspended his work as a free lance consultant to take up a five year contract with his local council in Hornsby Shire. He established and directed Council 's Environment Division, pursuing sustainability through an integrated approach to the management of the Shire's natural resources and the impacts upon them.

Postal Address: Alasdair Guthrie, Guthrie Consulting
2 Asaph Close, Hornsby Heights, NSW Australia 2077.

E-mail: guthriea@one.net.au