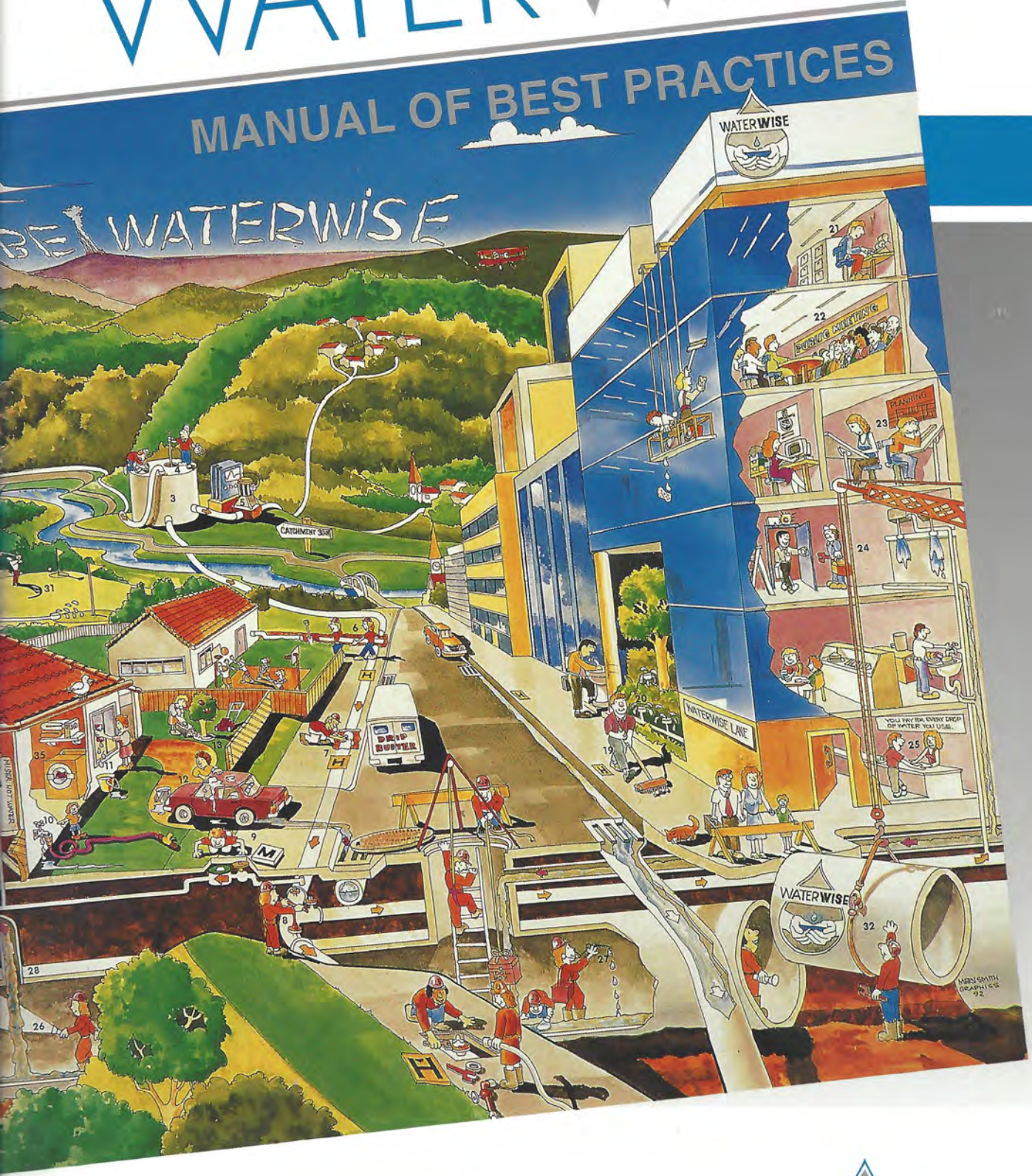
WATERWISE

MANUAL OF BEST PRACTICES



WATER CONSERVATION IN LARGE HOTELS AND RESORTS

WATERWISE
Gold Coast

Manual of Best Practice

Water conservation in large hotels and resorts

by

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Gold Coast City Council

NATURAL RESOURCES

WATERWISE QUEENSLAND

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The information contained in this document is not directive or comprehensive and may not be appropriate or relevant in every particular circumstance. Readers should obtain professional advice before adopting any of the procedures contained in this document. Some useful contacts are set out after each case study and in Section 3 of the document.

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Where specific product names or systems are used in case studies, Council in no way endorses their use over other similar products available on the market. It is the responsibility of the installer of any water conservation items or systems to ensure that the product chosen is the one best suited for the particular application.

Errata

Pages 21,33,38 and 68:

Hotel Conrad Jupiters total water consumption should be identified as **$289,290** not **$45,317**.

Contents

A Message from the Mayor

"Council's WaterWise campaign has been so successful among the City's residents, that per capita water consumption fell by 12 per cent during the four years from 1991 to 1994.

This represented a total estimated saving of more than $1.7 million for ratepayers."

Water is possibly the world's most precious natural resource, it is essential to our very survival. And yet it is easy to take this vital natural element for granted.

The Gold Coast, with its beaches, rivers and canals, gives the appearance of having an abundant water supply. But, like all of coastal Australia, we are part of a narrow green fringe surrounding the driest continent in the world. Our rainfall levels remain unpredictable, however our permanent population, and visitor numbers, continue to grow - along with the demand for quality, treated water.

It is estimated that by the Year 2005, it will be necessary for the Gold Coast to supplement its current water supply and significantly expand its treatment facilities to cope with this anticipated growth.

Infrastructure and treatment facilities are expensive. Council's forward works program estimates $120 million will be required for water supply works in the next five years.

The ratepayers, who shoulder much of this cost burden, are therefore also the major beneficiaries of water conservation.

Recognising the financial, social and environmental benefits to the community, the Gold Coast City Council has become a leader in the promotion of WaterWise practices.

WaterWise Queensland has applauded the Council's education, information and conservation incentive program for being 'well targeted, highly innovative and successful in changing community water use attitudes'.

In fact, Council's WaterWise campaign has been so successful among the City's residents, that per capita water consumption fell by 12 per cent during the four years from 1991 to 1994.

This represented a total estimated saving of more than $1.7 million for ratepayers.

While much of these savings has come from embracing water conservation in the home, a number of businesses and industries have also begun introducing WaterWise practices.

One major Gold Coast resort has already achieved a 35 per cent reduction in annual water consumption since 1990 to 1991.

This manual, prepared with the support and involvement of the hotel sector of the Hospitality Industry, is aimed at building further on the success of earlier education programs.

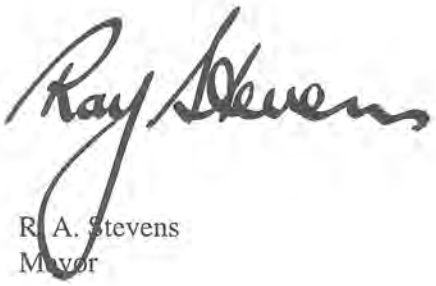
Accommodation houses are among the Gold Coast's major water users. With the co-operation of those involved in this important industry, further gains in water conservation are likely. The winners will be industry members, the community as a whole and, of course, the environment.

It is hoped that this manual will be a useful source of information for everyone associated with the hospitality industry.

All efforts have been made to include the varying needs of the different areas of hotel management, such as kitchen, housekeeping, landscaping, guest education and marketing.

I would like to thank in advance all those who will use this manual as a guide to WaterWise practices.

Sincerely



R. A. Stevens
Mayor

"One major Gold Coast resort has already achieved a 35 per cent reduction in annual water consumption since 1990 to 1991"

Acknowledgements

The development and writing of this manual has been vitally dependent on many people and organisations. WaterWise Gold Coast would like to acknowledge the assistance of:

- The Director and Officers of Gold Coast Water, and Plumbing and Drainage Services, Gold Coast City Council
- The Manager, Consultants and Officers, WaterWise Queensland.
- Management and Staff of the Hotel Conrad Jupiters Casino
- The Engineering and Human Resource Departments, Sheraton Mirage Gold Coast Hotel
- The Engineering and Marine Sciences Departments, Sea World
- The Engineering and Landscaping Departments, Royal Pines Resort
- The Engineering Department, Hyatt Regency Sanctuary Cove
- The Chief Engineer, Marriott Surfers Paradise Resort
- The Engineering Department and Environment Committee, Ramada Hotel Surfers Paradise
- The Horticulture Department, Currumbin Sanctuary
- The Environment Officer, Warner Bros. Movie World
- The Engineering and Purchasing Departments, Pan Pacific Gold Coast Hotel
- The Engineering Department, Hotel Inter.Continental Sydney
- The Food Services Department, Wesley Hospital Brisbane
- Platypus Water and Energy Conservation Systems
- Griffith University Gold Coast, Faculty of Engineering and Applied Science, Faculty of Business and Hotel Management
- Gold Coast Institute of TAFE - Hospitality Department
- Stuart Toplis, Ecotourism Section, Australian Conservation Foundation
- Tourism Training Queensland - Gold Coast Branch
- Australian Institute of Hotel Engineers - Queensland and West Australian Branches
- Commonwealth Department of Tourism
- Commercial Irrigation Consultants
- Queensland Department of Environment and Heritage – Industry Liaison Officer, Environmental Planning Branch

Sally MacKinnon

30 June 1996

Section 1 Introduction

This section describes:

- The importance of being WaterWise
- How hotels can conserve water
- How to start a water conservation program
- How to analyse hotel water use
- How to sell water conservation
- Implementation and evaluation
- The importance and purpose of a manual?

"Hotels that are putting in place measures to monitor and reduce energy use .. find that these measures rapidly pay for themselves through cost-saving, and hence improve the competitiveness of the business" (IHEH).

The importance of being WaterWise

"It is now recognised that business cannot afford to pursue economic success without regard to long term ecological impact."

What are the benefits of being WaterWise in the hotel industry?

Saving water means:

- Saving energy
- Saving on trade waste
- Saving money on building another dam or piping water from interstate
- Saving the environment. Raising the Hinze Dam will mean loss of valuable bird habitat in our hinterland
- Improved guest service, for example by guaranteeing hot water supplies and appropriate flow rates
- Improved public image - locally and beyond
- Improved status of hotel engineers and hotel staff, within your own hotel and the industry as a whole
- Improved staff morale as people input their valuable ideas and suggestions and act on them
- Improved industry status locally and beyond
- Continuing development of an environmentally and economically sustainable hotel industry - locally and worldwide
- The opportunity to work constructively and positively with local and state governments
- Media and public recognition

The International Hotels Environment Initiative (1993) also lists a number of benefits for good environmental practice in hotels. These include:

"Economic opportunities and increased competitiveness –

- Hotels that are putting in place measures to monitor and reduce energy use, to increase the efficient use and recycling of resources and to reduce waste, find that these measures rapidly pay for themselves through cost-saving, and hence improve the competitiveness of the business.

Developing sustainable industry –

- It is now recognised that business cannot afford to pursue economic success without regard to long term ecological impact.

Increased business travel and tourism are leading to ever greater pressure for companies in the sector to demonstrate actively their commitment to the sustainable development of this, the world's largest industry.

Employee quality and motivation -

- All hotels want to recruit the best possible staff and retain them, wherever in the world they operate.

  Pride in the company is essential, and it will be those companies that are best responding to public expectations and concerns about the environment that will succeed in motivating their staff, reducing staff turnover and attracting the best recruits.

  Many hotels are asking their own employees for suggestions aimed at introducing new and improved environmental practices.

Market acceptance –

- the well-being of a company does not depend only on the goodwill of shareholders. It must secure the goodwill of all its stakeholders - its employees, customers, suppliers and the wider community - to develop, retain and enhance its market position.
- Concern for the environment is shared by more and more of these stakeholders.

Business development and market entry –

- In markets where a company is developing its operations through new ventures, a track record of environmental responsibility is increasingly important to projecting a favourable corporate image.

  In some Western markets, especially the USA, stricter environmental standards and new legislation are creating a new phenomenon of 'environmental barriers to trade', threatening the trade of companies whose environmental performance falls short of expectations.

Projecting brand image –

- In markets where a hotel group is not yet well established, the association of the company's name and logo with events, publications and projects that are clearly focused on benefiting the environment can contribute to brand image and competitive market position" (IHEI, 1993, p xix).

The Hinze Dam - our only water supply and one very good reason to be WaterWise

How hotels can conserve water

There are two foundations for water conservation in hotels:

- Improved technology
- Improved water use habits

How your hotel goes about deciding on its water conservation foundation and actions can depend on a variety of factors including:

- Budget
- Hotel image and clientele
- Staff programs underway, for example continuous improvement teams and environment committees
- Hotel structural issues and operational problems for example, water flow and temperature fluctuations, maintenance priorities
- Government legislation, for example the Queensland Government's Environmental Protection Act 1994
- Hotel water and energy costs, for example excess water and trade waste bills

Water conservation measures can, depending on the above factors, involve high cost, high technology innovations such as:

- Whole hotel water and energy conservation systems (p21, 30, 33)
- Development and implementation of water reuse systems in the hotel laundry (p18 and 40)
- High technology landscape irrigation systems (p44 and 48)

Other less costly technologies and fixtures can be installed too, including:

- Water conserving shower roses in guest rooms (p24 and 27)
- Dual flush toilets and infrared urinals (p37)
- Tap flow restrictors (p87)
- Updated equipment for kitchens, (p32 and 34) and laundries (p18 and 40))

New technology can be installed immediately or progressively over time, depending on your hotel's budget.

Water conservation measures can also implemented at minimal cost by changing the water use habits of hotel guests and staff.

"Guest room signage can advise guests of water saving actions they can take, for example reusing towels and ensuring bath overflow does not occur."

For example:

- Guest room signage can advise guests of water saving actions they can take, for example reusing towels and ensuring bath overflow does not occur (p28 and 69)
- Staff induction training can set up sound water saving habits with new staff when they begin work at your hotel (p60 and 61)
- Continuous improvement teams can focus on water conservation measures (p60)
- Staff environment committees can focus on water conservation measures (p62 and 65)
- Regular departmental briefings can assist staff in conserving water for example, housekeeping staff can be made aware of flushing the toilet only once when cleaning guest rooms (p61)
- Landscaping staff can be involved in the development and application of irrigation systems and take ownership of the system's efficient operation (p41)

It all depends on your hotel's needs, situation and priorities.

Being WaterWise can begin today.

How to start a water conservation program

The WaterWise case studies in this manual outline in detail, many ways water conservation programs have begun in hotels including:

- Responding to operational and maintenance problems (p21, 24, 30 and 46)
- Improved water use habits (p60 and 69)
- Hotel renovations and the opportunity to retrofit fixtures, for example fitting water conserving shower roses (p27)
- Improving guest service, for example the installation of infrared urinals in public toilets (p37)
- Cost savings and financial pay back:

  While all the case studies presented in the manual achieve these outcomes, some hotels have embarked on product trials specifically to implement cost saving systems (p57)
- Alignment with international initiatives from a hotel parent company:

  A number of hotels are undertaking water saving and environmental programs with the encouragement of parent companies (p57)
- Strategic alliances with local government:

  One Gold Coast theme park has embarked on a WaterWise pilot program with the Gold Coast City Council, where Council is providing a water meter and the theme park is recording and returning its water use data to Council as well as utilising it to conserve water and minimise costs
- Staff induction and/or involvement of continuous improvement teams, staff environment committees, staff training and specific departmental involvement (p60,62, 65 and 68)
- Staff newsletters and notice boards - to raise awareness and elicit feedback and ideas (p66)
- Guest awareness and education about the hotel as a responsible corporate citizen - room signage is a great start (p69)

".. a number of hotels are undertaking water saving and environmental programs with the encouragement of parent companies."

"No matter what your reason for starting a water conservation program, it all counts."

It all counts

No matter what your reason for starting a water conservation program, it all counts.

Once one program is up and running successfully it is easier to get others started and you will find that more and more people will join your WaterWise program.

How to analyse hotel water use

"To best analyse water use, you will need to install sub meters in each water consuming department in your hotel, for example kitchen, laundry, guest room/s, public toilets and landscaping."

Analysing your hotel's water use can be as complex or as simple as you would like to make it.

You can gather and analyse water use over a few days, weeks, months or years, though analysing water use is really only a tool to help you and your engineering department make informed decisions.

Knowing your hotel's water use throughout different sections will also provide justification for the commencement and implementation of water conservation programs in-house.

- To best analyse water use, you will need to install sub meters in each water consuming department in your hotel, for example kitchen, laundry, guest room/s, public toilets and landscaping. (See water meter installation on page 54 for details on how to install meters and their benefits).
- The International Hotels Environment Initiative (IHEI) (1993) recommends "monitoring and recording utility consumption for 24 hours on a typical day.

  Analyse hourly consumption to trace leaks (for example high consumption at night) and peaks occurring during the day" (IHEI, 1993, p44).
- Once you have your data compare for example, "your total annual consumption with some benchmark. To do this, you will need to know the annual consumption of the hotel, the total flow area in square meters (m^2) and the occupancy.
- Calculate water consumption in cubic metres (m^3) per person per year:

  Annual consumption is 61,000m^3

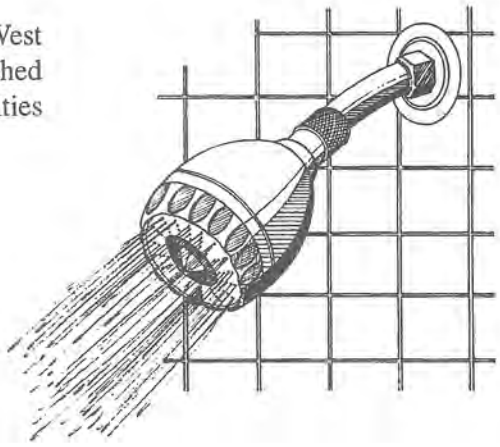
  Annual occupancy in a 300 room hotel at 70% equals 210 occupied rooms. 25% double occupancy = 262 guests per day

  61,000 m^3 divided by 262 = 233m^3 per person per year" (IHEI, 1993, p34).

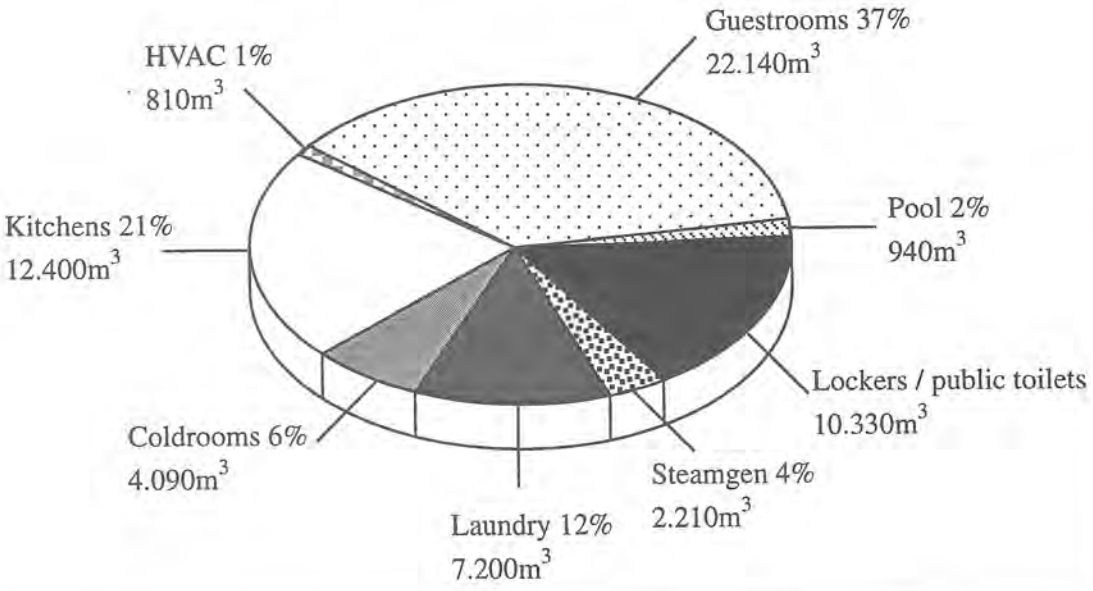
Factor in specifics

Naturally you will need to factor in any specific water use variables your establishment may have for example, large laundry, convention centre, large gardens/golf courses, etc.

The Australian Institute of Hotel Engineers – West Australian Branch, in December 1995 published *Hotel Benchmarking Part 1* to assist with utilities analysis (See p14 for details and ordering).



The IHEI (1993) has a useful diagram which outlines a typical water audit for a fully metered, 300 room hotel. 61.300m^3 = 750 litres/room/day (IHEI, 1993, p 32).



How to sell water conservation

"It is vital to calculate and present to your financial controller and general manager, the payback time of your water conserving program."

The IHEI (1993) has developed a very useful model to assist in the decision making process for water and energy conservation measures.

If most of these steps can be answered and developed prior to your proposal to upper management you stand a strong chance of approval.

This is summarised on page 5.

In presenting your water conserving proposal to upper management, you could use each step as a point in your presentation.

This would represent a very well thought through and viable project.

It is vital to calculate and present to your financial controller and general manager, the payback time of your water conserving program.

Step 1.	Applicable?
Step 2.	Technically feasible? Seek professional advice if necessary
Step 3.	Not detrimental to comfort, operations, health and safety, food safety? Violation of codes?
Step 4.	No increased risk of breakdowns or complications? Excessive maintenance?
Step 5.	Economically feasible? Include other benefits in your evaluation. Professional advice may be needed?
Step 6.	Conduct preliminary evaluation/study. Seek advice if necessary
Step 7.	Is project viable?
Step 8.	Conduct detailed engineering study - as required. Seek advice if necessary
Step 9.	Effects on feasibility and return on investment in view of other EICM's. Seek advice if necessary.
Step 10.	Revise evaluations?
Step 11.	Develop project. You may need professional advice.
Step 12.	Financing - design specifications.

(IHEI, 1993, p50)

Implementation and evaluation

The action plan

Water and energy efficiency

The International Hotels Environment Initiative (IHEI) (1993) recommends:

- "Carry out an energy/water audit in the hotel which will show your major energy and water consumer costs and where savings can be made.
- Compare your total and individual consumption figures with hotel industry benchmarks to determine saving potential.
- Prepare a summary of opportunities.
- Seek the advice of experts for analysis, evaluation and recommendations. Independent consultants should review the feasibility of major capital expenditure projects.
- Using the energy/water audit results, establish realistic goals for each department and the entire hotel.
- Communicate to all employees management's commitment and explain clearly the objectives and goals. Show current consumption data, costs and trends.
- Appoint a co-ordinator (usually the engineer), define responsibility within each department and develop an effective communication system.
- See that the entire staff participates. Capitalise on their knowledge, experience and familiarity with the building. They know it better than anyone else. Encourage them to put forward their ideas/proposals to save water (and energy).
- Establish a monitoring and targeting system.
- Provide training. Staff must understand how to make prudent use of utilities and operate and maintain the equipment in an energy/water efficient manner.
- Provide continued motivation. Develop standard operating procedures, efficiency charts and the like.
- Review current supply arrangements frequently with your supply company to ensure you are on optimum tariff" (IHEI, 1993, p31, 32).

"Carry out an energy/ water audit in the hotel which will show your major energy and water consumer costs and where savings can be made."

Payback time

It is vital to calculate and present to your financial controller and general manager, the payback time of your water conserving program.

Below is an example used by a chief engineer to calculate a five star hotel's payback details for the installation of water conserving shower roses throughout guest rooms.

Worked example

- One person @ one 10 minute shower per day with old 27 litres showers = 270 litres.
- One person @ one 10 minute shower per day with new 9 litre per minute showers = 90 litres, which is one third of the original consumption.
- 70 percent occupancy for one year = approx. 63,100 double rooms and potentially 107,000 guests.
- Each guest @ one five minute shower per day using the existing shower roses = 14,445 kilolitres of water.
- Each guest @ one five minute shower per day using the 9 litre shower roses = 4,820 kilolitres, a saving of 9,625 kilolitres.
- With basic water and trade waste costs @ $1.60 per kilolitre, this becomes a saving of $15,400 per annum (not including energy savings).
- To purchase and install the shower roses for each guest room, the Hyatt Regency is calculating less than one year payback.

Why a manual?

In 1992, the Gold Coast City and Albert Shire Councils (now Gold Coast City Council), began development of the school and community water conservation education program WaterWise in consultation with local educational publishing and consulting firm Wet Paper.

The initiative originated from the two councils in conjunction with the Queensland Water Resources Commission, Department of Primary Industries.

The aim of the WaterWise program, then and now, is to reduce urban water consumption in the Gold Coast region by 20 percent.

It also aims to:

- Increase environmental awareness through schools, community and industry projects
- Teach people how to conserve water
- Outline the costs associated with urban water supplies
- Identify water wastage at schools, homes and in industry
- Outline the benefits associated with water conservation

In July 1995, the Gold Coast City Council began development of the WaterWise Hospitality Industry program. WaterWise Gold Coast and Queensland consultants Sally MacKinnon and David Wiskar organised and hosted an industry focus group made up of members of large international hotel and theme parks to:

- Learn about current industry water conservation initiatives
- Identify with industry members, what the most effective and useful WaterWise hospitality program could be.

Five key findings emerged from that meeting:

- Development and distribution of a Gold Coast WaterWise Manual of Best Practices with an emphasis on plain English presentation and local case studies where possible
- Creation of industry networking opportunities involving key Gold Coast City Council Officers, the manufacturers and suppliers of water conserving technology, industry colleagues and WaterWise

"The aim of the WaterWise program, then and now, is to reduce urban water consumption in the Gold Coast region by 20 percent."

- Development of trial staff training in water conservation at one hotel
- Public and media recognition of water conservation initiatives in the hospitality industry
- Development of financial incentives for water conservation practices and technology in the hospitality industry.

Purpose of the manual

User friendly

As requested by members of the Gold Coast hotel accommodation sector, this manual is first and foremost designed to be user friendly.

It is written in plain English in order to be of use to the many types of people who work within the industry, from hotel engineers to training staff, environment officers to public relations and marketing staff.

A networking tool

The manual is an information networking tool.

While it is recognised that much water conservation work is occurring within large hotels both on the Gold Coast and around Australia, it can be difficult and time consuming to learn about these things.

To date in Queensland, existing water conservation initiatives in hotels have not been collated and outlined in any one publication and so this manual represents a start to such a process.

It aims to outline in some detail, specific hotels and the water conservation work they have or are undertaking.

The ideas and the contacts are there for the taking, adapting or investigation - please do all three if you like, no matter which area you work in the hotel sector.

Water conservation is a responsibility for us all.

Intent

As mentioned above, this manual can be utilised by anyone working within the hotel sector of the hospitality industry.

Certainly, it was originally intended for the engineers of large hotels on the Gold Coast - these are the folk who asked for such a publication in the first place.

Since work began on the manual though, WaterWise Gold Coast has recognised that many other industry personnel can access and make use of this information.

"As requested by members of the Gold Coast hotel accommodation sector, this manual is first and foremost designed to be user friendly."

We have included sections which cover Housekeeping, Landscaping, Staff Training, Environment Committees, Guest Education and even something on Marketing.

That means some sections will relate to hotel departments like Housekeeping and Stewarding, Landscaping and Horticulture, Human Resources and Training, Public Relations and Marketing.

From the general manager right through to casual staff, this WaterWise Manual of Best Practices has ideas for everyone. Some are based on sophisticated and costly technology, others are as simple as housekeeping staff flushing guest room toilets only once (instead of up to four times), when they are cleaning rooms.

Invitation

We welcome anyone involved with the hotel sector to take a look at the ideas and case studies within as a means of assisting your workplace to become more environmentally friendly and financially efficient while continuing to maintain the excellent standards your guests expect.

Section 2 Case studies

This section describes the following.

- Introduction
- Benchmarking
- Installation of water saving technologies
- Hotel Inter.Continental Sydney - a model
- Guest rooms
  - Hotel Conrad Jupiters Casino
  - Hyatt Regency Sanctuary Cove
  - Ramada Hotel Surfers Paradise
  - Pan Pacific Hotel
  - Royal Pines Resort
- Kitchens
  - Hotel Conrad Jupiters Casino
  - Wesley Hospital
- Public toilets
  - Hotel Conrad Jupiters Casino
- Laundry
- Landscaping
  - Currumbin Sanctuary
  - Royal Pines Resort
- Housekeeping
- Leak detection
  - Sea World
- Water meter use and installation
- Equipment testing procedures
  - Sheraton Mirage
- Staff training and environment committees
  - Hotel Conrad Jupiters Casino
  - Sheraton Mirage
- Guest education
  - Green Island Resort
- Trade waste and its effect on water consumption

Pan Pacific Hotel

Introduction

"The case studies in this manual were gathered predominantly through face to face interviews with engineers.."

The case studies in this manual were gathered predominantly through face to face interviews with engineers and other management and staff of relevant hotels and theme parks.

Where it was not possible to meet with people, for example because of distance, they completed and returned a written questionnaire which all interviews were based on.

Identification of the WaterWise best practices case studies occurred through ongoing contact with the engineers, environment officers and support services managers of large hotels and theme parks, through manufacturer's referrals to satisfied clients and through current literature.

Where at all possible, local Gold Coast case studies of water conserving best practices have been identified and written up.

Where it has not been possible to identify Gold Coast case studies, either interstate examples have been found or information from academic or hospitality industry sources has been utilised.

Benchmarking

This manual focuses only on water conservation best practices in large hotels and to a lesser extent theme parks.

It is recognised that benchmarks are important to identify before or in conjunction with best practices. The Australian Institute of Hotel Engineering West Australia Division, has developed the *Hotel Benchmark Study Part 1* at a cost of $200.

Part 1 gives fairly broad based benchmarks while *Part 2* (available from April 1996) goes into detail about specific consumption and expenditure benchmarks, including water.

Copies of the studies can be ordered from Mr Ian Knox, Secretary, AIHE-WA, PO Box 6191, East Perth, WA 6892. Mr Knox can be contacted at the Novotel Langley Perth Hotel on Ph (09)221 1200 or Fax (09)221 1669.

Installation of water saving technologies

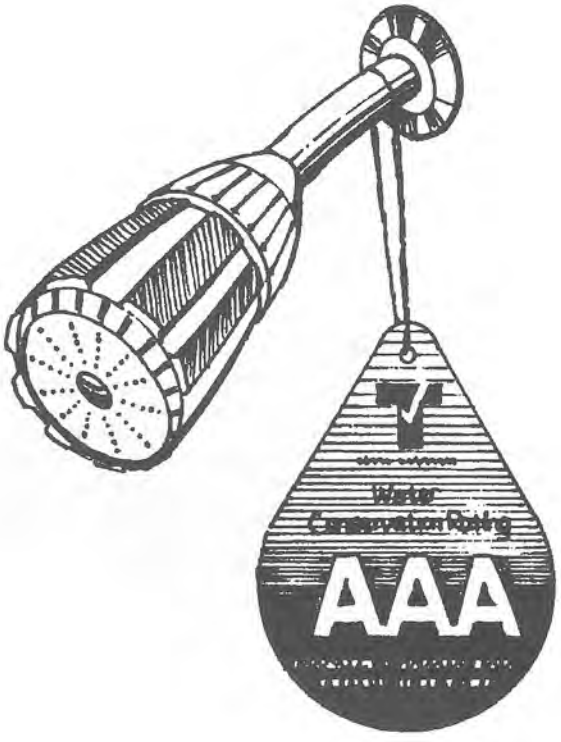
There are increasing types of water saving technology appearing on the market almost weekly - from water meters, shower roses, water recycling systems and water and energy conservation systems.

In large premises it can be expensive in the short term to install such technology in its entirety. Remember, the technology can be installed in smaller steps, progressively over time as the budget allows.

Many hotels in this manual are gradually installing water conservation technology and practices according to their financial parameters.

Some have developed strategic plans which encompass the next two, five, even ten years of water saving technology. If your establishment's budget is tight - plan ahead as you can still make a big difference in small steps.

"Many hotels in this manual are gradually installing water conservation technology and practices according to their financial parameters."



Hotel Inter.Continental Sydney - a model

This case study was written by the Engineering Department of the Hotel Inter.Continental Sydney.

Their contribution is gratefully acknowledged.

Hotel Inter.Continental Sydney, being the 1990 and 1991 winner of the NSW Award for International Deluxe Accommodation, Training and Education and the AHA 1992 and 1995 winner of the National Energy and Environmental Award - Building Category, is a five star hotel located near the Opera House in Sydney.

In 1994, the Prince of Wales Business Forum visited Australia and had two conferences relating to the environment. At this point Hotel Inter.Continental Sydney was definitely identified the leader in Australia and contributed a great deal towards these meetings.

The Australian Hotels Association, after these meetings, made a commitment to establish a committee to promote and facilitate environmental issues.

The expertise from the Hotel Inter.Continental Sydney is currently being used for this purpose.

Many hotels in Australia, since January 1994, are now following environmental practices and on many occasions have been assisted by the Hotel Inter.Continental Sydney.

National energy and environmental award

In 1992, the Hotel Inter.Continental Sydney won the National Energy and Environmental Award and Australian Hotels Association Environmental and Energy Award. Since then they have improved the way in which they deal with resources and energy. Subsequently in 1995, the International Hotels Association recognised Mr Grimm, the general manager, for his environmental commitment.

In its concept and design, the Hotel Inter.Continental Sydney perfectly captures the Australian Bicentennial mood.

Set in the city's historical Treasury Building, it displays a blend of rich colonial heritage and the robust contemporary architecture of a young nation.

"Many hotels in Australia, since January 1994, are now following environmental practices and on many occasions have been assisted by the Hotel Inter.Continental Sydney."

In line with conservation plans for the heart of Sydney, the final design for the Hotel Inter.Continental Sydney called for restoration of the magnificent 1851 Treasury Building on Macquarie Street and the addition of a tower wing along the Phillip Street frontage to provide 28 floors above and five floors below road level.

Careful, painstaking restoration of the three storey 19th Century building gave the hotel its elegant public rooms (now updated with discreetly installed fire protection and air conditioning service), while the tower block provides the 502 guest rooms with spectacular views of Sydney Harbour and the Royal Botanic Gardens.

The Hotel has four major food and beverage outlets with 24 hour room service, its own health club, three kitchens and in-house laundry.

Engineering department

The Engineering Department consists of 22 staff and the majority of repairs and maintenance is carried out by the Hotel. An Engineer is on duty around the clock for tighter control of the building and quick response to problems.

The Inter.Continental Hotel chain, consisting of more than 100 hotels, carries out comparisons and evaluations in the role of energy management in all its properties. The Hotel has a complete computerised preventative maintenance system for equipment, civil work and mechanical, electrical and plumbing systems.

The system was designed by the Hotel and is an aid to operate equipment efficiently.

Electricity is used for lighting, air conditioning, some kitchen equipment and laundry equipment. Gas is used for heating, cooking, by the laundry and production of steam for kitchen and laundry. Water is used in guest rooms, kitchens, laundry and air-conditioning.

Energy conservation is one of the major roles of the Hotel's Engineering Department. This Hotel, being one of the older properties in Sydney has passed on many ideas and recommendations to other hotels, high rise buildings and the Energy Technology Advisory Centre of NSW. The Engineering Department does not sell a product so no secrets are maintained and information is open to any person requiring it.

Early building design

During the design stage of the building, energy and waste management was not a priority which has caused the operator to add many energy and waste management concepts to its existing plant. It is very interesting to see that in the newer hotels, architects and design engineers are now including conservation measures at construction stage.

Since the Hotel was opened it has been very conscious of environmental issues. Many programs have been structured relating to this area, including recycling, reducing, re-using etc.

In 1991, when environmental concerns were becoming a high priority, the Hotel Inter.Continental decided to employ consultants and create an Environmental Manual as a guide to all hotels in the chain.

Conservation guidelines

The following guidelines were used to develop the manual:

1. Actively conserve natural resources and energy in our Hotel operations, while maintaining optimum guest satisfaction, and without sacrificing operational requirements or safety.
2. Efficiently manage and minimise our water production, to the benefit of our environment.
3. Utilise products and materials which have the least negative impact on the environment and which are beneficial whenever possible, both in their use and source of origin.
4. Fully recognise that environmentally favourable activities are practised unevenly throughout the globe, necessitating regionally diverse programs and adoptions of the program to local constraints, thereby generating improvement in environmental performance in every hotel.
5. Pursue action programs benefiting the environment in each hotel's local community.
6. Foster the education of environmental awareness both internally and externally.

".. in the newer hotels, architects and design engineers are now including conservation measures at construction stage."

Subsequently in 1993, the International Hotels Association developed the IHEI Environmental Manual, using the expertise of all the hotel chains that were actively involved in environmental issues.

In 1994, the Hotel adopted its "Policies and Procedures" an Environmental Policy Statement.

The world in which we live, work and thrive is dependent on our ability to respect its very nature. Hotel Inter.Continental Sydney is committed to leading its competitors and assisting them in this responsibility.

Current issues

The areas currently being undertaken by the Hotel are:

1. Waste management
2. Energy conservation
3. Product purchase
4. Indoor air quality
5. Air emissions
6. Noise
7. Storage tanks
8. Asbestos
9. PCBs
10. Pesticides & herbicides
11. Hazardous materials
12. Water
13. Community action
14. Laundry & dry cleaning
15. Checklist

Water conservation

When the hotel was built in 1985, water usage charges were not applicable as it was part of the land rates. Hotel Inter.Continental Sydney, having the philosophy of running an efficient building, implemented water conservation initiatives in following years.

Guest rooms

Shower restrictors were installed to reduce water consumption from 22 to 12 litres per minute. This was trialled in the general manager's apartment for three months and as there were no complaints it was implemented throughout the Hotel.

Washbasin flow was reduced from 22 to 8 litres per minute.

Cleaning procedures were revised to ensure minimum water was used. Flushes were reduced from 12 to 7.5 litres per flush. The Water Board was contacted to ensure this was within the legal limit. A cleaning procedure was established with regard to the number of times the cleaner used the flush.

Kitchens

All kitchen taps were installed with 13 litre per minute restrictors and hoses were installed with trigger guns. Cleaning procedures were revised to ensure minimum water was used and water was not left running. Dishwashers are constantly checked to ensure they are running at all times at full capacity and scheduled maintenance is carried out to ensure that equipment is running at maximum efficiency and water temperatures etc. are correct.

Health club and staff locker rooms

Showers and wash hand basins are restricted similarly to the guestrooms.

Laundry

Laundry washing machine water levels and tank temperatures are checked with preventative maintenance to ensure equipment is operating efficiently. Equipment is always run at full capacity unless it is an emergency situation.

A water reclaiming system was installed to re-use the rinse water for the main washers, which has now helped to reduce laundry water consumption by around 30 percent.

Public Toilets

All hand basins have restrictors installed and flushes have been adjusted to low levels. All urinals are controlled by sensors to be activated only when used and with minimum flushes through off peak periods.

"A water reclaiming system was installed to re-use the rinse water for the main washers, which has now helped to reduce laundry water consumption by around 30 percent."

General

In 1987, many submeters were installed for water, electricity and gas, to identify the consumption in different areas. This was a good tool to initiate the energy management program.

Now all respective departments (kitchen, laundry, rooms) are charged for their consumption, which makes them accountable for wastage. Detailed reports are submitted to the respective department heads, relating their consumption back to production.

This has made them conscious of wastage. Further to this at the Hotel's induction for new employees, energy and water conservation is discussed in the environmental segment of the program.

Further information

For further information about the Hotel Inter.Continental Sydney's water conservation initiatives please contact:

Andy Goonesekera
Chief Engineer
G.P.O Box 5120
Sydney NSW 2001
Ph: (02) 230 0200
Fax: (02) 240 1300

Guest rooms

Introduction

A spokesperson from Queensland's Department of Environment and Heritage said recently that holidaymakers use approximately five times more water while travelling than local residents.

It seems people on holidays can also take a holiday from sound water conservation habits.

According to the International Hotels Environment Initiative (IHEI) (1993), a 300 room hotel can expect approximately 37 percent of water to be utilised by guest rooms - the largest user of water in hotels.

Naturally the prime consideration in hotels is guest comfort and service. We now face the challenges of maintaining these and conserving precious resources like water. This can be accomplished and examples of water conserving guest rooms in five star hotels are now becoming abundant.

As the IHEI's *Environmental Management for Hotels - The industry guide to best practice* states:

"The objective of hotels is to provide a comfortable environment for customers.

If they are happy, they will come back. Cut waste - not corners" (1993, p29).

In this section we present five case studies of such hotels:

- Hotel Conrad Jupiters Casino - Water and Energy Conservation System
- Hyatt Regency Sanctuary Cove - Installation of water conserving shower roses
- Ramada Surfers Paradise Hotel - Installation of water conserving shower roses
- Pan Pacific Hotel - Research and intentions for water conservation
- Royal Pines Resort - Water and Energy Conservation System

Hotel guest rooms in their water conserving efforts, can also considerably reduce energy consumption via showers - it's a double bonus.

"Naturally the prime consideration in hotels is guest comfort and service. We now face the challenges of maintaining these and conserving precious resources like water."

How water savings can be achieved in guest rooms

The International Hotels Environment Initiative (IHEI) (1993) has some useful ideas:

- As previously mentioned, monitor and record utility consumption for 24 hours on a typical day. Analyse hourly consumption to trace leaks (for example high consumption at night) and peaks occurring during the day.
- How much water is used by housekeeping staff when making up the room? (Energy audits reveal they may use up to one third of total consumption).
  - Modifying cleaning procedures can save a lot of water and energy.
  - For example, the number of times housekeeping staff flush the toilet.
- During periods of low occupancy, arrange guests in groupings relative to mechanical and electrical systems.

  Shut off unoccupied areas.
- Adjust toilet flush tank to 6-8 litres and flush valve to appropriate time (seven seconds).
- Install pressure regulators on showers and flow restrictors on water taps and sinks (IHEI, 1993, p44).

The IHEI *Green Hotelier* magazine (1995), presents some brief case studies where water conservation in hotel guest rooms is underway:

"Working with the New York City Department of Environmental Protection, the Marriott Marquis replaced 1,800 old toilets with low-consumption units.

The effort was part of New York City's Toilet Rebate Programme where commercial buildings receive rebates of US $150 for each toilet replaced. The hotel received a rebate cheque for a massive US $297,000. This is in addition to the annual saving of 20 million gallons of water and a reduction of US $70,000 in water and sewer bills" (IHEI, 1995, p14).

"At the Hotel Inter-Continental Seoul, waste water from the guest rooms and health club baths, sinks and showers is collected, suitably treated and then reused for irrigation, public toilets and cooling towers.

Recycling this water saves 81,000m3 for a total saving of US $74,640" (IHEI, 1995, p14).

NB. Before embarking on such a program, ensure you liaise closely with local authorities at the planning stage to ensure health regulations are adhered to.

"At the Hotel Inter-Continental Seoul, waste water from the guest rooms and health club baths, sinks and showers is collected, suitably treated and then reused for irrigation, public toilets and cooling towers."(IHEI).

Griffith University Honours Graduate Guil Araujo in his thesis *Environmental Management Performance* in Gold Coast Tourist Accommodation suggests these methods of water conservation in hotel guest rooms:

• Dual flush cisterns and dual flush valves on toilets	33% saving
• Low-volume flush pans and cisterns	60% saving
• Reuse of grey water	100% saving
• Aerating shower roses	33% saving
• Aerating taps	33% saving
• Quarter turn taps	5% saving
• Single-lever control mixing tap	5% saving
• Flow control valves (shower/taps)	33% saving

(Araujo, 1995, p13).

Local university results

Hotel Conrad Jupiters Casino

Guest rooms

The information for this case study has come directly from an interview and questionnaire with the assistant chief engineer of Hotel Conrad Jupiters Casino. His assistance in the development of the case study is gratefully acknowledged.

Overview

- The Hotel Conrad Jupiters Casino at Broadbeach is a 609 room, full service, four star establishment.
- It incorporates a public casino, conference centre, hotel, large gardens, fitness centre, swimming pool and a showroom. It is situated on Broadbeach Island, surrounded by canals and river systems. It also has seven kitchens, six restaurants and ten public bars.
- It has a floor area of 64,238 m^2 as well as car parks of 53,400 m^2.
- Conrad Jupiters is part of Conrad International, the international subsidiary of Hilton Hotels Corporation USA and is owned by Jupiters Limited.

  In 1994/95 total water consumption was 374,205kL at a total cost of $45,317. Trade waste was $77,106.

Background

In 1992, Conrad Jupiters installed an energy and water conservation system in the hotel's guest rooms to address the temperature fluctuations regularly occurring and causing guest complaints.

Like Royal Pines (see case study p30), Conrad Jupiters operate not only their hotel but a conference centre too and regularly had hundreds of guests simultaneously operating showers, baths, toilets and taps after a day at their respective conferences.

Approximately two or three guest complaints were received daily regarding temperature fluctuations.

Added to the conference centre issue is the fact that Conrad Jupiters has a high percentage of Asian guests who tend to utilise hot water facilities fully

".. holidaymakers use approximately five times more water while travelling than local residents."

and the Hotel needed to reduce its hot water flow to ensure that water demands throughout the establishment, could be fully met at all times.

Guest comfort is paramount to Conrad Jupiters and it was feared that long term guests would be lost to water problems, temperature fluctuations and potential hot water shortages.

The energy and water conservation system was installed in the guest rooms in 1992 at a cost of $180,000. Of that cost, $34,000 was for the installation of the filtration system.

In 1994, the Conrad Jupiter's kitchens were installed with a similar system at a cost of $15,000. The primary aim of this installation was to reduce water consumption and trade waste in the hotel's kitchens and to consequently reduce costs.

Once the first system was installed in the Hotel's guest rooms, the kitchen system was able to make use of the existing filtration system, a substantial cost saving of approximately $34,000 for the kitchen system.

Planning and implementation

Initially, Conrad Jupiters trialled this and another water saving system to test for the greatest effectiveness and efficiency within their particular situation. (They had known of the energy and water conservation system because of prior company sales contact with the hotel).

Once the Engineering Department was convinced of its appropriateness for the Hotel, they obtained all costs and details and built it into their annual capital expenditure budget. They highlighted water and power cost savings and stressed the benefits of the system in controlling the temperature fluctuation problem. Approximately four months of part time preparation went into the collation of the capital expenditure budget and the installation of the system was approved during the Hotel's regular March budget meeting between the general manager, Financial controller and chief engineer.

The system took approximately six months to install throughout all guest rooms. The Hotel has two water tanks which service the rooms, one on Level 1 and one on Level 22.

There is enough water in the tanks normally for about one hour but in quiet times for example early morning that can be stretched to about two hours. Conrad Jupiters needed to shut the water system down fully in order to install the system's filter which they did successfully at approximately two o'clock one morning.

Installation, took approximately three hours, utilising the system's and Conrad Jupiter's Engineering personnel.

All specific on-site details for the system, such as filter size, self cleaning timing etc., were calculated by the system's engineer from figures supplied by Conrad Jupiters.

Once installed, it has required minimal monitoring and maintenance by Conrad Jupiters. There was a small amount of Engineering staff training undertaken to ensure that the hotel's maintenance would be effective and appropriate to the system.

Payback details and results

It has proved to be extremely difficult for Conrad Jupiters to estimate payback details because of a lack of metering for the guest rooms and kitchens at this stage. The Hotel Casino complex has also expanded significantly since the installation of the system which has meant extra demands on both water and energy use.

Nevertheless, consensus within the Hotel's Engineering Department is that there have been definite savings in water and energy use and costs, though to date figures are unavailable.

(Under the current Gold Coast City Council water metering system, Conrad Jupiters paid just over $45,000 in water for 1994/95. In this case a four year payback will occur).

New showers at Conrad Jupiters

In terms of increased guest comfort and the problem of water temperature fluctuations, the Hotel's Engineering Department says guest complaints in this area are now non-existent.

Another benefit Engineering staff perceive for Conrad Jupiters from its installation of a water reducing system like this one, is its increased standing in the eyes of the local Council - as a local leader in water conservation in the hospitality accommodation sector. They have also received associated media recognition. They believe they are now regarded as seriously addressing the issue of water conservation by members of the local community.

Their only perceived downside to the operation is the initial cost to install the system and their current difficulties in proving in detail the financial paybacks and decreased water and energy consumption.

Engineering staff state the benefits of installation have most definitely outweighed these factors and that the system has lived up to all expectations.

Lessons learned and next steps

Conrad Jupiters has learned that there is room for continuous improvement in their water conservation efforts while simultaneously maintaining their service standards for visitors and guests. Although to date, they have installed the energy and water conservation system, an infrared urinal system (See Public Toilets Section), and swimming pool and

laundry meters, they are continuing to explore other water and energy conservation measures.

They plan to progressively install water meters into many different areas of the Hotel Casino in order to more closely monitor water use and detect leaks quickly.

They are installing an infrared urinal system throughout their public and staff toilets and plan shortly to begin investigating water recycling systems for their large laundry which uses approximately 10 percent of the hotel's water, that is, about 3,400 kL per month. They are also conscious of the link between water conservation and the reduction of trade waste costs.

"The system took approximately six months to install throughout all guest rooms."

Further information

For further information about Hotel Conrad Jupiters Casino water conservation program, please contact:

Mr Jack McLaggan - Chief Engineer
Hotel Conrad Jupiters Casino
Broadbeach Island
Broadbeach 4218

Ph: (07) 5593 1133

On Page 86 in Section 3, supplier's information can be found about the energy and water conservation system discussed in this case study.

Guest room Conrad Jupiters

Hyatt Regency Sanctuary Cove

Shower roses in guest rooms

The information for this case study has come directly from an interview and questionnaire with the chief engineer of the Hyatt Regency Sanctuary Cove. His assistance in the development of this case study is gratefully acknowledged.

Overview

The Hyatt Regency Sanctuary Cove Resort is located at Hope Island.

It is a five star, 247 room resort.

Average occupancy over a 12 month period is approximately 70 percent with the main guest markets being Japanese tour groups, families and functions/conferences.

The Engineering and Kitchen sections are the highest water use departments with Landscaping included in the Engineering department.

The Hyatt Regency Sanctuary Cove is a hotel resort with four kitchens, large landscaped areas, swimming pool, spa and beach pool. It has five, three story accommodation blocks which house about 50 guest rooms per block. Neighbouring the Hyatt Regency Sanctuary Cove is the Sanctuary Cove Village, Sanctuary Cove residential areas and two golf courses. The Hyatt Regency Sanctuary Cove, manages the hotel property on behalf of Discovery Bay Developments (DBD). It was built in 1988.

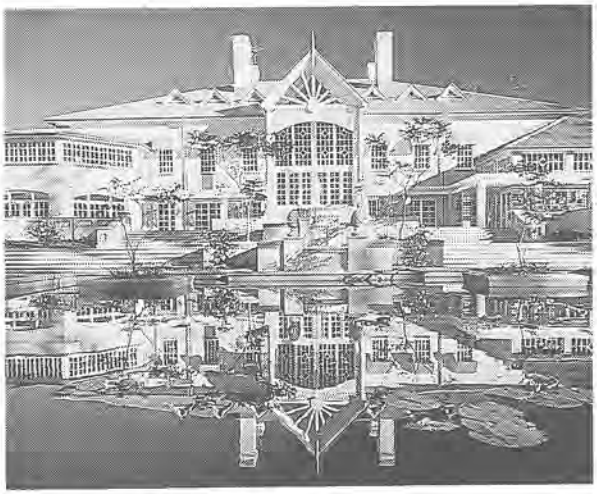
Annual water consumption for the Hyatt Regency is approximately 113,000 Kl with water supply and trade waste costs combined, amounting to about $1.60 per kilolitre. Total water and trade waste cost at this rate is $180,800.

Background

In late 1995 the Hyatt Regency installed 9 litre per minute, AAA rated, water conserving shower roses throughout all its guest rooms.

They replaced the hotel's old 27 litre per minute showers.

The prime reason for the shower installation was because of an original design problem in the guest



Hyatt Regency Sanctuary Cove

room showers. The shower trays are shallow and combined with the 27 litre per minute showers the hotel's drains were unable to efficiently drain the water.

This led to shower overflow and ongoing maintenance issues with the rooms' parquetry floors which lift and bow when wet.

The current chief engineer at the Hyatt Regency very quickly discovered this problem when he began work at the hotel in 1995.

He consulted with the hotel's contract plumber and they devised the solution of installing water reducing shower roses and doing minor repair work on the shower trays.

(Incidentally, the plumber had completed the WaterWise Master Plumbers program and was able to locate appropriate shower roses for installation).

In this instance no guest complaints were received by the hotel about the water overflow. The problem was located after guests had checked out and room inspections undertaken. Ongoing repair of the parquetry floors and subsequent delays in room sales while repairs were carried out were the catalysts to remedy the situation as quickly as possible.

For the hotel, this will result in a substantial reduction in maintenance costs as well as savings in water, energy and trade waste.

Planning and implementation

The first task the chief engineer undertook when the solution to the maintenance problem was devised, was to gather facts and figures regarding the shower roses he planned to install.

He gathered a large amount of information from the contract plumber and proceeded to buy one shower rose at the full retail cost of $79 and install it for a trial period in one of the guest rooms.

He then knew which room feedback could emerge from regarding the shower and water quality.

When no complaints were received he then informed management about the new shower rose and embarked upon a more official trial and monitoring period. He worked with front office staff to ask guests from that room on their check out how they found the shower.

In the weeks following its installation there were no negative comments.

During this time the chief engineer negotiated with the Hyatt Regency's financial controller and general manager regarding the shower rose installation throughout the facility.

His study, which he believes presents a conservative estimate is set out on page 26.

Support

Both the financial controller and general manager supported the plan and its proposed cost savings.

The hotel planned to install the shower roses before Christmas 1995. The chief engineer and plumber developed an installation program which allowed 10 minutes for shower rose installation and 10 minutes for minor plumbing maintenance on taps, washers etc. - a total of 20 minutes per room.

They planned to complete three and a half rooms per hour, eight hours per day. This equated to 24 rooms per day or one level of an accommodation block per day. They estimated 15 days total to install and liaised with front office staff to work around guest check in and out times. One plumber undertook all installation work.

According to the chief engineer, the main constraints in installation were the co-ordination of rooms and guests, while a key support was the use of a contracted plumber who was responsible for organising all relevant materials. The hotel supplied the shower roses.

"He gathered a large amount of information from the contract plumber and proceeded to buy one shower rose at the full retail cost of $79 and install it for a trial period in one of the guest rooms."

Product details

For the Hyatt Regency, two key factors determined the purchase of this particular shower rose:

- The increased reduction in water - @ 9 litres per minute it is 3 litres per minute less than what most hotels recommend, while still supplying a high quality shower with no adverse effects for guests
- Very low purchase price - the hotel's plumber was aware of a special purchase deal which had been negotiated with another hotel and which had fallen through. The Hyatt Regency was able to pick up that particular deal themselves

Details of the make and model of the shower rose may be obtained from the chief engineer.

Monitoring and Maintenance

Like many hotels, the Hyatt Regency has difficulty in monitoring water use for specific hotel areas. At this stage their water use is calculated by DBD from the one meter which rates the entire Sanctuary Cove property.

In terms of maintaining the shower roses, the chief engineer believes there will be little if any maintenance required.

While the shower roses do have moving parts - movable arms, head and joints, the manufacturers have had only two returns in 10 years of operation.

The Hyatt Regency estimates that maintenance will not have to be undertaken on the roses for approximately five to six years, and parts are cheaply and readily available.

Costs

Purchase and installation costs are not available due to the special negotiated price between the supplier and the Hyatt Regency.

Payback Details

As mentioned, the Hyatt Regency estimates a 10.5 month payback period with water and trade waste savings of $15,400 per annum.

Benefits

The main component in this case is reduced maintenance on the parquetry floors, increased and unhindered room turnover, as well as financial savings in water and energy costs.

Lessons Learned

Key lessons for the chief engineer in this instance include:

- A new awareness of the time factor to research, approve and install the shower roses. It took five weeks to trial and receive approval and the estimate was another 15 days to install.
- The importance of final equipment checks prior to ordering the water saving product. Despite testing the 9 litre shower rose in guest rooms, the chief engineer also personally showered under the proposed rose to ensure its quality.
- The chief engineer believes he was extremely lucky in this instance to have discovered such a cost saving solution to the guest room maintenance problem and says he was "in the right place at the right time" to take advantage of a lateral solution to a difficult problem.

Next steps

Potential water conservation projects in future may include:

- the installation of water saving technology in the Hyatt Regency's kitchens,
- ongoing staff training (the chief engineer recently wrote an article about water for the hotel's staff newsletter), and
- waste water initiatives - the chief engineer is interested in exploring water treatment and recycling systems.

Further information

For further information about the Hyatt Regency Sanctuary Cove contact:

Ian Crookston
Chief Engineer
P.O. Box 200
Sanctuary Cove 4212
Ph: (07) 55 301 234

On Page 86 in Section 3, supplier's information can be found about the water conservation shower roses discussed in this case study.

Hyatt Regency Sanctuary Cove shower roses in guest room calculations

- One person @ one 10 minute shower per day with old 27 litre per minute showers = 270 litres.
- One person @ one 10 minute shower per day with new 9 litre per minute showers = 90 litres, which is one third of the original consumption.
- 70 percent occupancy for one year = approx. 63,100 double rooms and potentially 107,000 guests.
- Each guest @ one five minute shower per day using the existing shower roses = 14,445 kilolitres of water.
- Each guest @ one five minute shower per day using the 9 litre per minute shower roses = 4,820 kilolitres, a saving of 9,625 kilolitres.
- With basic water and trade waste costs @ $1.60 per kilolitre, this becomes a saving of $15,400 per annum (not including energy savings).
- To purchase and install the shower roses for each guest room, the Hyatt Regency is calculating less than one year payback.

Hyatt Regency shower rose installation calculations

Ramada Hotel Surfers Paradise

Shower roses in guest rooms

The information for this case study has come directly from an interview and questionnaire with the chief engineer of the Ramada Hotel Surfers Paradise. His assistance in the development of this case study is gratefully acknowledged.

"..the link between showers and energy conservation was made."

Overview

- Address:
  Cnr. Gold Coast Highway and Hanlan Street Surfers Paradise
- Number of rooms:
  404 rooms
- Category:
  4 Star
- Floor area:
  46.920m², 4200m² of landscaped area
- Occupancy:
  90% year (average), mainly tour groups
- Highest water use:
  Guest rooms
- Variables:
  The hotel is located in the centre of Surfers Paradise with direct access to the beach and excellent views from the 36 level tower.
- Annual water consumption:
  1994/95 - 125, 322 Kl

Background

The hotel has its water tank on the top of the 36 level tower. It experiences significant underhead pressure because of this and recently began installing water conserving shower roses, reducing the flow rate from 20 litres per minute to 12 litres per minute, primarily to reduce energy costs.

The hotel commissioned an energy management report (1994) in which 20 items were highlighted. While water conservation was not a priority, energy saving was, and the link between showers and energy conservation was made. The hotel's main interest is guest comfort followed by potential energy savings.

The investigation on energy management - *Energy Management Report*, was made by Lincoln Scott and the aim was to implement an efficient energy management system. The plan identified areas of potential savings via changes in operations or modifications to equipment.

Planning and implementation

The first step in the installation of water conserving shower roses started in 1994 with the preparation of the 1995/96 budget. This was presented to the general manager and financial controller for approval.

The installation of the water saving shower roses was planned over a period of approximately 12 months at a cost of $7,000.

The payback period was estimated at one year based on energy savings for the 90 percent average occupancy of the hotel.

The water conserving shower roses will eventually be installed in every guest room and the main aim is to reduce the flow of hot water by up to 40 percent. As the hotel is simultaneously renovated, some of the current installations such as toilets will also be upgraded to dual flush systems. The objective is to operate the hotel as efficiently and cost effectively as possible while maintaining guest service and comfort.

Monitoring

This will be done by comparing figures from the previous year with the actual budget. The Ramada is unable to closely monitor the water use in guest rooms because sub meters are yet to be installed.

Costs

Total cost is $7,000 to install the water conserving shower roses in every guest room.

Results

Decrease in the overall maintenance costs of the building. Overall maintenance and operation costs of the hotel building are the main concerns. Not just water but the entire hotel's operations.

Next steps

Implementation of a computerised energy management system in order to safeguard and enhance the owner's investment.

Evaluation

The evaluation will be made based on the budget report from the previous year comparing the figures after the installation of the computerised energy management system, to verify total savings in costs (which includes water).

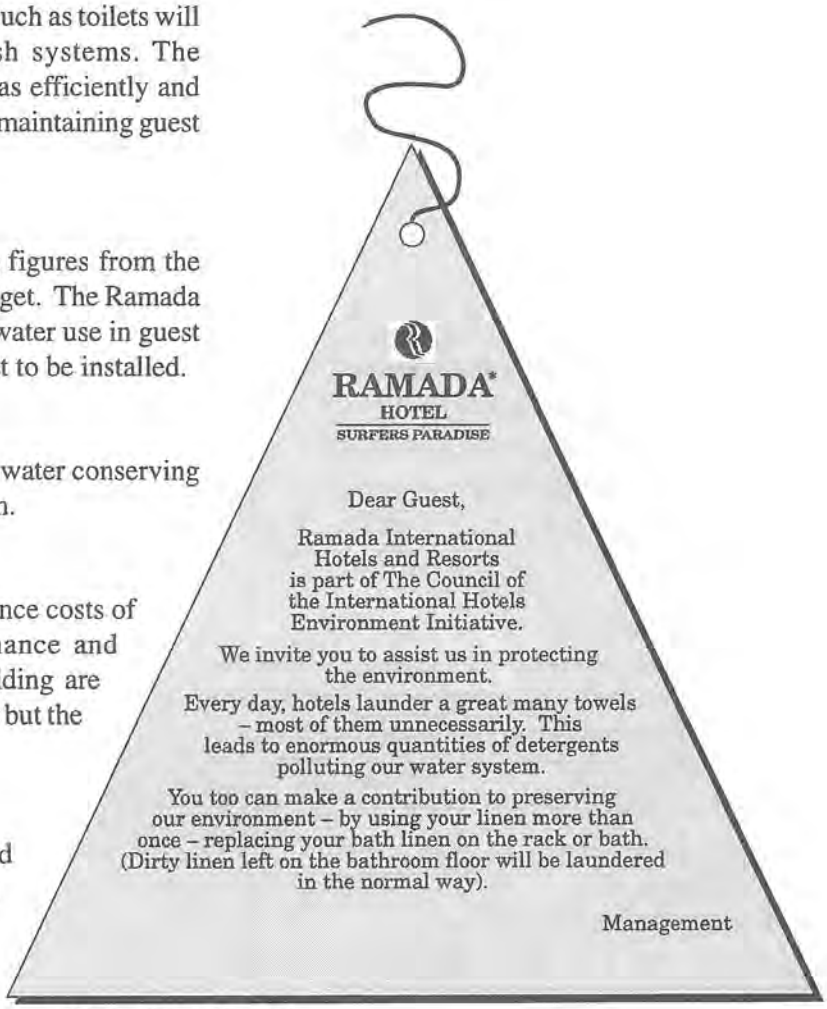
Further information

For further information about the Ramada Hotel's water and energy conservation program, contact:

Stephen Hayes
Chief Engineer
PO Box 1342
Surfers Paradise 4217

Ph: (07) 55 793 499

On Page 86 in Section 3, supplier's information can be found about the water conservation shower roses discussed in this case study.



Door hanger Ramada Hotel

Pan Pacific Hotel

Research and intentions

The information for this case study has come directly from an interview and questionnaire with the chief engineer of the Pan Pacific Hotel. His assistance in the development of this case study is gratefully acknowledged.

Overview

- Address:
  81 Surf Parade
  Broadbeach 4218
- Number of Rooms:
  298 rooms
- Category:
  4 Star
- Floor Area:
  27.223 m^2. Approx. 5.000 m^2 of landscape
- Occupancy:
  85% year (average). Mainly tour groups and conferences
- Variables:
  Close proximity to the Hotel Conrad Jupiters Casino and the beach, 22 level tower
- Annual Water Consumption:
  1994/95 - 156, 962 kL
  1994 - 251, 355 litres/day
  1995 - 233, 256 litres/day
  (at date of writing)

Background

The hotel installed water restrictors in the shower roses as a design requirement during development stage in order to limit the amount of hot water used. This measure did not affect water flow in the pipes, because the hotel's water tank is located on the roof of the building with subsequent underhead pressure.

Planning and implementation

As mentioned, water restrictors were installed during the hotel's development stage. However, in order to better control the water flow throughout the hotel and save water, there are plans to install an energy and water conservation system in the near future.

The present owners are keen to install the system but are reluctant at this stage, until significant financial incentives become available. It is estimated that installation of the system will take approximately 17 days.

Product/ program details

The energy and water conserving system has been selected because of the product's perceived credibility and use within the hotel industry. As well, the system fits the Pan Pacific's present hardware and taps.

Monitoring

The monitoring will be undertaken by monthly meter reading by one staff member and it is expected there will be no running or maintenance costs.

Costs

The costs for the implementation of the system are expected to be in the order of $89,000, with an expected payback in approximately 13 to 18 months predominantly through energy savings. The main constraint for implementation is financial cost and the main support is expected financial savings through energy and water conservation.

Results

The results to date cannot be summarised as the system has yet to be installed. In the future, the Pan Pacific plans to develop a total concept package in environmental management. This will be completed in conjunction with the establishment's staff environment committee and will include water and energy conservation, waste management and recycling.

Further information

For further information about the Pan Pacific contact:

Ian Turnbull
Chief Engineer
PO Box 174
Broadbeach 4218
Ph: (07) 5592 2250

On page 86 in Section 3, suppliers information can be found about the energy and water conserving system discussed in this case study.

Pan Pacific Hotel

Research and intentions

The information for this case study has come directly from an interview and questionnaire with the chief engineer of the Pan Pacific Hotel. His assistance in the development of this case study is gratefully acknowledged.

Overview

- Address:
  81 Surf Parade
  Broadbeach 4218
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  298 rooms
- Category:
  4 Star
- Floor Area:
  27.223 m^2. Approx. 5.000 m^2 of landscape
- Occupancy:
  85% year (average). Mainly tour groups and conferences
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  Close proximity to the Hotel Conrad Jupiters Casino and the beach, 22 level tower
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  1994/95 - 156, 962 kL
  1994 - 251, 355 litres/day
  1995 - 233, 256 litres/day
  (at date of writing)

Background

The hotel installed water restrictors in the shower roses as a design requirement during development stage in order to limit the amount of hot water used. This measure did not affect water flow in the pipes, because the hotel's water tank is located on the roof of the building with subsequent underhead pressure.

Planning and implementation

As mentioned, water restrictors were installed during the hotel's development stage. However, in order to better control the water flow throughout the hotel and save water, there are plans to install an energy and water conservation system in the near future.

The present owners are keen to install the system but are reluctant at this stage, until significant financial incentives become available. It is estimated that installation of the system will take approximately 17 days.

Product/ program details

The energy and water conserving system has been selected because of the product's perceived credibility and use within the hotel industry. As well, the system fits the Pan Pacific's present hardware and taps.

Monitoring

The monitoring will be undertaken by monthly meter reading by one staff member and it is expected there will be no running or maintenance costs.

Costs

The costs for the implementation of the system are expected to be in the order of $89,000, with an expected payback in approximately 13 to 18 months predominantly through energy savings. The main constraint for implementation is financial cost and the main support is expected financial savings through energy and water conservation.

Results

The results to date cannot be summarised as the system has yet to be installed. In the future, the Pan Pacific plans to develop a total concept package in environmental management. This will be completed in conjunction with the establishment's staff environment committee and will include water and energy conservation, waste management and recycling.

Further information

For further information about the Pan Pacific contact:

Ian Turnbull
Chief Engineer
PO Box 174
Broadbeach 4218
Ph: (07) 5592 2250

On page 86 in Section 3, suppliers information can be found about the energy and water conserving system discussed in this case study.

Royal Pines Resort

Guest rooms

The information for this case study has come directly from an interview and questionnaire with the chief engineer of the Royal Pines Resort. His assistance in the development of this case study is gratefully acknowledged.

Overview

- Address:
  Ross Street
  Ashmore 4214
- Number of rooms:
  330 rooms
- Category:
  5 Star
- Floor area:
  56.073 m^2
- Occupancy:
  70% year (average). Mainly tour groups, business and convention groups
- Highest water use:
  Food and beverage, laundry, landscaping and guest rooms (not in order). Landscaping is possibly the highest user.
- Main characteristics:
  Extensive hotel resort with large grounds and gardens, large conference facilities, commercial size laundry, seven food and beverage outlets, golf course, pools, marina, wildlife sanctuary.
- Variables:
  Occupancy (not necessarily number of rooms, but also the business of the hotel - e.g. golf tournaments which use other facilities of the resort such as food and beverage), banquets, design and maintenance of plant, equipment and work areas.
- Annual water consumption:
  1994 - 205, 136 kL (hotel only)
  1995 - 55, 645 kL (laundry)

Background

During its development, Royal Pines Resort did not install any water conservation systems.

At the end of June 1995, a water and energy conservation system was installed because of guest complaints about water flow and temperature fluctuations. The situation had developed soon after the opening of the resort. It was realised the problem lay in the design of the hotel's hydraulic system. Measures were taken to correct the problems, including installation of a second hot water system in 1994. Until the energy and water conservation system was installed, the hotel's problems continued.

Planning and Implementation

It was decided by the hotel following unsuccessful attempts to correct the faulty hydraulic system that the only option was to install the energy and water conservation system because of its ability to regulate water pressure and flow. Communication with the property owner's representative took place and the system was installed in 1995.

The implementation of the system was progressive - three guest floors at a time. The back of house areas were also completed a section at a time. The whole process took about six weeks to complete. The costs related to the installation were in the order of $110,000.

Payback

Payback will be approximately 2.8 years based on 35% water savings or two years on 50% water savings. Both estimates are based on 70% occupancy. Water consumption after 3 months of installation dropped 10%. Current figures to March 1996 indicate an average of 33.88% in water savings. Litres used per occupied room have dropped from 301.25 litres in 1994, 260.79 litres in 1995 to 191.33 litres in 1996.

Monitoring

Monitoring of water consumption and guest satisfaction is done on a monthly basis. It requires only one staff member and virtually no maintenance cost.

Costs

The total costs of installing the system including filtration, valves and labour were, $110,000. Non financial costs included staff training about details of the system installed.

Results

According to Royal Pines Resort's chief engineer, the benefits of the system are guest comfort (complaints about water and temperature fluctuations stopped), reduced water consumption costs, a stable hydraulic system, less wear on the system and components, increased capacity of the hot water system and management satisfaction.

Water savings were calculated by comparing data for the same period of the previous year - water consumption versus occupancy.

Expectations of the system are very high at the hotel.

Lessons learned

According to the chief engineer, the main lesson learned from this process was that the system should have been installed in the hotel during its development phase. It was also recognised that the hydraulic system was inappropriate for the hotel's needs.

Next steps

Close monitoring of the system will occur for the next 12 months.

Further information

For further information about Royal Pines Resort contact:

Garry Croxford - Chief Engineer
Ross Street
Ashmore 4214

Ph: (07) 55978 707

On page 86 in Section 3, supplier's information can be found about the energy and water conserving system discussed in this case study.

".. the benefits of the system are guest comfort (complaints about water and temperature fluctuations stopped), reduced water consumption costs, a stable hydraulic system, less wear on the system and components, increased capacity of the hot water system and management satisfaction."

Royal Pines Resort

Kitchens

Introduction

According to the International Hotel's Environment Initiative (IHEI, 1993) *Environmental Management for Hotels - The industry guide to best practice,* kitchens are the second largest water users in hotels at approximately 21 percent of total consumption. Most hotels have more than one restaurant and kitchen and within its operations, involve many staff - from executive chefs to stewards, dishwashers to food preparers.

"Kitchens are traditionally among the least energy (and water) efficient operations in hotels. Large amounts of utilities are wasted, owing to lack of planning and excessive and poor use. Equipment is turned on in the morning and left on most of the day. Water taps may be kept running to defrost frozen goods or to clean vegetables.

Compared with private restaurants, hotel kitchens use two to three times as much energy for the same quantity and quality of food. An excellent opportunity for achieving energy efficiency - without affecting guest comfort and with minimal investment - thus remains untapped to a large degree" (IHEI, 1993, p 44).

IHEI Suggestions

Suggestions from the IHEI for water savings in general kitchen operations include:

- "Can kitchen operations be centralised? Operate less kitchens for the same outlets.
- Can specific cooking operations from different kitchens be combined in order to run less equipment?
- Shut equipment off when not in use.
- Match equipment operation to your needs.
- Wherever possible use dishwashers and glass washers only fully loaded.
- Install flow restrictors or self-closing spring-loaded valves on faucets to reduce water flow. Maintain hot water at 50 degrees Celsius at the tap.
- Use hot water only when necessary.
- Do not keep water running for cleaning purposes.
- Mop from a bucket to conserve water.
- Shut off booster on dishwashers and glasswashers automatically via solenoid valve when equipment is off.
- When the main dishwashing rush is over, turn off equipment and accumulate dishes until a full load is available or the next rush period occurs.
- Check whether cleaning can be done during the day.
- Do not defrost or clean food under running water.
- Establish detailed cleaning procedures for the stewarding department "(IHEI, 1993, p 44,45).

The Green Hotelier

The Green Hotelier (1995), also overviews the Hotel Inter-Continental Hanover which "installed a new dishwasher to replace an outdated unit. The equipment has reduced water consumption by 80 percent - from 1,800 litres per hour to 360 litres - and saved US $8,900 for a 2.7 year return on investment " (IHEI, 1995, p14).

In this section we present two case studies of water conservation in kitchens:

- Hotel Conrad Jupiters Casino - Energy and Water Conservation System.
- Wesley Hospital - Installation of new dishwasher.

Hotel Conrad Jupiters Casino

Energy and water conservation system in kitchens

The information for this case study has come directly from an interview and questionnaire with the assistant chief engineer of the Hotel Conrad Jupiters Casino. His assistance in the development of this case study is gratefully acknowledged.

Overview

As mentioned earlier, the Hotel Conrad Jupiters Casino at Broadbeach is a 609 room, full service, four star establishment.

It incorporates a public casino, conference centre, hotel, large gardens, fitness centre, swimming pool and a showroom and is situated on Broadbeach Island, surrounded by canals and river systems. It also has seven kitchens, six restaurants and ten public bars.

It has a floor area of 64,238 m2 as well as car parks of 53,400 m2.

Conrad Jupiters is part of Conrad International the international subsidiary of Hilton Hotels Corporation USA and is owned by Jupiters Limited.

In 1994/95 total water consumption was 374,205 Kl at a total cost of $45,317. Trade waste was $77,106.

Background

In 1992, Conrad Jupiters installed an energy and water conservation system in the hotel's guest rooms to address the temperature fluctuations regularly occurring and causing guest complaints.

So successful was that system, that after testing other water conserving systems, the same system was installed in the Hotel Casino's seven kitchens in late 1994.

Kitchens are generally regarded as being high water consumers in hotels and the energy and water conserving system was installed as a water and cost saving exercise.

It was also recognised by the hotel that water supply reductions can reduce associated trade waste and the combined reductions can result in significant financial savings.

"It was also recognised by the hotel that water supply reductions can reduce associated trade waste and the combined reductions can result in significant financial savings."

For Conrad Jupiters, trade waste is approximately 80 percent of total water usage.

The system was installed at a cost of approximately $15,000 and was able to utilise the existing filter (for the guest room system), which alone had originally cost $34,000. (See Guest Room Case Study p21).

Planning and implementation

The system took three weeks to install throughout the Hotel Casino's kitchens and caused very little inconvenience to staff in its installation. The Engineering department merely advised kitchen staff of the situation and proceeded to install the system quickly.

Results

There have been no complaints from kitchen staff about the system's operation in the establishment's kitchens and Conrad Jupiters is satisfied with the system in both the kitchens and guest rooms.

While they believe water savings in the kitchens are not significant in the context of total facility water usage, the Hotel Casino does recognise the cumulative benefits of installing water saving technology in different areas of the facility, from guest rooms to kitchens and even public toilets.

Further information

For further information about Conrad Jupiters energy and water conservation system installation contact:
Jack McLaggan - Chief Engineer
Conrad Jupiters
Broadbeach 4218
Ph: (07) 55 92 1133

On page 86 in Section 3, supplier's information can be found about the energy and water conserving system discussed in this case study.

Wesley Hospital

Kitchen dishwasher

The information for this case study has come directly from an interview and questionnaire with the Co-ordinator Hospitality Services of Wesley Hospital. His assistance in the development of this case study is gratefully acknowledged.

Overview

The Wesley Hospital is Uniting Church operated and located at Auchenflower in Brisbane. It has been selected for this case study because in February 1996 the food services department installed a new dishwasher - energy and water saving as well as efficient. It appears no similar dishwashers have yet been installed in any Gold Coast establishments.

In 1995, the Wesley Hospital was one of only six organisations in Australia to receive a Commendation in the Australian Quality Awards. It was the only business in Queensland to receive the 1995 Commendation.

The Hospital is approximately 25 years old (as is its kitchen), and has grown from a 100 bedroom facility to its current 324 bedrooms. During 1995 the hospital constructed a new wing which from February 1996, will house a completely new kitchen facility.

Wesley Hospital employs 1,250 staff, 80 of whom work in the food services department. The kitchen serves an average of 275 patients per day with three main meals, morning and afternoon teas, supper and early morning tea. It also serves a minimum of 450 meals per day (lunch and dinner) in the hospital's dining room which caters for staff and the public. An added operation of the kitchen is catering for hospital functions which can vary from 10 to 1,000 meals a day.

"In 1995, the Wesley Hospital was one of only six organisations in Australia to receive a Commendation in the Australian Quality Awards."

Background

The old Wesley Hospital kitchen had two commercial dishwashers, one which was originally installed when the hospital was built, the second installed approximately 15 years ago. Both were replaced by the one dishwasher when the new kitchen became operational in February 1996.

A number of aims were developed at the design stage of the kitchen and include:

- Modern kitchen operations
- Environmentally sound for example, water and energy conserving, no corrosive chemicals used etc.
- Adherence to Occupational Health and Safety Standards
- Correct work flows designed and regularly reviewed
- Elimination of any dangerous work practices in kitchen design

The new dishwasher also adheres to all of the above requirements.

The new kitchen was designed by an architectural firm in collaboration with food services management and had a budget of $1.6 million for full fitting out.

Wesley Hospital dishwasher (photo courtesy FTX Hobart)

With the move to the new kitchen, a whole new catering system came into practice in food services with new menus planned and the delivery of meals to rooms mirroring restaurant standards of service.

It is all part of the goal of Wesley's food services team to become the best at its job within Australia's hospital system. It also plans to gain 9002 Quality Assurance accreditation and subsequently market its expertise throughout South East Asia.

Planning and implementation

The new dishwasher has a capacity for 1,500 plates - this was the starting point for the kitchen designers and the food services Department's research into an appropriate machine.

As well as addressing the previously mentioned kitchen aims, it also needed to:

- Work effectively, with washed plates emerging clean, dry and not requiring rewashing
- Be completely reliable
- Be cost effective in terms of labour, water and energy
- Be fast
- Require minimum washing chemicals
- Have a capacity for one person to operate the machine in slow times, (in busy times this model can accommodate up to four people at one time)

Cost and Installation

The dishwasher was installed and made fully operational over a two week period in early 1996 at a cost of approximately $150,000. Included in this price is staff training and warranty. The food services department will also implement a preventative maintenance scheme in conjunction with either its own maintenance department or the suppliers.

Product details

According to the supplier, the Wesley Hospital dishwasher is primarily water conserving in its dual rinse system where the final rinse water is captured and reused both in the first rinse and in the previous washing cycles.

This reduces water use from 600 litres per hour to 300 litres per hour. As well, the dishwasher contains a heat recovery condenser which collects then reuses the heat energy generated from the washing and blow dryer operations.

This means the final rinse water is fed into the machine cold then heated to the required 80 degrees without accessing mains power at a saving of 18.5 kilowatts per hour.

The second water saving option on the machine is its auto timer option which turns the machine off when plates are not stacked on the conveyor belt system. In most kitchens, commercial dishwashers continue to operate whether or not plates are going through. Staff can therefore be trained to stack the machine only when a full load of plates comes in, thus greatly minimising dishwasher use and water wastage.

Next steps

Wesley Hospital kitchen's next step in its water conserving strategy is the installation of a power soak sink which soaks and cleans pots and kitchen equipment through water turbulence in sinks.

It saves water and labour in its one cycle operation so instead of stewards scrubbing equipment under continually running water, the equipment can be left in the power soak (which has been described as something like a saucepan spa!) while continuing with other work. Only one cycle of water is required for operation.

Further information

For further information about the Wesley Hospital's dishwasher contact:

Mark Ford
Co-ordinator Hospitality Services
The Wesley Hospital
PO Box 499
Toowong 4066
Ph: (07) 3232 7969

On page 87 in Section 3, suppliers information can be found about the dishwasher discussed in this case study.

".. the Wesley Hospital dishwasher is primarily water conserving in its dual rinse system where the final rinse water is captured and reused both in the first rinse and in the previous washing cycles.

This reduces water use from 600 litres per hour to 300 litres per hour.."

Public toilets

Introduction

The International Hotels Environment Initiative (IHEI) (1993), estimates that for a 300 room hotel approximately 17 percent of water is used in lockers/public toilets. This is certainly an area where water conservation measures can be as simple as installing dual flush toilets through to state of the art infrared urinal systems.

Please note, the Gold Coast City Council has a plumbing policy which states that dual flush toilets must be installed in all new buildings. They are required to have a water consumption level of 6/3 litres. (See Resource Section for the Gold Coast City Council Plumbing and Drainage Services Conditions of Approval p82).

In this section of the manual we have one detailed case study outlining a local initiative. It is:

- Conrad Jupiters Casino - installation of an infrared urinal system.

  As well, we overview a number of other initiatives discussed by the IHEI in *The Green Hotelier* (1995) and *Environmental Management for Hotels - The industry guide to best practice (1993).*

- As mentioned in the Guest Rooms section of the manual, the Marriott Marquis in New York City "replaced 1,800 old toilets with low-consumption units.

  The effort was part of New York City's Toilet Rebate Programme where commercial buildings receive rebates of US $150 for each toilet replaced. The hotel received a rebate cheque for a massive US $279,000. This is in addition to the annual saving of 20 million gallons of water and a reduction of US $70,000 in water and sewer bills.

  Even if there are no similar demand side management programs in the area, the return on investment from water savings alone can be very appealing" (IHEI, 1995, p13).

- "Sloane House, a Forte property in Aylesbury England, was consuming 3,600m^3 of water a year in each men's urinal because they were automatically activating every two minutes.

  By installing passive infrared systems (which activate the flushing after each use), the volume of water used in the building was reduced to 251m^3. This initiative resulted in a 93 percent reduction, a saving of 3,200 pounds per urinal" (IHEI, 1995, p13).

- Not all toilets need to be of the flushing variety. Though difficult to apply to five star, international hotels at this stage, operations like Jemby Rinja Lodge, an ecotourism development in the Blue Mountains has installed composting toilets throughout its cabins and conference centre. According to Harris and Leiper (1995), Jemby Rinja Lodge currently has the largest single installation of these toilets in Australia - there are nine in all.

  "Waste from toilets is commonly removed every six months and placed in a rotating compost tumbler. Here it is mixed with other natural products such as kitchen scraps and vegetable peelings. The resulting mixture, once composted, is then dispersed around the property including the lodge's herb garden" (Harris and Leiper, 1995, p112).

Hotel Conrad Jupiters Casino

Infrared urinals

The information for this case study has come directly from an interview and questionnaire with the assistant chief engineer of the Hotel Conrad Jupiters Casino. His assistance in the development of this case study is gratefully acknowledged.

Overview

- As mentioned previously, the Hotel Conrad Jupiters Casino at Broadbeach is a 609 room, full service, four star establishment.

  It incorporates a public casino, conference centre, hotel, large gardens, fitness centre, swimming pool and a showroom. It is situated on Broadbeach Island, surrounded by canals and river systems. It also has seven kitchens, six restaurants and ten public bars.

It has a floor area of 64,238 m2 as well as car parks of 53,400 m2.

- Conrad Jupiters is part of Conrad International, the international subsidiary of Hilton Hotels Corporation USA and is owned by Jupiters Limited .
- In 1994/95 total water consumption was 374,205 kilolitres at a total cost of $45,317. Trade waste was $77,106,

Background

Early in 1995, Conrad Jupiters began trialling an infrared water saving system for urinals in two public toilets of Jupiters Casino.

The aim of this trial (and subsequent installation), was to reduce the Hotel Casino's water consumption and provide a more effective service to guests and Casino visitors.

Planning and Implementation

The infrared system has been installed in the Level One and Two public toilets in the Casino to date, at a cost of $12,000.

At the time of writing, it has been operating for over four months and efforts have been made to gather some historical data for the Casino on its water use and savings as well any maintenance issues with the system.

The assistant chief engineer is expecting quite significant water and financial savings for the Casino, mainly because a reduction of water supply into the hotel urinals means an associated reduction in trade waste.

Conrad Jupiters is now fully installing the infrared system throughout their six public toilet areas and eventually in the two staff toilet blocks as well, at a total cost of $35,000. Installation is expected to take eight weeks.

They do not expect to undertake any specific staff training for monitoring or maintenance of the new system.

As far as running and maintenance costs are concerned, the system is under warranty for 12 months and will not require any extra costs for maintenance. The purchase and installation of the system has occurred through the organisation's capital expenditure budget.

Results

Conrad Jupiters is expecting an 18 percent decrease in water consumption use through the system.

".. the Gold Coast City Council has a plumbing policy which states that dual flush toilets must be installed in all new buildings.

They are required to have a water consumption level of 6/3 litres."

According to the assistant chief engineer, financial payback is not an issue for them with the installation. Maintenance and lack of proper use of the old flusherettes is of more concern as visitors had a tendency not to flush and cause subsequent problems with the system.

Monitoring of resulting guest feedback will occur, though at this stage the process for this is yet to be determined.

Further information

For further information about Conrad Jupiters infrared urinal installation contact:
Jack McLaggan
Chief Engineer
Conrad Jupiters
Broadbeach Island
Broadbeach 4218
Ph: (07) 55 92 1133

On page 88 in Section 3, supplier's information can be found about the infrared urinal system discussed in this case study.

Laundry

Introduction

The International Hotels Environment Initiative (IHEI), publication *Environmental Management for Hotels - the industry guide to best practice* (1993), states that in a 300 room hotel in a typical water audit, the laundry uses 12 percent of total water.

For case study information about water conservation in a hotel laundry, please see p16 and the Hotel Inter.Continental Sydney experience.

- The IHEI (1993) states:

  "The laundry operation of a hotel can have an enormous impact on the environment. For various cleaning and finishing processes we use a vast amount of energy and water, while the chemicals used can cause air pollution, toxic waste and sewage problems.

  The pattern of energy consumption within the department depends largely on the type of equipment in use and to a lesser extent on the type of textiles (fabrics) being processed. Washing accounts for approximately 35 percent of the total process energy consumed in a laundry" (IHEI, 1993, p46).

"The laundry operation of a hotel can have an enormous impact on the environment."

Laundry tips

The IHEI (1993), has a number of laundry operation tips including:

- "Check that laundry operating hours are adapted to actual needs of operation.

  Extended operation results in additional energy (and water) consumption.

  If restricted laundry operation is still required after normal working hours, check if a separate small steam generator can be installed, instead of keeping large steam generators going for the laundry alone.
- Modify laundry operating hours according to actual load, which is almost directly proportional to occupancy.

  When occupancy is sufficiently low, check if the laundry operating hours could be reduced or if it could be closed for one or two days.
- Operate all equipment fully loaded at rated capacity.

  Utility consumption at partial loads is practically the same.
- Work out a smooth schedule of housekeeping to ensure timely flow of used linen being returned in the morning hours, instead of infrequently starting and stopping equipment.
- Immediately repair leaks: water, steam, compressed air.
- Once you have evaluated total operating costs of your laundry check whether full or partial outside laundry services are more economical.
- Re-channel water lost to drains from dry-cleaning machine.

  It can be used for cooling tower make-up or for gardening - but not for domestic water supply.
- Frequently check steam traps for proper functioning.

  Do not allow flash steam or live steam from leaking traps to get lost to the atmosphere.

  Install flash steam vessel and heat exchanger to recover energy and water.
- Check for steam and condensate losses and repair immediately.

  All condensate must be returned to the condensate tank.
- Adjust suds and rinse levels to manufacturer's recommended setting.
- Check and adjust water flow rate on tunnel washers and CBW's (continuous batch washers) to manufacturer's recommended setting.

- Make sure all water inlet valves are closing properly.
- Check for leaking dump valves.
- Check level controls on water re-use tanks.
- Minimise the amount of suds, bleach, rinse operations without reducing quality standards.

  Total cycle time could be reduced by approximately 10 percent.
- Consider using 'intermediate extraction' between rinse operations.
- Ensure fully loaded machines.
- Consider the re-use of water from previous rinse cycles for washing by installing temporary holding tanks.

  Chemicals and heating energy will also be saved. Water consumption can be cut by 40 percent.
- For hotels over 500 rooms, a continuous batch washer (CBW) could be considered.

  Because of the counterflow system, a CBW uses all the rinse water for pre-washing and main suds operation.

  Compared to a conventional type washer-extractor, a CBW uses 50 percent less water.
- Prolong spinning cycle to achieve final water retention of 55 percent.

  Less energy will be required by drying and flatwork ironer" (IHEI, 1993, p46,47,48 and 49).

"The laundry operation of a hotel can have an enormous impact on the environment. For various cleaning and finishing processes we use a vast amount of energy and water, while the chemicals used can cause air pollution, toxic waste and sewage problems"

The Green Hotelier

The Green Hotelier (1995), also briefly overviews international examples of best practice:

"In addition to fitting 1,100 low flow shower heads, the Boston Park Plaza Hotel and Towers has installed a laundry water conservation system.

This will save 65 percent of the 10 million gallons previously used.

With the combined energy, chemical and sewer savings, the technology will be paid for in 18 months " (IHEI, 1995, p14).

Tips

They also give five key tips:

- "Only run equipment when fully loaded
- Ensure smooth co-ordination of workflow and minimise operating hours
- Install recovery from washing and dry cleaning machines
- Re-channel all condensation and flash steam. Avoid steam loss!
- Check washing machines for correct water level during individual cycles" (IHEI, 1995, p14).

Landscaping

Introduction

Without a doubt, hotel and resort landscaping and gardens can consume huge amounts of water in their development and maintenance. Currently on the Gold Coast most of the water used for landscaping is potable/treated water, though the following case study from the Currumbin Sanctuary demonstrates how secondary treated reclaimed water can be accessed simply and cost effectively to ensure large garden areas are kept looking their best. The second case study overviews Royal Pines Resort's use of a computerised, rain sensing irrigation system which works effectively to conserve water.

Current figures on the average use of water for landscaping in hotels is of course unobtainable because of the diversity in property sizes and recreational facilities. Here on the Gold Coast we have hotels and resorts which range in size from the Royal Pines Resort and Sanctuary Cove with golf courses and large landscaped areas, through to properties like Hotel Conrad Jupiters Casino which has a smaller land area but highly valued gardens, then to inner Surfers Paradise hotels and resorts with minimal yet focused landscaping.

".. the Currumbin Sanctuary has installed a reclaimed water irrigation system for $40,000, only plants native species, uses large amounts of mulch to prevent evaporation and has installed a low cost, flow form water reuse system to almost totally reduce its excess water use and charges."

Research indicators

The research undertaken for this section of the manual has revealed three key points:

1. Both low technology and high technology water conserving practices and equipment are available for hotel and resort landscaping.

   For example, the Currumbin Sanctuary has installed a reclaimed water irrigation system for $40,000, only plants native species, uses large amounts of mulch to prevent evaporation and has installed a low cost, flow form water reuse system to almost totally reduce its excess water use and charges.

   On the other hand, our second case study - Royal Pines Resort - has installed high technology, computer operated irrigation systems which utilises potable/treated water and maximises the effectiveness of its water use.

   Such systems can be very costly, yet in large operations like Royal Pines Resort, provide a very efficient watering regime if managed effectively.

2. The people factor... despite installing the most high technology, state of the art equipment like computerised, radio operated irrigation systems, organisations will not achieve potential water and financial savings if they are not operated and maintained effectively.

   According to irrigation consultant Chris Edwards, relevant staff need to take ownership of the installation and ongoing running of such equipment for hotels and resorts to reap the associated cost savings.

The benefits from matching staff appropriately with equipment include:

- Greater control over where, when and how much water is used
- Minimal labour involvement when the system is up and running
- Healthier and more aesthetically pleasing landscaped areas

3. The Currumbin Sanctuary liaised closely with the Gold Coast City Council in the design and installation of their reclaimed water irrigation system. It is extremely important that any establishment considering utilising reclaimed water on their premises, contact their local authority for advice and information regarding policy and procedure.

The Green Hotelier

The International Hotels Environmental Initiative Green Hotelier (1995), offers some further suggestions on water conservation for gardens and outside areas:

- "Analyse the types of plants in use. Some plants consume a lot of water
- Establish watering programs to work out exact requirements
- Install soil humidity sensors to control water flow
- Install rainwater sensors to stop irrigation at appropriate moments
- Install subsurface irrigation systems, especially if fed from waste water
- Use recovered water from hotel
- Establish cleaning procedures for all outside areas and minimise losses
- Cover swimming pools when not in use - most water is lost from pools through evaporation" (IHEI, 1995, p 23).

The same document outlines a case study from the Hotel Inter-Continental Seoul where "waste water from the guest room and health club baths, sinks and showers is collected, suitably treated and then re used for irrigation, public toilets and cooling towers. Recycling this water saves 81,000m^3 for a total saving of US $74,640" (IHEI, 1995, p14).

Note

Approval must be received from relevant local authorities before considering this sort of option.

Green Island Resort

Closer to home, Harris and Leiper (1995), outline the Green Island Resort which makes use of a diversity of plants endemic to the island. When the resort was developed between 1992 and 1994, the site was revegetated with some 6,000 native plants (of 60 different native species). These supplemented already existing vegetation.

"While fertiliser was used to establish new plants, amounts were strictly limited and its use has since been phased out. Treated reclaimed water is used for irrigation purposes, however nutrient levels are strictly monitored. Irrigation is directed at plant root zones and foliage to minimise run off and water pressure is kept low for the same reason. In the event of a treatment plant malfunction, the irrigation system automatically shuts down. No pesticides are employed on the resort's gardens as gardeners have been successful in establishing a natural predatory cycle" (Harris and Leiper, 1995, p104).

In addition:

"Most of the property's structures do not have gutters. In addition nearly all buildings in the accommodation zone and the public day-visitor facilities are connected by suspended boardwalks. These design features allow rainwater to fall on the ground and so replenish moisture levels required to support the resort's vegetation and the island's aquifer. The boardwalks are also effective in limiting damage stemming from the trampling of vegetation" (Harris and Leiper, 1995, p102).

Kingfisher Bay

According to Tony Charters, Heritage Director of Kingfisher Bay Resort and Village at Fraser Island, the landscape treatment of this establishment also "used native species from the actual site and surrounding environs.

This involved using immature plants, however within a short time the resort plant community was expected to mirror that of the surrounding area.

A large nursery was constructed on site to care for the 150,000 plants required for the project. The Queensland Forest Service was contracted to raise 60,000 plants from seed and cutting stock taken from the island. The nursery continues to provide stocks of native shrubs and trees for the resort" (Harris and Leiper, 1995, p119).

In a recent discussion, Mr. Charters outlined the benefits of Kingfisher Bay's native landscaping. These include minimal maintenance costs. As all the resort's plants are endemic to Fraser Island most require irrigation only in their establishment phase. Other maintenance programs are minimal as all garden areas are heavily mulched.

Currumbin Sanctuary

Landscaping

The information for this case study has come directly from an interview and questionnaire with the Horticultural Manager of the Currumbin Sanctuary. His assistance in the development of this case study is gratefully acknowledged.

Overview

This case study about Currumbin Sanctuary will cover three key areas of water conserving landscaping and horticultural practice. They are:

- The use of reclaimed water for irrigation
- The use of flow forms to reduce and reuse water supplies
- Native plantings to minimise water use while maintaining distinctive and attractive Australian landscapes for visitors and Sanctuary fauna.

The Currumbin Sanctuary is a major Gold Coast tourist attraction which exhibits a wide range of native flora and fauna. It also operates an education centre which caters for schools and colleges. The Currumbin Sanctuary is located on 72 acres of land at the southern end of the Gold Coast. To date, approximately 45 acres have been developed and utilised by the Sanctuary for public access. It is owned by the National Trust of Queensland.

In 1994, the Sanctuary attracted approximately 510,000 visitors. Over the next five years they expect visitor numbers to increase to around one million people per year.

The Currumbin Sanctuary's main priority is the preservation of native flora and fauna and in line with this is a commitment to simulate natural conditions for animals and to exhibit them in an educational manner. The Sanctuary aims to preserve the site's existing flora and to expand on that stock by both reintroducing species that are endemic to

Innovative practices - Currumbin Sanctuary

the area as well as species which are listed as rare and endangered.

The Horticulture Section has 15 staff, eight of whom are qualified horticulturists. They each have specialist interests including landscaping, nursery production, permaculture and hard landscaping for example, paving, retaining walls etc. Other staff members are made up of apprentices, greenkeepers and labourers. Horticulture also employs a number of off site staff at the Sanctuary's two eucalyptus plantations at Merrimac and Elanora. Merrimac is currently under development and houses 35,000 eucalyptus trees and 5,000 rainforest trees, while the established Elanora site has 11,000 eucalyptus koala food trees which are irrigated with secondary treated reclaimed water.

The Horticulture Section also has 21 trainees operating within a New Work Opportunities Program who are completing a six month horticultural course at the Sanctuary.

The Horticulture Manager has now been at the Sanctuary for five years and in that time has focused on the operation's mission of "preserving and promoting our natural heritage". He receives assistance from the Department of Environment and Heritage which now lists the Sanctuary as a safe haven for rare and endangered plants. He believes there is a great need to preserve the flora of the South East Queensland bioregion because of ongoing urban development and related land clearing. "We have a moral obligation to bring those species back from the brink," he said.

The relationship between the Horticulture Section, the Sanctuary's upper management and the National Trust is a very positive one because of the organisation's stated commitment towards the preservation of native flora and fauna. The Horticulture Manager develops proposals for new projects, presents them to upper management and usually receives wholehearted support - from funding to assistance in liaising with relevant government bodies and so on. It's all in the name of maintaining and continuing to develop the Currumbin Sanctuary as both an animal and plant sanctuary.

Reclaimed water for irrigation - background

Over the past five years approximately 85 percent of the Currumbin Sanctuary's grounds have been irrigated with reclaimed water. The Horticulture Section worked with the Gold Coast City Council to bring the water to the edge of the Currumbin Sanctuary property. From there, the Horticulture staff laid 63 mm pipe around the perimeter of the grounds and tapped lines off that to irrigate most of their gardens and lawns.

"Initially the Sanctuary irrigated only lawns with the reclaimed water to test its effectiveness. They then tried it on gardens and it seemed to have no ill effects, in fact they recorded very good growth rates from many species."

The majority of irrigation occurs at night when the public is not on site and evaporation rates are lowest.

The Sanctuary undertook the reclaimed water scheme when they realised that to provide ideal growing conditions for their landscapes, they would have to supplement their current irrigation system. Potable/treated water irrigation alone, seemed wasteful of both a precious natural resource and money.

Planning and implementation

The reclaimed water for irrigation works utilising two processes:

- The Gold Coast City Council uses high pressure pumps at night to pump water from its Elanora treatment plant on to Benowa. While this occurs, the lines to the southern Gold Coast are also pressurised and so the Currumbin Sanctuary is able to take advantage of this to irrigate all its public areas at night (without using its own pump). Sprinklers are placed near pathways and public access areas and energy is saved by not having to use its own pump at this time.

- The Sanctuary has a reclaimed water pump which lifts pressure during the day. This is run on all gardens and non public areas during the daytime. The pump is on an automatic timer and cuts off before evening.

The Horticulture Section has found the reclaimed water excellent for its gardens and lawns because of its high levels of nitrogen and phosphorous.

The lawns are very green because of the nitrogen and they have found the native gardens are thriving on the reclaimed water. Specific species like Proteaces do have trouble with reclaimed water, so the horticulturists ensure minimal use of reclaimed water is used and the plant is flushed with potable water soon after irrigation.

Initially the Sanctuary irrigated only lawns with the reclaimed water to test its effectiveness. They then tried it on gardens and it seemed to have no ill effects, in fact they recorded very good growth rates from many species.

The entire irrigation system operates on timers. While the Sanctuary recognises that it's usually better to water heavily once a week, they now prefer to water more often and lightly in order to prevent irrigation run off.

They give 30 minutes to one hour once a night or every second night depending on the garden area and its location to lagoons.

In this way, little if any run off occurs, though they have found that where run off has occurred in gullies, the water is soaked into the ground before it reaches any lagoons.

The Horticulture Section also believes that the reclaimed water is naturally well filtered through the soil before it reaches the groundwater table.

Costs

Total cost so far for the irrigation system is $45,000 including the high pressure pump, main irrigation lines and subsidiary lines.

That is balanced by an earlier annual excess water bill of $10,000, so the system has more than paid for itself in the last five years. There is no cost for the reclaimed water.

Ongoing maintenance of the system is minimal, with filters cleaned weekly. It is believed the lift pump will eventually wear out though it has a life span of at least 10 years. In its four years of operation it has never broken down. The Sanctuary is unsure of how large its excess water bill would now be without the reclaimed water system, though they estimate probable annual costs of at least $15,000.

"Because the Sanctuary is constantly using the irrigation pipes, the lines are automatically kept clean."

Small areas of the Sanctuary do continue to be irrigated with potable/treated water, but these are high profile public areas adjacent to cafes and seats. The animal exhibits and hospital are also supplied with potable/treated water for health reasons.

Monitoring

One of the main concerns of the reclaimed water irrigation system initially was the possible effects on staff who handle pipes and sprays. They have found in the five years of operation that there have been no problems. To ensure the safest possible standards though, the Sanctuary has put the reclaimed water irrigation on a separate tap system to the operation's potable treated water. It operates on a plunger system and is inaccessible to anyone but Horticultural staff.

Because the Sanctuary is constantly using the irrigation pipes, the lines are automatically kept clean. In periods of rain when irrigation does not occur, the irrigation valves are turned off so water cannot stagnate in the lines. The Horticulture staff also flush the lines first before using them after a break.

Flow forms - background

Just over four years ago the Currumbin Sanctuary became very concerned about the quality of water in its series of nine duck ponds. They recognised a combination of around four or five key problems:

- Off site erosion problems in heavy rain, where top soil run off ended up in duck ponds. Over

".. the Manager, who had a high level of interest in permaculture ... began to explore more simple and natural alternatives to the problem."

the years this built up in the ponds and the original depth of 1.5 - 2m shrank to 100 - 200mm.

- Major duck population growth as ducks from southern Australia migrated during duck hunting season to the safety of places like the Sanctuary. Once there, they didn't leave.
- With high duck populations came high levels of excreta in the ponds causing high nitrogen levels.
- Lack of water flow throughout the pond system because a 50 mm circulating line was not turning over enough water.
- The ponds were in areas of sunshine and with the combination of the previous four factors, they experienced algal outbreaks, which depleted the water of oxygen and caused fish deaths.

The Sanctuary decided something needed to be done to significantly improve this situation.

Planning and Implementation

Initially the organisation went to a hydraulics engineer to devise a solution. They developed a series of computer controlled biological filters and oxygenators for each pond. According to the Horticultural Manager, this was a very expensive solution which was difficult to operate and required constant surveillance and maintenance.

Dissatisfied with this option, the manager, who had a high level of interest in permaculture - a design system which operates on nature's own systems and cycles - began to explore more simple and natural alternatives to the problem.

He investigated flow forms, a series of large 'bowls' which are designed to work with gravity in cascade formations to fully aerate water which flows through them. Flow forms have been used in Europe for many years, particularly around small alternative communities and large dairies.

After much research, the Horticulture Section put forward a proposal first to the Director of the Currumbin Sanctuary and then to the National Trust, to instigate the application of flow forms for the duck ponds. They initially had to educate both parties about permaculture principles and then the flow forms themselves, before they were able to gain hesitant initial approval to proceed with the project.

They developed the flow form design for the pond system then installed the flow forms themselves. The Horticulture team had never seen the practical application of flow forms in Australia so had to import the moulds from New Zealand and contract a local company to make up the flow forms.

Initially, there were teething problems with the system but in the last 18 months of full operation, independent water tests indicate that oxygen levels have improved by 75 to 80 percent and the E-coli content in the water has decreased by approximately 50 percent.

Costs

To have the flow form system installed and operational cost approximately $40,000 - for a series of 30 flow forms flowing through five settling ponds and two swale drains full of native reeds which also filter the nitrogen and phosphorous out of the water. In all, the flow form cost was much less expensive than the hydraulic engineering option and did not require specialised staff to operate and maintain.

Monitoring

The system is monitored weekly and inspected daily to ensure there are no blockages in the system and that water is not overflowing.

Very minimal maintenance is carried out every six to eight weeks when the system is shut down for a day to clean out the flow forms. Because they are turning over and aerating large amounts of water, algal build up does occur within the flow forms themselves. The water is therefore turned off and the flow forms scraped out by hand.

The settling ponds dug by the Sanctuary are about two meters deep and it is envisaged that every four or five years they will need to be emptied and pumped out to remove the settled clay sediment. The sediment removed will be used as garden top soil.

Lessons learned

The biggest lesson for the Horticultural Manager, and indeed the Sanctuary itself, was accepting the experimental nature of the flow form project - being open to trying new ways of doing things if 'Plan A' didn't work as expected.

Another lesson was accepting that the operation is a sanctuary and that large numbers of migratory birds will come in and out of the grounds. Once accepted, the Horticulture section now recognises the need to fence off areas of planting so they can be established without being destroyed by large numbers of birds.

In the end, the Horticulture section is very pleased with the success of the flow form project and is now regularly asked to conduct educational tours for various horticultural and permaculture colleges, councils, water boards and government departments. The Sanctuary's Horticulture Manager said, "Many people know the theory of flow forms but haven't seen it operating in reality. The people who have visited the Sanctuary to see our system think it's a very interesting concept and application and that it's aesthetically pleasing as well."

Native planting and landscapes

The Currumbin Sanctuary as previously discussed, is a sanctuary for native flora and fauna. The only exotic plants in the area are those originally planted by the Sanctuary's founder Alex Griffiths. Since the Currumbin Sanctuary became a National Trust property in 1974, no exotic species have been planted and any exotics that self germinate are removed.

There are many benefits in developing and maintaining native landscapes for the Sanctuary including:

- Minimisation of labour
- Minimal use of fertiliser
- Uniquely Australian landscaping which attracts birds and which fascinates overseas visitors
- Water savings
- Cost savings

The Horticulture Section undertakes quite a lot of propagation in order to have native plants which can both cope with the wet, sub tropical conditions of the Gold Coast and simultaneously flower. The Sanctuary's horticulturists are constantly searching for rare and endangered plant species and have found that despite the challenges, both horticultural staff and visitors alike, delight in the successes they have in obtaining, propagating, planting and maintaining unusual and indigenous plants.

The Sanctuary has just produced and distributed a botanical guide to its premises which has detailed approximately 100 species. Most are native though some mature exotic species planted by Alex Griffiths are also described. The native plant species are described in their ideal growing conditions as well as their traditional Aboriginal use.

When asked about native landscapes for Gold Coast hotels and resorts the Horticulture Manager suggested that many guests are keen to see and stay in Australian environments. He discussed the benefits of native landscapes for these establishments as being bird attracting and cost effective - native gardens are renowned for their self management qualities. With some substantial mulching, hotels with native gardens can expect pleasing aesthetics, visitor appreciation and water (and cost) conservation. With the Sanctuary's success in native landscaping a further benefit they have identified is the high motivation among its Horticultural staff as they research, acquire, propagate, plant and care for the rich diversity of indigenous plants.

Next steps in water conservation at currumbin sanctuary

Any project the Horticulture section at the Sanctuary now undertakes, includes water conservation methods whether it's via swales to build up groundwater or netted panning around specific trees.

They recognise the need for ongoing water conservation staff education in all Sanctuary departments to make people aware of the benefits of using reclaimed water and to minimise the use of potable/treated water.

The sanctuary will continue to improve their water conservation throughout the park - even now they are utilising rainwater runoff on gardens by piping it down their gutters and straight onto garden beds (instead of down the stormwater drains).

They are also constantly updating their native plant lists. Fifty to 60 nurseries now send the Sanctuary their plant lists.

Further information

For further information about the Currumbin Sanctuary's horticultural initiatives contact:
Shane Holborn
Horticultural Manager
28 Tomewin Rd
Currumbin 4223
Ph: (07) 55 341 266

Royal Pines Resort

Landscaping

The information for this case study has come directly from an interview and questionnaire with the Landscaping Manager of the Royal Pines Resort. Her assistance in the development of this case study is gratefully acknowledged.

Overview

- Address:
  Ross Street, Ashmore 4214
- Number of rooms
  330 rooms
- Category
  5 Star
- Floor area:
  56.073 m^2
- Occupancy:
  70% year (average) Mainly tour groups and business convention groups
- Highest water use:
  Food and beverage, laundry, landscaping and rooms (not in order). However, landscape is possibly the highest user.
- Main characteristics:
  Extensive hotel resort with large grounds and gardens, large conference facilities, commercial size laundry, six food and beverage outlets, golf course, pools, marina, wildlife sanctuary.
- Variables:
  Occupancy (not necessarily number of rooms, but also the business of the hotel - e.g. golf tournaments which use other facilities of the resort such as food and beverage), banquets, design and maintenance of plant, equipment and work areas.
- Annual water consumption:
  1994 - 205, 136 kL(hotel only)
  1995 - 55, 645 kL (laundry)

Background

The gardens at Royal Pines Resort are watered :

- Summer: every 2-3 days
- Winter: every 3 days or once a week

"The water saving device utilised here is a rain sensor which connects to the controller. It is made of cork and once wet, swells and cuts off the electrical irrigation program."

The irrigation system is based on a computer system and satellite boxes or controllers. These electrical devices control the irrigation stations which control the sprinkler heads intended to be used.

Messages come from the controller which program the location and timing of the irrigation stations to be activated.

The satellite box or controller is a device similar to a computer or sophisticated timer and through this, irrigation for the gardens can be programmed.

The water saving device utilised here is a rain sensor which connects to the controller. It is made of cork and once wet, swells and cuts off the electrical irrigation program. The computer system enables all the controllers to be linked to one main control. Electrical lines traverse the irrigation stations, bringing the sprinkler heads on. All controllers are linked to one computer. However, this system has to be manually turned off and is more expensive to install.

One of the greatest advantages of the computer system, is its capacity to control large areas of garden/landscape irrigation.

At the Royal Pines Resort, approximately three quarters of the gardens are controlled by the computer system and the rest by the satellite boxes. The systems were installed to reduce water use.

Maintenance costs of the rain sensors are negligible. However, for a little extra cost, Royal Pines Resort highly recommends the installation of a back-up battery to the rain sensor, which will activate in case of power failure.

Planning and Implementation

These water saving systems were installed in four locations at a time for cost effectiveness.

The plan was approved by upper management because of its significant water savings and reduction of maintenance time. It took over a year to install the system throughout the total area of 26 hectares.

Product/program detail

The rain sensors are usually installed in open areas on the top extremity of a pipe, connected to an underground concrete slab. This should easily be accessible by rain.

Monitoring

This is done on a daily basis by one irrigation staff member.

Costs

The installation cost for the Royal Pines Resort irrigation system was in the order of $6,000 for 20 units @ $300 per unit. For the residential area of the resort, the rain sensors were purchased by individual owners.

Next steps

It is planned to connect a rain sensor to the central computer in order to effectively manage the use of water throughout the entire gardens complex of Royal Pines Resort.

Evaluation

It is not possible to detect precise savings through the irrigation system due to a lack of sub metering.

However, according to the chief engineer there have been significant savings in the total water bill of the resort.

A willingness to improve the system is present among landscaping staff and providing upper management authorises financial support, improvements will be made to optimise the use of water at the Royal Pines Resort.

Further information

For further information about Royal Pines Resort and its computerised irrigation system contact:
Michelle Smith
Landscaping Manager
Ross Street
Ashmore 4214
Ph: (07) 55 978 707

"It is planned to connect a rain sensor to the central computer in order to effectively manage the use of water throughout the entire gardens complex of Royal Pines Resort."

Royal Pines Golf Course

Housekeeping

Introduction

This is an area in hotels where large financial and water savings can be made through training and working effectively with relevant staff.

While we have been unable to locate a Gold Coast case study, the International Hotels Environment Initiative's *Green Hotelier* (1995), presents a short overview:

"The Abu Jihahi Corniche Hilton International has focused on training staff in conservation techniques. Previously, it was common practice for housekeepers to flush the toilet four times while cleaning it. Through environmental awareness sessions, housekeepers learned the impact of their actions and now flush toilets only once during cleaning. Environmental management programs can also be a catalyst for boosting morale and facilitating a continuous improvement ethic" (IHEI, 1995, p13).

Key success

The key success in this instance is the establishment of appropriate cleaning procedures with staff, requiring minimal cost and returning maximum water and financial benefits.

While water conservation is the focus of this manual, it is worth noting that a number of hotels are using environmentally friendly cleaning products - in the end it protects our water systems and can save money on hotel trade waste charges. For example, all of the Green Island Resort's cleaning products used on site are biodegradable and nitrate free.

Blue Mountains example

According to Harris and Leiper (1995), at Jemby Rinja Lodge in the NSW Blue Mountains, "biodegradable washing detergents and cleaning products are used where possible, and a computer-monitored soap dispenser has been installed above the dishwasher to minimise detergent usage. Diversity Australia (the only company recommended by the NSW Environmental Protection Authority), imports this system which electronically measures the pH factor of the water and then adds the detergent and rinse aid as required" (Harris and Leiper, 1995, p113).

Housekeeping - Conrad Jupiters

Leak detection

Introduction

Maintenance of hotel equipment and facilities is an extremely important and sometimes overlooked water conservation measure.

Local anecdotes abound of theme parks and shopping centres consuming and paying for large amounts of excess water only to find after a little investigation, that major leaks exist in their pipes or rides which can often be easily repaired.

Presented in this section is a case study about a leak detection and repair operation at Sea World. It took many months and some expensive investigation to locate a major leak in one of its rides - in the end though, the exercise proved worthwhile with the theme park's water consumption and related expenses reduced once the leak was repaired.

Value in monitoring

Many hotel engineers regularly record their hotel's water consumption - some daily, some weekly. By consistently monitoring consumption and developing a history of their hotel's water use, they are subsequently able to identify possible leaks if consumption figures increase or spike at traditionally low water use periods, for example late night/early morning. If water use figures begin to noticeably increase over days, weeks or a month, it may also be a signal that some leak detective work is required.

"It took many months and some expensive investigation to locate a major leak in one of its rides - in the end though, the exercise proved worthwhile with the theme park's water consumption and related expenses reduced once the leak was repaired".

Council leak detection equipment

Sea World

Leak detection

The information for this case study has come directly from an interview and questionnaire with the chief engineer of Sea World. His assistance in the development of this case study is gratefully acknowledged.

Overview

- Address:
  Sea World Drive, Main Beach, 4215
- Area:
  61 acres with 5-10 acres of landscaping
- Highest water use:
  Filtration, backwashing and daily washing of the park area. Other water use is for the defrosting of fish to feed the animals, swimming pool evaporation and kitchen outlets.
- Variables
  Marine theme park
- Annual Water Consumption:
  Approximately 200 million litres for 1994\95

Background

Sea World has progressively been installing water conservation devices throughout all departments including automatic flush control toilets for urinals and automation of the sprinkler system for the gardens (which has increased from 25 percent to 75 percent automation in the last nine years).

The theme park is currently testing dropping valves and an energy and water conservation system for appropriateness to their situation and needs.

They employ a staff member who has completed specific training in water conservation and who works on leak detection and water conservation improvements at the theme park.

Sea World has undertaken a major leak detection program on their Bermuda Triangle ride, which eventually took 18 months of investigation to complete. During that time, large amounts of excess water were consumed by the ride. Sea World is now working towards minimising their excess water and effectively conserving water.

"In order to discover the location of the water leak, Sea World utilised all possible methods of leak detection including: borrowing equipment from the Gold Coast City Council and private companies, audio monitoring, cameras inside pipes, divers inside pipes and videoing."

Planning and implementation

In order to discover the location of the water leak, Sea World utilised all possible methods of leak detection including: borrowing equipment from the Gold Coast City Council and private companies, audio monitoring, cameras inside pipes, divers inside pipes and videoing. The procedure was to isolate the leaking pipelines even if the leaking could not be stopped.

The plan was implemented via recommendations made in the park's report on water conservation management.

Following the report's release a number of recommendations have been implemented including the installation of:

- Automatic flush toilet devices
- Dual flush toilets
- Automated irrigation

The leak detection plan was approved by Sea World's financial controller and upper management because of their support in significantly reducing the amount of water used in the park.

The main constraint was allocating time to observing possible leakage situations. The park opens daily between 9 am and 5 pm and the detection operation had to be undertaken after these hours.

Because of water wastage and subsequent costs caused particularly by the Bermuda Triangle leak, it will be difficult for Sea World to precisely estimate the savings from installation of water saving devices in the short term.

Over time though, the theme park is confident its combination of water conserving measures will significantly reduce water consumption and costs.

Monitoring of equipment is now undertaken on a weekly basis and more often if the need arises. It is done by one staff member.

Payback details

Sea World estimates a 12 month payback for its major water leakage program and estimates significant savings in the theme park's total water bill.

For other water conserving devices recently installed, it estimates a one to three year payback.

Results

Sea World is expecting the combined effort of water conserving devices and leak repair to bring about a significant reduction in their water bill.

Next steps

Continuing monitoring and upgrading of water conserving devices and equipment.

Evaluation

Sea World is now working to optimise its water use in many different ways.

A program of constant monitoring of equipment for leaks, maintenance of equipment and facilities and a gradual upgrading of water saving devices and procedures throughout the park is now well underway.

Further information

For further information about Sea World's water conservation measures including leak detection, contact:

Dennis Fountain
Chief Engineer
Sea World Drive
Main Beach 4215
Ph: (07) 55 882 185

"A program of constant monitoring of equipment for leaks, maintenance of equipment and facilities and a gradual upgrading of water saving devices and procedures throughout the park is now well underway."

Water meter use and installation

Introduction

All Gold Coast properties have a water meter installed within their boundary which is read annually (or more), by a Gold Coast City Council water meter reader. It is this information which is used by Council to determine water charges to hotels (and residences, industry etc.).

While this meter will indicate an establishment's total annual water consumption, as previously mentioned it can be very useful to use submeters to monitor water usage within each department of a hotel in order to gather information about how and how much water is specifically used in kitchens, laundries, guest rooms and landscaping departments for example.

This information can ultimately assist in developing an informed decision making process around the purchase of water conserving equipment as well as give staff in relevant departments an accurate idea of their water consumption and how they can conserve water through their work practices.

Once water conservation technologies or work practices are installed or underway, the meters can assist staff to measure the gains made and the financial payback and savings for the hotel.

Inter.Continental Hotel Group

The International Hotels Environment Initiative (1993) outlines one such case study with the Inter.Continental Hotel Group in *Environmental Management for Hotels - The industry guide to best practice:*

"In a pilot project the Inter.Continental group installed gas, electricity and water meters in individual departments in three of its hotels, to assess the potential for financial savings.

Under this scheme, departments were charged for their energy consumption and held accountable for improving performance. (Sub meters had been installed in the majority of hotels in the course of previous energy and water audits).

"Once water conservation technologies or work practices are installed or underway, the meters can assist staff to measure the gains made and the financial payback and savings for the hotel."

Benchmarks were established and the amount of waste or inefficiency calculated for each department, enabling realistic targets to be set.

Hotel general managers were requested to continue with the installation of meters and the scheme was extended to 75 percent of hotels. Initial technical problems were ironed out, and the benefits of the scheme became clear - of the $5,000,000 saved (4 percent each year for 3 consecutive years) in 76 hotels since the campaign started, approximately 60 percent can be attributed to this approach.

A wealth of technical data and feedback from the hotels has provided valuable information for setting future targets and priorities" (IHEI, 1993, p53).

The installation of departmental water meters can be an excellent way of involving many hotel staff and managers. As the IHEI *Green Hotelier* states:

"Water involves everyone. Our audits suggest that all departments must be included in water management.

The traditional restriction was that water management was for the chief engineer only. This deprives hotel management of the wonderful potential of employees' knowledge, ideas and energy.

Why should a laundry manager, steward or chef worry about water consumption if they are not responsible for it?

It is essential to delegate authority, and benchmarking must be applied to individual departments so that performance can be related to good practice" (IHEI, 1995, p19).

Installing water meters in hotel departments can be a little tricky depending on the internal hotel infrastructure. Here are some basic steps to consider:

- Know your water system and how it works internally, how the lines interconnect. If necessary conduct a network analysis.
- Select the area/department you would like to monitor.
- Decide if you need to isolate this area and if so, how that should occur. Consider whether this isolation will have any effect on the total water system. Ensure an adequate supply is available from an alternative source if necessary (you may need to install a stop valve where you want to isolate the system. Clearly define and record where stop valves are installed and what they're for and inform relevant staff).
- Install the meter in the appropriate area and run the necessary water consumption tests.

"Why should a laundry manager, steward or chef worry about water consumption if they are not responsible for it?

It is essential to delegate authority, and benchmarking must be applied to individual departments so that performance can be related to good practice"IHEH.

Triple A rating scheme

Equipment testing procedures

Introduction

Every hotel and resort can have different needs when it comes to water conservation equipment and technology. What works for one establishment may not work for another, given variables such as building height and layout, water supply system details and floor area, right through to accommodation rating and guest service philosophy.

It is therefore very important that prior to deciding upon and installing water conserving equipment, you test it out in your own situation.

You may choose to test two or more systems and compare their operation as our Sheraton Mirage case study details. Or you may choose to test one product you are interested in to ensure that it will meet your standards and needs, as the Hyatt Regency Sanctuary Cove did with water conserving shower roses.

By testing equipment:

- You will see the equipment in action.
- You will have an increased understanding of its usefulness in your unique situation.
- You will be able to gather important operating data which can assist your presentation to upper management should you pursue its installation.

In the end, testing equipment means more information and better informed decision making processes. You, your department, your guests and your hotel will be the winners.

"It is therefore very important that prior to deciding upon and installing water conserving equipment, you test it out in your own situation."

Sheraton Mirage

Equipment testing Procedures

The information for this case study has come directly from an interview and questionnaire with the chief engineer of the Sheraton Mirage Hotel. His assistance in the development of this case study is gratefully acknowledged.

Overview

The Sheraton Mirage Gold Coast is located on Sea World Drive at The Spit. It is a 293 room, five star hotel with a floor area of 22,893m². Its occupancy is approximately 90 percent in the high season and 60 percent in June and July - its low season. Its main guest markets are Japanese tours, convention groups, family and holiday makers.

The Sheraton Mirage currently has only one water meter for the entire hotel and is unable to detail water use in the hotel, though these departments are the highest water consumers:

- Guest rooms
- Landscaping
- Kitchen
- Laundry (operating for 15 hours per day)

The hotel has one main kitchen level which incorporates a bakery, food preparation area, banquet kitchen and a restaurant kitchen. There is a second restaurant kitchen in a separate area.

Total site area is 10.5 ha including a public sports centre, freshwater lagoons which cover 5,500m2 of water area and large landscaped areas with potable water irrigation. The hotel is low rise and with its close proximity to the beach, experiences a prevailing onshore wind. It is believed because of this wind, a high degree of evaporation occurs in the lagoons.

The hotel's chief engineer has embarked on an extensive resource monitoring program in order to track resource consumption and simultaneously account for hotel variables such as occupancy, food covers, laundry pieces etc. He has now gathered as much information as possible from 1993-95 and even plans to make links with the Bureau of Meteorology in order to track natural factors such as wind rates and evaporation.

"The hotel's chief engineer has embarked on an extensive resource monitoring program in order to track resource consumption."

The ultimate aim is to provide historical data which can assist in the hotel's decision making processes regarding resource consumption and the installation of appropriate technology.

Annual water consumption is approximately 216,000 Kl with a cost of $113,332 in standard rates and $51,282 in excess rates. Total cost is $164,614 per annum. The hotel is currently charged only for water consumption not for trade waste.

Background

Beginning in December 1995, the Sheraton Mirage planned to trial two water conserving technologies in guest rooms to determine the most appropriate for installation in the hotel. A trial of this depth aligns with the chief engineer's data collection program on resource use and will, he believes, ensure the hotel continues to address the Sheraton Group's environmental policy as well as ensure the most cost effective and appropriate technology is installed in the hotel.

The aim of such installation is to conserve water and energy in guest rooms (without compromising guest service), which will lead to financial savings on water and power supply. (As mentioned previously, the Sheraton Mirage is currently charged on water supply only).

Important to the hotel as well, is the positive image its resource conservation measures will present to both the community and the hotel industry.

Part of the Engineering Department's operating philosophy is to inform staff of the running costs of the hotel in order to encourage a resource conservation culture. It works closely with the hotel's environment committee to channel key information to staff.

Planning and implementation

The Engineering Department planned to install hot and cold water meters into three high occupancy, popular rooms.

One room became the control room while the other two rooms each had a particular water and energy conserving device or technology installed.

Two test procedures were to be undertaken:

- Testing purely for water consumption with the same use of showers, baths, toilets and hand basins for all three rooms. Water meters were read at the conclusion of the trial to determine the most resource efficient applications. This was undertaken in less than one day and in conjunction with the Gold Coast City Council's WaterWise program.
- Testing for water and energy consumption and guest interaction with technologies and service standards. Here, the Sheraton Mirage recorded both water consumption and variables such as number of guests in each room, length of stay, frequency of room letting and even the type of guests, for example family groups, couples, tour groups etc. This occurred over the peak holiday season between December and May/April.

The plan is subsequently to develop a proposal and installation plan revolving around the most suitable equipment and then install all technology during the hotel's low season.

The hotel is very conscious that guests receive their five star perceptions of standards and service. Alongside this perception are particular hotel minimum standards, for example shower roses with a minimum flow of 12 litres per minute.

The hotel will ensure hot water use is also metered in the trial because they can register hot water flow rates and calculate how much energy is used to heat that hot water and the costs of replacing it. As the Sheraton Mirage uses electric hot water, this component of the test will be vital to them in estimating the payback time frame on installation of water and energy saving technology. At this stage they believe it will be approximately 15 months, incorporating power supply.

"Important to the hotel as well, is the positive image its resource conservation measures will present to both the community and the hotel industry."

Engineering estimated total installation time of trial meters and equipment at one full day. Due to the design of the Sheraton Mirage's plumbing system, the line to each room was frozen with liquid nitrogen in order to allow meter installation. One plumber only was needed to do all installation work.

Why test so thoroughly?

The Sheraton Mirage may spend approximately $130,000 or more on the installation of its water and energy conserving technology in guest rooms and wants to be sure that in their own unique hotel, it will operate as effectively as possible.

As well, in negotiating such initiatives with the hotel's Financial controller and general manager, the chief engineer believes it is crucial to present as much accurate financial information as possible.

He said, "If real savings can be proven in the short term, the Financial controller and general manager will be totally supportive.

We need to prove it because we're talking about a lot of dollars to install specific resource saving systems like this".

Trial cost

The cost of this trial was just over $600 for the water meters. The manufacturers of the water conserving technology involved, supplied necessary components free of charge and the Sheraton Mirage installed the equipment in-house. They will leave the meters and technology operating in the rooms when the trial is completed to monitor ongoing results. (Because of the trial's low cost, the chief engineer has not required upper management permission to go ahead).

Involvement of other departments

The Engineering Department is monitoring guest feedback from those staying in the trial rooms in order to ensure five star service is maintained. They have liaised with front office staff so guests can comment on the room's facilities - during their check out. The hotel does not notify guests earlier about the trial to avoid creating potentially negative or unrealistic guest perceptions or expectations.

Engineering has also liaised with the hotel's Housekeeping Department in order to monitor the meters as each room becomes vacant. In conjunction with housekeeping, a system for monitoring and communication is to be fully developed. The general manager will also be fully informed of the trial program.

"Engineering has also liaised with the hotel's Housekeeping Department in order to monitor the meters as each room becomes vacant. In conjunction with housekeeping, a system for monitoring and communication is to be fully developed."

Potential pitfalls

The chief engineer believes it is crucial that the hotel's water is controlled, not restricted too much. He said, "It's easy to go along and save water - we can just reduce the amount of water that goes into a room - it's very easy. But we're not giving guests what they want and if that happens then we're not going to get the business... You've got to be careful how you select your flow rate".

He also believes the type of shower rose is an important factor in the delivery of a five star shower for guests.

That will need to be carefully matched with the pressure and flow rate of water for guest rooms.

Trial results of both systems will not be released to competing manufacturers because of trade ethics. Instead, the results from each system will be communicated only to the relevant company in the context of its operation within the Sheraton Mirage building. In its collation and write up of test results, involved companies will remain confidential with no company or product names used.

Further information

For further information about the Sheraton Mirage's product trialling procedures contact:

Stuart Deacon
Chief Engineer
P.O. Box 2595
Southport 4215
Ph: (07) 55 911 488

Staff training and environment committees

".. many establishments now recognise that educating staff about water conservation will over time, build up a level of awareness and expertise throughout the entire industry. "

Introduction

Staff training programs are an integral component of water conservation success in the hotel industry. This section presents ideas on a number of levels, from a staff induction program at Hotel Conrad Jupiters Casino to staff environment committees operating at the Sheraton Mirage Hotel and again, at Hotel Conrad Jupiters Casino.

Education of staff about water conservation can occur through:

- Induction training, where staff are briefed about the establishment's water conservation initiatives alongside general policy and procedure. In this instance, water conservation is presented as an integral part of the hotel's operations and new staff are expected to adhere to current procedures
- Ongoing training via:
  - Self directed team operations
  - Regular departmental briefings
  - Refresher training
  - Continuous improvement procedures
  - Staff newsletters
  - Staff notice boards

Locally, nationally and internationally, hotels are recognising that water conservation practices by staff and management are part of their day-to-day quality assurance procedures.

While high levels of staff turnover are a real concern for training within the hospitality industry, many establishments now recognise that educating staff about water conservation will over time, build up a level of awareness and expertise throughout the entire industry.

Other benefits

Other benefits from staff training in water conservation include:

- Staff empowerment and increased motivation as staff contribute personal values and expertise to the organisation

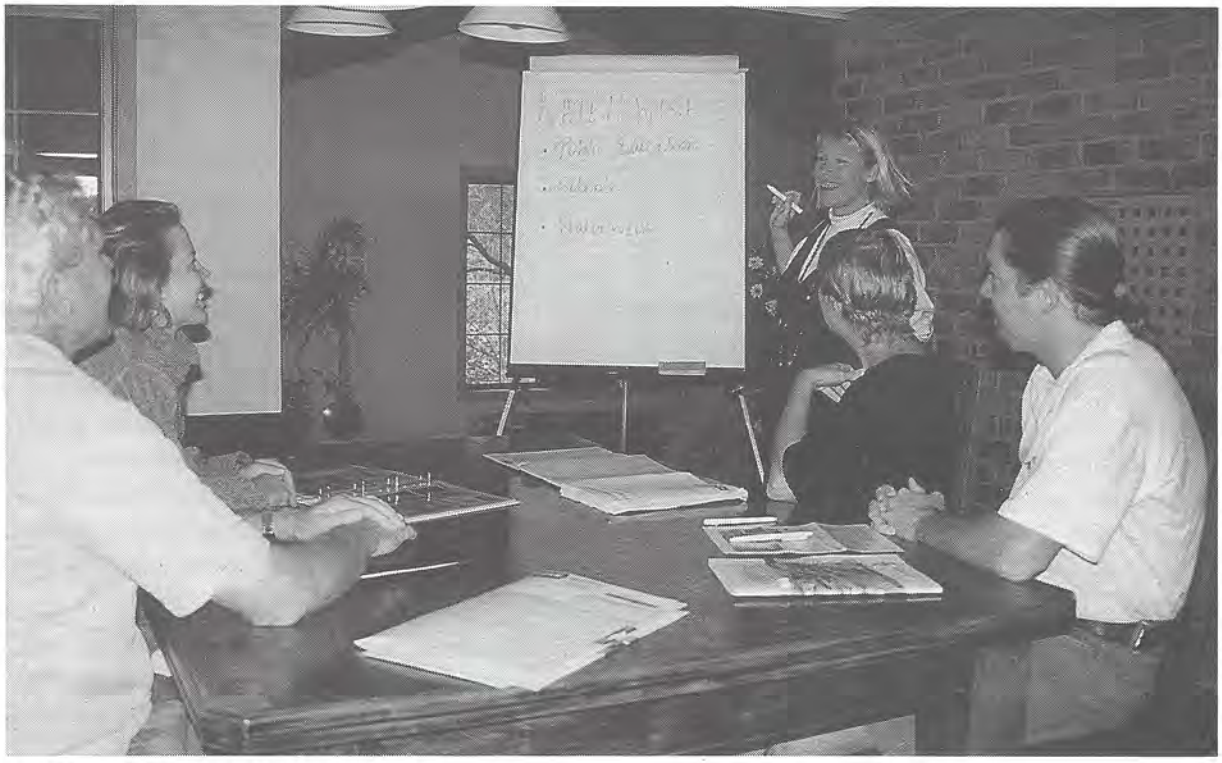
- Increased efficiency in staff and hotel operations
- Reduced costs for water and energy supply
- Facilitation of a continuous improvement ethic among staff
- Increased communication and dialogue between staff and management and between different hotel departments

The International Hotels Environment Initiative in the *Green Hotelier* (1995) outlines two relevant examples of staff training and involvement in water conservation. As mentioned in this manual's Housekeeping Section (p50):

"The Abu Jihahi Corniche Hilton International has focused on training staff in conservation techniques. Previously, it was common practice for housekeepers to flush the toilet four times while cleaning it. Through environmental awareness sessions, housekeepers learned the impact of their actions and now flush toilets only once during cleaning. Environmental management programs can also be a catalyst for boosting morale and facilitating a continuous improvement ethic" (*Green Hotelier, 1995*, p13).

"As part of an aggressive campaign by Holiday Inn, the Bangkok Crowne Plaza has implemented a program which offers a monthly employee reward for suggestions which create 'Environmental Improvement' and operational cost savings" (Green Hotelier, 1995, p14).

For further information about WaterWise training, please contact:
David Wiskar
WaterWise Consultant
Department of Natural Resources
GPO Box 2454
Brisbane 4001
Ph: (07) 3224 2716



Staff training session by the author

Hotel Conrad Jupiters Casino

Facility Environment Committee (FEC)

The information contained in this case study has come directly from an interview with the Hotel Manager of Hotel Conrad Jupiters Casino. His assistance in the development of this case study is gratefully acknowledged.

Overview

As previously mentioned, the Hotel Conrad Jupiters Casino at Broadbeach is a 609 room, full service, four star establishment.

It incorporates a public casino, conference centre, hotel, large gardens, fitness centre, swimming pool and a showroom. It is situated on Broadbeach Island, surrounded by canals and river systems. It also has seven kitchens, six restaurants and ten public bars. It has a floor area of 64,238 m2 as well as car parks of 53,400m2.

Conrad Jupiters is part of Conrad International, the international subsidiary of Hilton Hotels Corporation USA and is owned by Jupiters Limited.

Background

In June 1995 Jupiters Limited, owning company for the Hotel Conrad Jupiters Casino and the Conrad Treasury Hotel and Casino, finalised its *Environmental Policy, Practices and Procedures Manual* in order to address the Environmental Protection Act 1994 (EPA). (All organisations involved in "Environmentally Relevant Activities" are required to register with the Department of Environment and Heritage - for further information about the EPA see this Manual's Reference Section).

As a result of this legislation and Conrad International and Jupiters Ltd's environment policy, an Executive Environment Committee (EEC) was formed in June 1995 involving the owning company, legal representatives and the general manager and Hotel Manager of Conrad Treasury and Conrad Jupiters respectively.

As well, at Conrad Jupiters a Facility Environment Committee (FEC) was formed at the same time involving the Hotel Manager, representatives from Support Services, Engineering, Human Resources, Security and Health Care plus the Executive Chef and Back of House Manager. All departments involved have operations relevant to the EPA and it is the most relevant people from each department in this context, who are members of the FEC.

*"In June 1995 Jupiters Limited ... finalised its **Environmental Policy, Practices and Procedures Manual** in order to address the Environmental Protection Act 1994."*

The aim of the EEC and FEC as well as the Jupiter's Environment Policy, is to ensure compliance to the EPA and allow the organisation to undertake proactive environmental measures throughout its facilities. It provides a structure for these aims to occur.

Planning and Implementation

Jupiters Limited spent approximately five to six months developing its *Environmental Policy, Practices and Procedures Manual.* When it was finalised in June 1995, the EEC and FEC were implemented as key components of the organisation's environment policy.

Focus areas of the policy include noise, air quality and waste management. Conrad International and Jupiters Limited perceive themselves as leaders in Australia's gaming industry and are keen to position themselves simultaneously as environmental leaders of industry.

The EEC meets every two months while the FEC expects to meet monthly. Its emphasis is on the EPA and broader environmental issues affecting the hotel

casino - including water and energy conservation and waste minimisation.

Meeting structure for the FEC is:

- Minutes from last meeting - review and Matters Arising from the Minutes
- Events of Non Compliance (to the EPA) for example air quality, chemical waste disposal
- Monthly Committee Report - updating progress on EPA matters
- Specialist reports from Departments for example:
  - Back of house hosing and car park cleaning
  - Support Services - Queensland University composting program
  - Support Services - refrigerated compactor
  - Paper recycling started
  - WaterWise and Conrad Jupiter's involvement (The aim is to achieve a common level of understanding and consensus regarding actions the organisation is taking on current environmental issues)
- Education - updates on current courses and professional development opportunities in the environmental area
- General business and organisation of next meeting.

FEC meetings take approximately one hour to complete.

The committee process is an important one to Conrad Jupiters in its efforts to unite an environmental focus for their diverse departments and to share information throughout the entire facility. It increases understanding of important issues, it increases the effectiveness of current structures to address environmental initiatives, it increases management and consequently line staff support for environmental action. As well, it has helped increase staff and general interest in Conrad Jupiters and participation and co-operation with current environmental projects is increasing.

Communication throughout the hotel about the EPA and organisational initiatives is a high priority to the FEC and an upcoming project in this area is the installation of environmental staff notice boards throughout the hotel to highlight current environmental projects as well as general environmental information. The FEC also plans to have a regular environment column in Conrad Jupiter's staff newsletter.

"The committee process is an important one to Conrad Jupiters in its efforts to unite an environmental focus for their diverse departments."

Results

The FEC is confident of the financial benefits in Conrad Jupiters becoming more environmentally friendly, for example as new technologies in water and energy conservation are brought on line, financial paybacks will occur in the short, medium and long term.

It also believes there will be non financial benefits too as its environmental initiatives come on line and Conrad Jupiters is seen to be a leader in environmental management. As a major Gold Coast employer, Conrad Jupiters is anticipating an ability to pilot and model environmental initiatives both in the hospitality/tourism industry and potentially in other industries too.

Projects now underway or complete within the hotel casino include:

- Installation of water and energy conservation system
- Installation of energy efficient lighting in the car park
- Refrigerated compactor for more efficient waste disposal
- Recycling of cardboard, aluminium, glass and paper
- Pilot composting program in conjunction with Queensland University and Rocky Point Sugar Mill
- Removal of kitchen waste grinders and subsequent improvements in the quality of trade waste (program undertaken with Queensland University).

Lessons learned

While the FEC is a recent environmental initiative at Conrad Jupiters, two key developments have already emerged for the organisation:

- Via the FEC's operation, staff and management interest and co-operation in internal environment programs has increased
- The operation of the FEC enables a united and co-ordinated organisational approach to the EPA and environmental issues

Next steps

According to Conrad Jupiters, undertaking environmental initiatives is now a way of life for the organisation. It believes it will continue to address environmental legislation as well as be proactive about future issues and actively look for opportunities to develop in-house environmental initiatives.

It is working to ensure access to in-house and external environmental expertise and support employees who develop their skills in this area.

It aims to be at the forefront of industry particularly in the areas of air quality, noise minimisation and waste management and is committed to addressing these issues in a focused and co-ordinated manner.

More information

For more information about Conrad Jupiters FEC contact:

Mr Bob Lohrmann
Hotel Manager - Hotel Conrad Jupiters Casino
Broadbeach Island
Broadbeach 4218
Ph: (07) 55 92 1133

"According to Conrad Jupiters, undertaking environmental initiatives is now a way of life for the organisation."

Staff briefing session Conrad Jupiters

Sheraton Mirage

Environment committee

The information for this case study has come directly from an interview with the Human Resources Officer of the Sheraton Mirage Gold Coast Hotel. Her assistance in the development of this case study is gratefully acknowledged.

Overview

As previously mentioned the Sheraton Mirage Gold Coast is located on Sea World Drive at The Spit. It is a 293 room, five star hotel with a floor area of 22,893m^2. Its occupancy is approximately 90 percent in the high season and 60 percent in June and July - its low season. Its main guest markets are Japanese tours, convention groups, family and holiday makers.

The Sheraton Mirage currently has only one water meter for the entire hotel and is unable to accurately detail water use in different areas of the hotel, However, the departments that are the highest water consumers are:

- Guest rooms
- Landscaping
- Kitchen
- Laundry (operating for 15 hours per day)

The hotel has one main kitchen level which incorporates a bakery, food preparation area, banquet kitchen and a restaurant kitchen. There is a second restaurant kitchen in a separate area.

Total site area is 10.5 ha including a public sports centre, freshwater lagoons which cover 5,500m^2 of water area and large landscaped areas with potable water irrigation. The hotel is low rise and with its close proximity to the beach, experiences a prevailing onshore wind. It is believed because of this wind, a high degree of evaporation occurs in the lagoons.

The hotel's chief engineer has embarked on an extensive resource monitoring program in order to track resource consumption and simultaneously account for hotel variables such as occupancy, food covers, laundry pieces etc. He has now gathered as much information as possible from 1993-95 and even plans to make links with the Bureau of Meteorology in order to track natural factors such as wind rates and evaporation.

"The hotel's chief engineer has embarked on an extensive resource monitoring program in order to track resource consumption and simultaneously account for hotel variables such as occupancy, food covers, laundry pieces etc."

The ultimate aim is to provide historical data which can assist in the hotel's decision making processes regarding resource consumption and the installation of appropriate technology.

Annual water consumption is approximately 216,000 kL with a cost of $113,332 in standard rates and $51,282 in excess rates. Total cost is $164,614 per annum. The hotel is currently charged only for water consumption not for trade waste.

Background

In 1993, the hotel's Environment Committee was initially developed because of two key initiatives:

- An environmental directive from the hotel's head office in Boston
- Implementation of Total Quality Improvement structures

At the same time, the hotel was developing staff empowerment aims and strategies.

It took approximately 12 months to fully develop and implement an internal Environment Committee, which now involves any interested staff members from all hotel departments including Laundry, Housekeeping, Front Office, Food and Beverage, Human Resources and Engineering.

The HR department is currently the driving force behind the committee, though it aims to delegate ongoing operation to key committee staff in future. The Engineering department also works closely with the committee to communicate its environmental projects to other staff and to assist as much as possible with committee ideas and projects.

Planning and implementation

The Environment Committee usually meets once a fortnight, though meetings are reduced to once a month in peak holiday periods. Its overriding aim is to develop an environmental culture in the Sheraton Mirage which it believes will involve staff in ongoing, small yet significant behaviour changes in their work.

Projects

Projects completed to date include:

- Recycling of cardboard, glass and more recently paper
- Publication of *The Green Sheet*, a staff environment newsletter which overviews both hotel and community projects and issues
- Air quality audit project in conjunction with third year University of Queensland Engineering students
- Energy conservation investigation in the hotel
- Environmental suggestion box for staff
- Distribution of used computer paper to local kindergartens
- Out of date magazines to retirement and aged people's homes
- Environmentally friendly disposal of laundry chemical waste
- Guest signage in bathrooms focusing on bath water overflows (this signage is soon to be updated)
- Support for local environment group - Gold Coast and Hinterland Environment Council
- Environmental thought for the day on staff notice boards
- As well, the hotel's Engineering department has embarked on CFC free refrigeration programs, energy and water conservation programs and a major lagoon maintenance program.

The Environment Committee usually meets between 3-4 pm which is the hotel's shift change over time.

The meeting time is designed to allow staff easy access to the meeting either at the end or the beginning of their shifts. The Sheraton Mirage also pays staff for one hour of their attendance at the meetings or for hotel environmental project work.

"The Environment Committee usually meets between 3-4 pm which is the hotel's shift change over time."

Two more environmental projects are currently under management consideration:

- Updated guest signage regarding reuse of towels which the Committee believes can potentially save the hotel up to two towel washes or 900 towels per day, a huge saving in water and energy consumption in the laundry
- Guest option to have newspapers. Traditionally, the hotel offers guests a choice of newspapers during their stay. A new suggestion is asking guests if they would like a newspaper at all.

The Environment Committee is an ongoing team in the Sheraton Mirage's framework of Total Quality Improvement teams. In other situations, teams are developed in the short term to solve particular hotel issues like breakages or door damage. All teams are encouraged to research their issues, make a presentation to the Executive Committee to gain approval for their particular project based on their research, and when approval is gained to then implement their solution within the five star context of the hotel.

It is planned that within the next two years the hotel will have seven or eight such teams operating at any one time. Team members will be paid for some of their out of work hours team involvement. In April/May 1996, as the hotel moves into its slower season, preparation for the quality teams will move into full swing.

The hotel is looking at including within their promotion criteria the need for applicants to have worked at some stage in their Sheraton Mirage career, as a team leader or active team member. The hotel has recognised the teams as a positive way to develop potential managers.

Lessons learned

The Sheraton Mirage has recognised the vital need to communicate their projects and successes clearly to all hotel staff members and in that way, present an active and effective image throughout the hotel.

They believe it is crucial for staff to get excited about their work, in order to start creating an environmental culture. They have found the environmental newsletter *The Green Sheet*, to be one useful way of informing staff of their work in a fun and interesting way.

They have also learned about the importance of briefing or educating the hotel's management team about their role and activities in order to establish ongoing management support.

They aim to encourage management in all departments to include environmental information in their daily staff briefings, particularly when it concerns changes in staff behaviour.

The Environment Committee has learned that staff can get very enthusiastic about hotel projects and work 'smart' to support those projects if it can make their work practices easier.

They continue to keep this lesson in mind in planning their future environmental projects.

Benefits

- Increased internal communication between staff and management
- Cross fertilisation of information and knowledge between hotel departments
- Central departments like Human Resources are able to increase their understanding of the day-to-day operations of different hotel departments
- Improvement of relationships between departments as greater understanding of different operations is achieved
- Increased staff morale where people's expertise is acknowledged, utilised and even extended

Further information

For further information about the Sheraton Mirage Hotel's Environment Committee contact:

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Ph: (07) 5591 1488

Sheraton Mirage

Hotel Conrad Jupiters Casino

Trial staff training

The information contained in this case study has been collated through ongoing discussion and planning between WaterWise Gold Coast, the Training Manager and Human Resources Director - Hotel Conrad Jupiters Casino. Their assistance in the development of the case study is gratefully acknowledged.

Overview

As previously mentioned, the Hotel Conrad Jupiters Casino at Broadbeach is a 609 room, full service, four star establishment. It incorporates a public casino, conference centre, hotel, large gardens, fitness centre, swimming pool and showroom. It is situated on Broadbeach Island, surrounded by canals and river systems. It also has seven kitchens, six restaurants and ten public bars. It has a floor area of 64,238 m^2 as well as car parks of 53,400m^2.

Hotel Conrad Jupiters is part of Conrad International, the international subsidiary of Hilton Hotels Corporation USA and is owned by Jupiters Limited.

In 1994/95 total water consumption was 374,205 kL at a total cost of $45,317. Trade waste costs amounted to $77,106.

Background

In August 1995, two Conrad Jupiters staff members became involved in the WaterWise Gold Coast Hospitality Industry Program - the assistant chief engineer and the support services manager. At the same time, the Conrad Jupiters Facility Environment Committee (FEC), was becoming operational and as well as involving the assistant chief engineer and support services manager, also included the director of human resources.

When WaterWise was discussed at an early FEC meeting, it was decided that both engineering and human resources would work closely with WaterWise Gold Coast.

In line with this decision the Human Resources Department undertook to:

- Incorporate a WaterWise segment in the Hotel Casino's staff induction training program
- Install WaterWise staff notice boards as part of the establishment's environmental awareness program for staff
- Explore the possibility of incorporating water conservation into one of its self directed team operations for continuous improvement, for example the Housekeeping team

The director of Human Resources, the Training Manager and WaterWise Gold Coast met to discuss these initiatives in detail and in the ensuing months have focused on the development and installation of WaterWise notice boards in particular. From mid 1996, it is envisaged that WaterWise will be included in the Hotel Casino's updated staff induction training. It will be trialled for approximately one month, then reviewed and finalised as an on-going component of Conrad Jupiters training.

Conrad Jupiters is confident that the three forms of staff training mentioned above will enhance staff morale and motivation and sit appropriately within the Hotel Casino's staff empowerment and guest service programs. In the end, it will also prove to be cost effective for the establishment.

For further information about the Hotel Conrad Jupiters Casino Staff Training Program contact:

Sandy Deans
Director of Human Resources or
David Feachnie
Training Manager
Hotel Conrad Jupiters Casino
Broadbeach Island
Broadbeach 4218
Ph: (07) 55 928 601

On-the-job training at Hotel Conrad Jupiters Casino

Guest education

Introduction

Many travellers seem to find it easy to forget their good water conserving habits when holidaying.

Yet a 1994 survey in *Lodging Hospitality* (April 1994), does reveal that over 70 percent of travellers surveyed stated that they want to stay in hotels that show concern for the environment.

It seems interest in the environment and environmentally friendly accommodation is high and that the time is right to inform guests of:

- How they can help the environment while staying at your establishment
- What your hotel\resort is doing to help the environment

We have included two examples of guest signage here:

- Bathroom door hanger from the Cairns Hilton Hotel
- Vanity basin pyramid from the Ramada Hotel Surfers Paradise (page 28)

Both signs encourage guests to be environmentally responsible travellers without detracting from the high quality standards of service and accommodation these hotels provide.

Cairns Hilton Bathroom Door Hanger

Green Island Resort

Guest education

According to Harris and Leiper (1995), "The Green Island marketing strategy highlights the environmental aspects of the resort. The Resort's brochure states that the Resort is:

'One of the most environmentally sensitive tourist developments in the world, designed and built with extreme care to preserve the island's delicate environment. (It) has been constructed to be sympathetic to irreplacable natural surroundings which are protected and nurtured with passionate responsibility.'

According to resort management, this message has been significant in attracting guests to the resort as they appreciate the fact that their stay will have minimal impact on the island's environment. This view is however, based on anecdotal information as no formal survey of guests has been conducted. Management also believes that tourists will increasingly ask questions about the environmental practices of their accommodation houses, and that Green Island will be well placed to respond to these" (Harris and Leiper, 1995, p105).

"Green Island Resort also supports the World Wide Fund for Nature (WWFN) in two ways.

First, Green Island Resort provides opportunities for guests to become aware of WWFN and its activities by placing WWFN newsletters and books in public areas within the resort.

Second, guests are given a gift certificate which can be redeemed either as a $10 donation in the guest's name to the WWFN or as a $10 gift from Green Island towards WWFN membership" (Harris and Leiper, 1995, p104).

"The Resort's brochure states that the Resort is:

'One of the most environmentally sensitive tourist developments in the world, designed and built with extreme care to preserve the island's delicate environment.' "

Trade waste and its effect on water consumption

Introduction

The following is a brief overview of the Gold Coast City Council's Trade Waste Policy, together with four case studies of its effect on water consumption. It has been written by the Technical Officer, Gold Coast Water and his contribution to this manual is gratefully acknowledged.

The Gold Coast City Council's Trade Waste Policy caters for two main generators:

- Minor generators
- Major generators

The policy allows for both a quantity and quality charge. However, this report covers only the quantity charge and its relationship and effect on water conservation.

Minor generators

Minor generators are allowed a discharge of 414 kilolitres a year for a standard registration fee of $166.00 paid in advance and calculated as 414 kilolitres @ 40 cents a kilolitre.

The method of calculation of the volume used per annum is as follows:

1. Total water meter reading for the 12 month period
2. From that quantity the following is deducted to determine if the generator is in excess:
   a) 136 kilolitre per water closet
   b) 414 kilolitre (allowable quantity generated)

Should the calculation show the generator to be in excess, the generator is advised that should they be in excess the following year, they will be reclassified as a major generator.

The above procedure has resulted in a significant reduction in the water consumption of minor generators.

In the first year's readings, approximately 15 to 20 percent of minor generators were in excess. This has now been reduced to 2 to 4 percent.

Council believes the fact that minor generators do not wish to be reclassified to the higher rate of $355

"Should the calculation show the (minor) generator to be in excess, the generator is advised that should they be in excess the following year, they will be reclassified as a major generator.

"Where it is considered necessary due to continuous large excess accounts, Council requires the generator to install a flow meter. The figures from the water meter and the flow meter are then used in assessing the situation with regard to water which cannot be accounted for."

for a major generator, acts as the main deterrent.

In addition, at the time of noting that the generator is in excess, Council's Trade Waste Officers assist generators in determining where the excess usage may be and offer advice on how to reduce consumption.

Major Generator

Major generators are allowed a discharge of 888 kilolitres a year for a standard registration fee of $355.00 paid in advance and calculated as 888 kilolitres @ 40 cents a kilolitre. The method of calculation of the volume used per annum is as follows:

1. Total water meter reading for the 12 month period
2. From that quantity the following is deducted to determine if the generator is in excess:
   a) 136 kilolitre per water closet
   b) 888 kilolitre (allowable quantity generated)
   c) Any usage required in the actual manufacture of a product
   d) Wash down water which does not discharge to sewer

Major generators pay 40 cents a kilolitre for all waste generated in excess of the above calculation. Council has found that many major generators doubt the calculated excess.

Where it is considered necessary due to continuous large excess accounts, Council requires the generator to install a flow meter. The figures from the water meter and the flow meter are then used in assessing the situation with regard to water which cannot be accounted for.

Where it is not considered necessary to install a meter, Council has been able to assist generators with a visual inspection of the premises and through previous experience in similar situations, to locate areas in which water is being wasted, for example:

a) Poor maintenance of plumbing fixtures
b) Hidden overflows from pressure relief valve or hot water systems
c) Irrigation systems
d) Washing with fine hoses or hosing down in general.

The following case studies show a dramatic reduction in water usage which would not have occurred were it not for investigation of the system, resulting from the volume of excess trade waste.

Trade Waste Case Study - Pelerman's Barn

The following flows were determined directly from the water meter readings:

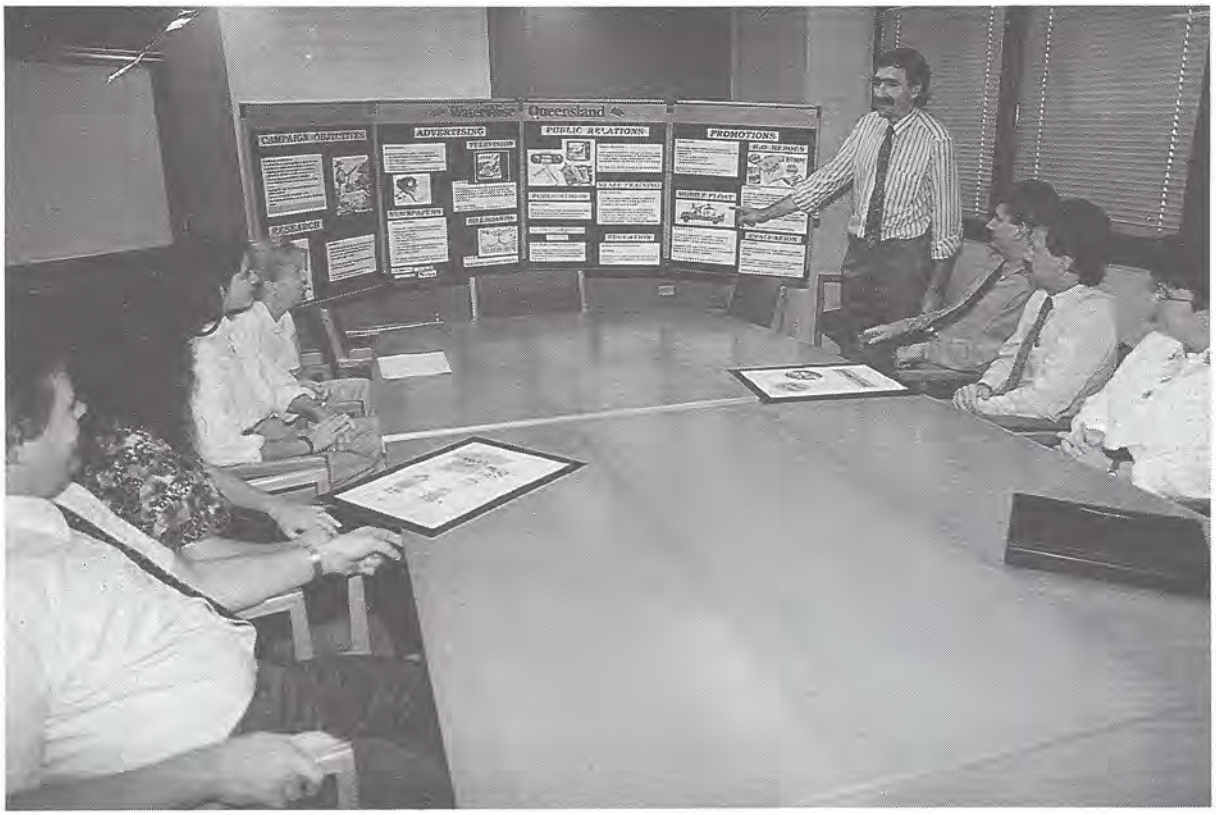
Period	Flow
11\3\91 to 3\3\92	37566 kilolitres
3\3\92 to 5\3\93	41317 kilolitres
5\3\93 to 7\3\94	10 327 kilolitres

Due to an excess trade waste charge account being issued in December 1992, attention was drawn to the fact that the volume of water passing through the meter exceeded the estimated calculated quantity of water for the nature of the business.

Investigations were carried out between management and Council's Trade Waste Inspector and major leakage was found to be occurring in the plumbing system outside the buildings and discharging into stormwater drains. Finding and fixing these leaks - which continued to occur - took considerable time. However, the system was eventually fixed and renewed where required.

The latest readings have shown a reduction of approximately 30,000 kilolitres which is equivalent to a combined saving of approximately $30,000 for excess water and trade waste charges.

"Investigations were carried out between management and Council's Trade Waste Inspector and major leakage was found to be occurring in the plumbing system outside the buildings and discharging into stormwater drains."



Planning session WaterWise Queensland

"After receiving their first excess trade waste account, the Casino conducted a water audit on the hotel section of the premises. "

Council's current excess water, charges 88.9 cents per kilolitre for the first 500 kilolitres and 60.5 cents per kilolitre there after. This equates to a combined saving of approximately $1.00 a kilolitre which is unnecessarily passing through the system and discharging as trade waste.

Trade Waste Case Study - Dreamworld

At the time of implementation of Council's Trade Waste Policy it was noted that Dreamworld's water meter had been operating erratically and had stopped on two occasions. A new meter was installed and in addition, due to the unusual nature of the business, a flow meter was installed to measure trade waste quantities. The cost of supply and installation of a 150 mm diameter magnetic flow meter with a totaliser and flow chart is approximately $20,000.

It was found that after making the usual allowances, there was poor correlation between the two meters. A check was carried out on night usage and it was found that approximately 80 kilolitres of water was passing through the meter during the hours of 8 pm to 5 am.

Investigation of the system showed that the losses were due to poor maintenance of plumbing fixtures such as:

a) Running urinals and toilets
b) Overflows of hot water pressure relief valves into hidden ducting
c) Dripping or running taps
d) Uncontrolled flushing of urinals.

The current water usage for Dreamworld is approximately 96,000 kilolitres a year. Had it not been for maintenance of the system due to the installation of a flow meter for trade waste, it is conservatively estimated that over 25,000 kilolitres of water would be wasted per year.

Trade Waste Case Study - Conrad Jupiters

After receiving their first excess trade waste account, the Casino conducted a water audit on the hotel section of the premises. The Casino advised that a 10 percent reduction in usage was gained. The reduction was mainly attributed to the fact that the flushing valves on the 800 toilets required adjustment to operate at maximum efficiency.

Having obtained a reduction in the initial phase of conservation, the Casino then had a water and energy conservation system installed throughout the hotel section of the complex to help reduce consumption further.

Due to metering problems at the Casino, actual figures on the reduction in usage are unavailable. However, the Casino is satisfied that the work done to date has been effective in reducing consumption.

Management then had Queensland University investigate the commercial side of the Casino and is looking at the possibility of recycling both water and heat from the in-house laundry.

Trade Waste Case Study - Hyatt Regency Sanctuary Cove

Excess trade waste volumes were considerably larger than what would be considered as average for a hotel of this size. The hotel is metered independently from the remainder of Sanctuary Cove and it was possible to compare the potable water flows with trade waste flows.

The system was investigated by Hyatt Management and Council's Trade Waste Officer. Major leaks were found in the garden sprinkler system. As the system was progressively repaired, trade waste excess flow was reduced from 100, 000 kilolitres to 67, 500 kilolitres. The latest excess was 37, 500 kilolitres.

Conclusion

It can be seen from the previous four case studies that significant reductions in the quantity of water passing through the water meter and trade waste flow meter has been achieved. These reductions have resulted in significant dollar savings for Council's consumers. While the savings in the case studies are directly related to poor maintenance or workmanship and not industry usage for production, the figures show the importance of maintaining plumbing fixtures in good order and the effect this can have on water usage.

Industry which requires trade waste permits, especially major generators, are also high water consumers. Any savings which can be achieved in this area form a vital part of the WaterWise in the Workplace program.

More detailed information relating to the above case studies and others can be provided by Council's Trade Waste Officer.

For further information about Gold Coast City Council's Trade Waste Policy contact:

David Zinn
Gold Coast City Council
PO Box 5042
Gold Coast Mail Centre 4217
Ph: (07) 55 816 000

"ESD is development which improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends" (DEH).

Section 3 Resources

Environmental Protection Act 1994

The following article has been reproduced from the Department of Environment and Heritage Brochure *Environment News*, BP817-2 February 1995 for the purpose of discussion.

Introduction

"The adverse effects of human activities on the environment have accelerated in the last few decades. Desertification, ozone layer depletion and extinction of species are some of the serious problems affecting the planet today. Consequently, most nations are giving priority to the protection of the environment. Environmental legislation must be effective if sustainable development is to be achieved.

In Australia, the principles of ecologically sustainable development (ESD) are defined in the National Strategy for Ecologically Sustainable Development. ESD is development which improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends.

To meet the challenge of protecting the environment in a way that balances economic development and ecological protection, the Queensland Government has introduced legislation to reform environmental management throughout the State. The objectives of the legislation are to protect the environment, to remove uncertainty regarding administrative responsibility for environmental protection and to allow integration of environmental protection and resource and infrastructure development.

New legislation

To ensure the legal framework can accommodate the principles of ecologically sustainable development, the Government has introduced the Environmental Protection Act 1994 to replace the Clean Air, Clean Waters, Noise Abatement, Litter and State Environmental Acts.

This new legislation provides all Government departments with a mechanism to incorporate environmental factors into their decision making.

The Environmental Protection Act:

- integrates waste minimisation with the environmental management planning process;
- reduces red tape by allowing businesses to develop their own environmental management programs to ensure compliance with the law;
- reduces costs to responsible environmental managers by reducing government regulations;
- provides nationwide consistency of environmental requirements to assist business;
- provides a legal framework to efficiently achieve ecologically sustainable development, with strict requirements to consider ESD principles and other relevant matters when decisions are made at by state and local governments;
- provides flexibility to address new threats to the environment by establishing a social consensus on the most appropriate response from government and the community;
- provides significantly higher penalties, including imprisonment in some cases, for environmental crimes;
- decentralises administration and provides for service delivery by other departments and local government (the administering authorities);
- enables the most efficient use of resources by identifying urgent and irreversible threats in annual reports to Parliament and regular "State of the Environment" reports.

To encourage businesses to develop new, cleaner technologies and adopt better environmental management practices, Queensland is expanding the range of ways to achieve maximum environmental protection. The new legislation will encourage self-regulation, as well as co-operate relations between administering authorities, business and the community.

"To encourage businesses to develop new, cleaner technologies and adopt better environmental management practices, Queensland is expanding the range of ways to achieve maximum environmental protection" (DEH).

Environmental protection policies

The legislation provides for proclamation of subordinate legislation in the form of legally binding environmental protection policies (EPPs). These provide issue-specific standards and criteria for particular environmental problems. Policies can cover the whole State or smaller areas, such as an airshed or catchment.

The first policies being developed set standards for air, water and noise. Policies on waste and the

Brisbane River are expected to follow closely. The environmental protection policies may also be used by other departments to fulfil their environmental responsibilities, if their own legislation does not provide adequate environmental protection.

Each environmental protection policy must be developed through two rounds of public consultation to ensure the strategies are practical, environmentally efficient and socially acceptable.

Licences and approvals

The environmental impact of most activities can be minimised by sound environmental planning at the approval stage. However some activities are environmentally risky and require accountability for their management through a licensing system.

The legislation includes a regulation listing "environmentally relevant activities", which have been identified on the basis of potential environmental risk. These activities must not be undertaken without authorisation by the administering authority.

All applications for authorisation will be determined by the administering authority, taking into account:

- the principles of ecologically sustainable development;
- any relevant environmental protection policy;
- Commonwealth, State and local government plans, standards, agreements or requirements;
- any relevant environmental impact studies, assessment or report;
- the character, resilience and qualities of the receiving environment;
- all submissions made by interested parties;
- the financial implications of the authorisation requirements, as they relate to that sector of industry;
- the public interest.

Standard licence conditions have been prepared so that the environmental requirements can be applied consistently, no matter which administering authority is in charge.

The licensing system has several new features which increase its environmental and economic efficiency:

- licences are for the life of the activity (with an annual administration fee payable) unless the licensee is causing substantial environmental harm or otherwise contravenes the legislation;
- the number of licences required can be reduced substantially by consolidating the current pollution control licences for one site into a single environmental licence;
- details of all licences are held on the Environmental Register and are publicly available. Copies of entries on the Register can be inspected and bought from the administering authority;
- licence conditions require strict compliance and will be enforced.

"The first policies being developed set standards for air, water and noise" (DEH).

The Department of Environment and Heritage is also examining a proposal to introduce a graded licensing system to reward good environmental management. The system will encourage self-regulation and decrease regulatory costs by allowing a licensee to move to a higher grade of licence as performance improves.

Environmental management programs

Enterprises that cannot immediately meet the specified environmental standards are required to prepare environmental management programs (EMPs), which are submitted for approval to the administering authority. Environmental management programs are contractual agreements to achieve the required level of pollution control or waste minimisation in a specified time.

Environmental management programs can be applied equally to licensed or unlicensed activities and specify process, site and area management and monitoring practices and requirements. Environmental management programs also take into account the risk of environmental harm being caused by the activity.

An environmental management program is a broad

strategy with milestones and target dates rather than a detailed management system. The process offers Queensland industry a degree of self-regulation in return for greater accountability.

If the life of an environmental management program is greater than three years, it must be advertised and public submissions must be invited.

The administrating authority must take into consideration the views of interested parties and appeals can be lodged by those parties.

Detailed information on environmental management program requirements is given in the Department of Environment and Heritage Environmental Management Programs Guideline.

Environmental evaluations

The legislation provides for two types of environmental evaluations. The administering authority may require an environmental audit if it determines that a licensee is not complying with licence conditions or the requirements of an environmental protection policy. An environmental investigation may be required when emissions from premises are not readily apparent and normal monitoring or inspections cannot identify the extent of the problem.

In both cases, the reports submitted to the administering authority must be accompanied by a statutory declaration certifying the accuracy of the report and stating the qualifications and experience of the person who carried out the audit or investigation.

The cost of carrying out environmental evaluations and preparing reports must be met by the person responsible for the problem, to ensure that environmental costs are recognised as a normal part of business costs.

If a company carries out an audit which shows that its operations do not meet the licence requirements in one or more ways, it must inform the administering authority immediately. Special provisions in the new legislation protect the licensee from prosecution, for continuing offences, provided that the licensee also proposes to prepare an environmental management program within a period (up to three months) specified by the administering authority.

Financial assurance

The legislation permits a financial assurance to be required of an operator to guarantee environmental management performance. Financial assurances include various forms of security, such as bonds, bank guarantees or other surety the administering authority considers appropriate.

"An environmental management program is a broad strategy with milestones and target dates rather than a detailed management system. The process offers Queensland industry a degree of self-regulation in return for greater accountability"(DEH).

Typically, a financial assurance may be required when a provisional licence is granted to allow commencement of an environmentally relevant activity, where the proponent is using new, untried technology, or where the administering authority is concerned about particular aspects of the proposal which may pose a risk to the environment.

Enforcement

The legislation would be ineffective if the administering authority cannot enforce the provisions of the Act and take action against those causing environmental harm. The Act provides effective enforcement powers.

Enforcement measures include on-the-spot fines, injunctions to cease activity, orders to carry out specified works or clean up damage and, if necessary, prosecution. The new legislation overcomes many of the legal problems of enforcement that existed with previous Acts, but prosecution is not the preferred response.

The Act provides for a variety of penalties, such as remediation orders, which seek to enhance the environment and not just punish the offender. Wilful serious offences can incur substantial fines

and jail sentences.

The Department of Environment and Heritage has prepared an Enforcement Guideline to explain exactly haw the enforcement provisions of the Environmental Protection Act are applied.

Devolution

The Environmental Protection Act gives local government responsibility for environmental management of specific environmentally relevant activities. This process is called devolution. Such responsibilities are additional to those already held by local government.

Over the next three years further responsibilities may be devolved. The criteria for devolution are that the activity has only a local environmental effect and that it uses simple technology. Environmental management of activities with statewide or regional economic significance, or with regional significance because of their scale, intensity or location will not be devolved. If a local government carries out an environmentally relevant activity, such as sewage treatment the Department of Environment and Heritage is the administering authority.

To make sure local governments have the appropriate resources for environmental management, the State Government has:

- provided a subsidy to help local government buy monitoring equipment;
- developed training programs available to all local governments;
- provided training for local government environmental health officers in their new responsibilities;
- provided grants to help establish administration at the local level;
- developed a local government computer system to be used for licensing;
- funded installation of the Councilnet computer system to link councils with statewide information services;
- established a local government liaison officer in each regional office of the Department of Environmental and Heritage;
- set licence fees that will generate sufficient funds for all local governments to carry out their administrative responsibilities to protect the local environment.

"The Environmental Protection Act gives local government responsibility for environmental management of specific environmentally relevant activities" (DEH).

Lead agency

The State Government has appointed the Department of Environment and Heritage as the "lead agency" for environmental management. The Department's role is to co-operate environmental policy for all Government departments and advise how best to manage the environment. The Department sets the policy and environmental standards to be achieved, gathers material to prepare a "State of the Environment" report and regularly audits the performance of the devolved agencies.

The new legislation allows the Department of Environment and Heritage to delegate management functions to the other government agencies which manage the State's resources and infrastructure. Delegation will be given only if the staff and resources necessary for the delegated functions are available. The Department influences the environmental standards and policies of other departments and will check on the effectiveness of those policies.

Each delegation is bound by a memorandum of understanding, copies of which are available on request. Random environmental audits can also be carried out cooperatively with other departments and annual reports are required from delegated departments. The Minister for Environment and Heritage will publish the results of all reports and audits as part of the annual report to Parliament.

Environmental management guidelines

Most damage to the environment is caused through ignorance. The Department of Environment and Heritage and industry associations have developed environmental management guidelines to provide advice to industry, local government and the public about how best to minimise the environmental impacts of their operations.

Guidelines on a wide range of environmentally relevant activities and on specific issues, such as odour and noise management, are now available. These guidelines provide information, but are not legal documents. They can be used by local government when developing or reviewing town planning conditions or local laws.

Incentives

In the past, emphasis has been placed on simply complying with standards. Some companies, however, want to and can do more than meet the minimum standards. These companies will now be encouraged to do so through reduced regulatory requirements and fees. Those who will not or cannot comply will be required to be more accountable in their self-monitoring, will pay higher fees and will be inspected more often.

The Environmental Protection Act will encourage self-audits and self-monitoring by providing certain immunities from prosecution if an audit is disclosed and an environmental management program is used to address any identified environmental problems.

Further information

If you require further information on the Environmental Protection Act, its administration environmental management guidelines or other matters treated in this section, contact the nearest office of the Department of Environment and Heritage, your local government, or phone the FREECALL Environment Hotline on 1800 065 369.

Regional Departmental contact

Southeastern Region
56-62 Mary Street
Brisbane
GPO Box 2771
Brisbane 4001
(07) 3224 5641

Some DEH Publications

- Guidelines for the preparation of Environmental Management Programs
- Enforcement Guideline for Environmental Protection Act 1994
- Due Diligence Guideline
- Consideration of the Standard Criteria Guidelines
- Integrated Environmental Management Systems Guidelines (IEMS)
- Risk Assessment Guideline
- Environment Audit Guideline
- Environment Protection Act News
- Environmental Stewardship - a new approach to environmental management news
- Enforcing the Environment Protection Act News
- The Public Register (FOI) - Newsletter
- The Environment Protection Act and You
- Information for Business and Industry
- Licensing - what you need to know

Write to:

Division of Environment
160 Ann Street
Brisbane
P0 Box 155
Brisbane Albert St
QLD 4002
(07) 3227 6422

Gold Coast City Council Plumbing and Drainage Services

Conditions of approval water supply / sewerage by-laws and council requirements schedule

1. The owner must ensure that the proposed building work does not interfere with either the Local Government's sanitary sewer or house drain. Excavation for a building or structure must not be closer than 2 metres to the extremity of the Local Government's services. If an alteration to either sanitary sewer or house drain is necessary, an application must be made to Plumbing and Drainage Services.
2. Owners and builders must locate water, sewerage and stormwater services which traverse land and exist on the frontage of the land on which it is proposed to carry out building work.
3. Alterations to fire hydrants, valves, street gully traps and pits, stormwater and sewerage access holes because of changing ground or surface levels must be carried out by the Local Government at the owner's expense.
4. If a private stormwater drain crosses land, the owner must keep all foundations or footings clear of the said stormwater drain. No responsibility is taken by the Local Government for any damage to the building or structure as a result of the foundations or footings being over the drain and the owner accepts responsibility for any damage to the said stormwater drain.
5. The owner of the land must determine if it is affected by a Local Government stormwater drain or other service and or easement. When a stormwater drain crosses the site it is the owner's responsibility to ensure all foundations and footings are kept clear of the drain and\or easement.

   Where permission has been obtained from the Local Government to build over a drain and or easement the bridging details indicated on the owner's plans must be adhered to. No responsibility is taken by Council for any damage to the building or structure because of the foundations or footings being over the drain. Any damage to the pipe must be reported to the Co-ordinator-Plumbing and Drainage Services and repairs must be completed to his\her satisfaction at no cost to the Local Government.
6. Prior to any building works being carried out, the builder is to establish the exact location and level of any sewer or stormwater pits for the allotment. All stormwater drainage, including surface water is to be discharged clear of the downstream properties, either by easement, by means of a rear allotment stormwater drainage system, or with a downstream neighbour's consent through that property.
7. To prevent a nuisance being caused to other property owners as a result of the building works covered by this approval, adequate measures are to be taken to control the discharge of rainwater from roofs and the site, so as to prevent the concentration of such water and the deposition of silt etc, onto other properties.
8. A work commencement card to be submitted prior to first inspection.
9. Water services to be seen as an individual inspection or in conjunction with other inspections.

"The owner must ensure that the proposed building work does not interfere with either the Local Government's sanitary sewer or house drain."

10. Water supply to be in accordance with Council's Policy, Water Supply and Sewerage Act and AS 3500.1.
11. Vacuum breakers are required on all hose taps.
12. All fire, water, sewer, stormwater, spa and bath flashings and connections require inspection prior to backfilling or cladding.
13. Fire services are to be installed with an approved back-flow device.
14. All house drainage to be sighted and tested before backfilling.
15. Roof water must be discharged to a point designated by and to the satisfaction of the Co-ordinator Plumbing and Drainage Services.
16. Where stormwater is permitted to be connected to kerb and channel, pipe work shall be 100 mm heavy duty PVC with and approved kerb adaptor. Where sufficient cover cannot be achieved a cast iron or galvanised steel pipe shall be used or an alternative method as approved by the Co-ordinator Plumbing and Drainage Services.
17. All stormwater drainage pipes are to be sighted before backfilling.
18 1050mm straight through open channel inspection chambers are required near the connection prior to sewer mains on all Commercial Properties. {eg. units, factories, and shops etc.} and where otherwise required.
19. Inspection openings to surface level are required on all soil branches again set the wall of the structure and at the connection point to Council's sewer.
20. Reinforced lids are to be provided on sumps, septic tanks, grease traps, manholes and inspection chambers in areas subject to vehicular traffic.
21. Drainage is to be run external where possible {not underslab}. If this is not possible arrange for a site inspection for consultation with the area inspector.
22. All services are to be kept clear of foundations. (Refer to AS 3500.2 for standard footing to service detail.)
23. Drainage penetrations through footings shall be wrapped with 6 mm lagging.
24. In situ showers have a Council approved membrane, copper or stainless steel tray installed. Flood testing is required at the final inspection.
25. The floor of a wet area {eg. bathrooms and laundries etc.} is to be graded to a floor waste. {Refer By Law of the WS & S Act for the correct size.}
26. A safe tray with a 50mm drain is to be provided to all hot water units located internally, unless otherwise approved. Where possible the overflow is to be run external separately.
27. Lagging shall be used on hot water pipework where clipped or where it travels through studs or plates etc. in accordance with AS 3500.4.
28. Pressure limiting valves and cold water expansion valves to be fitted to all new and replacement hot water storage units.
29. Separate applications are required for spa baths exceeding 455 litres capacity.
30. The following fixtures shall be installed:
    - Low flow shower roses
    - flush on demand urinals
    - 6/3 litre dual flush toilet suites {sewerage}
    - 6/3 litre dual or limited flush toilet suites {septic}.
31. All water, waste, fire, stormwater and gas pipes in multi storey buildings are to be clearly labelled in accordance with the Water Supply and Sewerage Act.
32. All water services in multi unit residential buildings are to be provided in accordance with the current regulations or as directed by the site inspector.
33. Access panels, inspection openings and test gates are to be provided in accordance with the current regulations or as directed by the site inspector.
34. PVC pipe must note be used where the figure discharge temperature exceeds 60 degrees Celsius.
35. Duplex units are to have separate water meters.
36. Backflow prevention is to be in accordance with AS 3500.1
37. Laundry tubs and vanity basins are to be installed on finished floors. No well is permitted underneath.
38. Swimming pool filter backwash is to be directed to sewer via the house drain in accordance with Council's standard drawing.

Contact lists

Gold Coast City Council

1. Gold Coast City Council
   Plumbing and Drainage Services
   Matthew Hulse
   Co-ordinator Plumbing and Drainage Services
   Gold Coast City Council
   PO Box 5042
   Gold Coast Mail Centre 4217
   Phone: (07) 55 780 305

2. Gold Coast City Council
   Trade Waste
   David Zinn
   Gold Coast City Council
   PO Box 5042
   Gold Coast Mail Centre 4217
   Phone: (07) 55 816 000

3. Gold Coast City Council
   Gold Coast Water
   Shaun Cox - Director
   Graham Walker - Technical Officer
   Darren Hayman - Supervisor, Water Meter Reading
   P.O. Box 5042
   Gold Coast Mail Centre 4217
   Phone: (07) 55 816 000

WaterWise Qld

1. WaterWise Queensland
   John Clowes - Manager
   Department of Natural Resources
   G.P.O. Box 2454
   Brisbane 4001
   Ph: (07) 3224 2718
   David Wiskar
   WaterWise Consultant
   Department of Natural Resources
   G.P.O. Box 2454
   Brisbane 4001
   Ph: (07) 3224 2716

2. WaterWise Gold Coast
   Wet Paper Publishers and Consultants
   Bob Moffatt - Manager
   14 Milbong Terrace
   Ashmore 4214
   Ph: (07) 55 972 806

   Sally MacKinnon
   Wet Paper Consultant
   39 Doomben Court
   Beechmont Qld 4211
   Ph: (07) 55 333 646

Information current as of June 30 1996

Contributing Hotels and Theme Parks

1. Hotel Conrad Jupiters Casino
   Bob Lohrmann - Hotel Manager
   Jack McLaggan - Chief Engineer
   Godfrey Vella - Past Assistant Chief Engineer
   Brett Lake - Support Services Manager
   Sandy Deans - Director, Human Resources
   David Feachnie - Training Manager
   Tracee Leaver - Assistant to Hotel Manager
   Broadbeach Island
   Broadbeach 4218
   Ph: (07) 55 921 133
2. Royal Pines Resort
   Garry Croxford - Chief Engineer
   Michelle Smith - Head of Landscaping
   Ross Street
   Ashmore 4214
   Ph: (07) 55 978 707
3. Sheraton Mirage Gold Coast Hotel
   Stuart Deacon - Chief Engineer
   Leith Evans - Human Resources Officer
   Sea World Drive
   Main Beach 4215
   Ph: (07) 55 911 488
4. Hyatt Regency Sanctuary Cove
   Ian Crookston - Chief Engineer
   P.O. Box 200
   Sanctuary Cove 4212
   Ph: (07) 55 301 234
5. Ramada Surfers Paradise Hotel
   Caron Manning - Chairperson, Environment Committee
   Stephen Hayes - Chief Engineer
   P.O. Box 1342
   Surfers Paradise 4217
   Ph: (07) 55 341 266
6. Currumbin Sanctuary
   Shane Holborn - Manager, Horticulture
   28 Tomewin Street
   Currumbin 4223
   Ph: (07) 55 341 266
7. Sea World
   Dennis Fountain - Chief Engineer
   Sea World Drive
   Main Beach 4215
   Ph: (07) 55 882 185
8. Pan Pacific Hotel
   Ian Turnbull - Chief Engineer
   P.O. Box 174
   Broadbeach 4218
   Ph: (07) 55 922 250
9. The Wesley Hospital
   Mark Ford - Co-ordinator Hospitality Services
   PO Box 499
   Toowong 4066
   Ph: (07) 3232 7019
10. Hotel Inter.Continental Sydney
    Andy Gooneskera - Chief Engineer
    G.P.O. Box 5120
    Sydney 2001
    Ph: (02) 230 0200

Australian Institute of Hotel Engineering

1. Queensland Branch
   c\- Stuart Deacon - President
   Sheraton Mirage Gold Coast Hotel
   Sea World Drive
   Main Beach 4215
   Ph: (07) 55 911 488
2. West Australian Branch
   c\- Ian Knox - Secretary
   PO Box 6191
   East Perth 6892
   Ph: (09) 221 1200

Information current as of June 30 1996

Suppliers

These lists were compiled from people who responded to advertisements placed in major Gold Coast and Queensland Newspapers. Companies wanting to be included in future editions are encouraged to fax their company and product details to David Wiskar - Department of Natural Resources on (07) 3224 7999.

Water and Energy Conservation Systems

Platypus Water and Energy Conservation Systems
Don Arms - Queensland Distributor
137 Melbourne Street
South Brisbane 4101
Ph: (07) 3844 5311

Con-Serv Corporation
John Thomson - Commercial Sales Manager
5 Noble St
Wilston 4051
Ph: (07) 3856 4411
Mobile: 015 110 810

Controlled Urinal Systems

CF & T Washroom Equipment Pty Ltd
Patrick Macky - Director
P.O. Box 581
Mermaid Beach 4218
Ph: (07) 55 785 199

James Hardie Bathroom Products
Ian Maunder - State Manager
P.O. Box 345
Zillmere 4034
Ph: (07) 3265 7777

Zip Heaters (Aust) Pty Ltd
Ken Peuker - Queensland Sales Manager
3\43 Links Avenue North
Eagle Farm 4009
Ph: (07) 3268 3301

Water Saver Systems Ltd
Rohan Wills - Managing Director
P.O. Box 1703
Christchurch NZ
Phone: 64 3 366 8089

Water Conserving Shower Roses

Amway
Phil Lep - Distributor
PO Box 873
Toowoomba 4350
Ph: (076) 333 117

Con-serv Corporation
John Thomson - Commercial Sales Manager
5 Noble Street
Wilston 4051
Ph: (07) 3856 4411
Mobile: 015 110 810

Delrana
Phil West - Manager
2 Ryecroft Street
Carrara Qld 4211
Ph: (07) 55 303 000

Water Saver Systems Ltd
Rohan Wills - Managing Director
P.O. Box 1703
Christchurch NZ
Ph: 64 3 366 8089

Flexispray
Kevin Post - Queensland Sales Manager
10 Boorreen Court
Helensvale 4210
Ph: 018 989 283

Allied Hardware Agencies
Allan Threlfall
105 Robertson Street
Fortitude Valley 4006
Ph: (07) 3252 8727

Water Meters

Davies Shephard
Ian Pitt - Marketing Manager
12 Holland Street
Northgate 4013
Ph: (07) 3266 7733

Information current as of June 30 1996

Flow Restrictors

BR Homersham Limited
Hamish Buchanan - Pumping and Filtration
P.O. Box 280
Christchurch Mail Centre NZ
Ph: 0064 3358 8309

Eco-Valve
Merv Hook - Director
P.O. Box 1339
Noosa 4567
Ph: (074) 487 228

Inventions Marketing International - Aqualoc
Graeme Knight - Director, Sales and Marketing
P.O. Box 236
Kenmore 4069
Ph: (07) 3878 5155
Fax: (07) 3878 3603

Con-Serv Corporation
John Thomson - Commercial Sales Manager
5 Noble St
Wilston 4051
Ph: (07) 3856 4411
Mobile: 015 110 810

Dishwashers

Hobart
Dennis Brown - Sales Representative
35 Allison Street
Mayne 4006
Phone: (07) 3854 1313

Stoddart Metal Fabricators
Martin Crist - Technical Representative Food Service Specialist
PO Box 420
Sunnybank 4109
Phone: (07) 3345 5011

Irrigation

Turf Irrigation Services
Chris Ashwood - Sales Representative
P.O. Box 459
Capalaba 4157
Ph: (07) 3245 6000

Commercial Irrigation Consultants
Chris Edwards - Director
P.O. Box 415
Spring Hill 4004
Ph: (07) 3831 3188

Hardie Irrigation
Lawrence McGregor Lowndes - State Manager
P.O. Box 1115
Toombul 4012
Ph: 13 15 88

PPI Industries
David Chappell
P.O. Box 55
Geebung Qld 4034
Ph: (07) 3865 2300

Gardening and Horticulture Products

Searle's Potting Mix
Ashley Searle
P.O. Box 183
Kilcoy Qld 4515
Ph: (074) 97 2022

Arthur Yates and Co
Eileen Jackson - Marketing Manager
129-133 Cobalt Street
Carole Park
Ph: (07) 3271 3433

Information current as of June 30 1996

Toilets

Caroma Industries Ltd
Alex Pagonis - State Manager
P.O. Box 1191
Eagle Farm 4007
Ph: (07) 3260 1977

James Hardie Bathroom Products
Ian Maunder - State Manager
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Zillmere 4034
Phone: (07) 3265 7777

Other

Blue Lagoon Enterprises
Ken Peucker - Director
Water Conservation Consultant
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Phone: (07) 5539 2828

KDR Industries Limited
D.A. Law
Shower Control System
P.O. Box Shirley
Christchurch NZ
Phone: 64 3 385 2984

Tradelink Plumbing Supplies
Robert Sinnerton - State Marketing Manager
Major Plumbing Supply Retailer
190 Kelvin Grove Road
Kelvin Grove Qld 4051
Phone: (07) 3352 6622

Saxon Sales
David O'Gorman
Hot Water Systems
212 Zillmere Road
Zillmere Qld
Phone: (07) 3265 5133

Other contacts

Department of Environment and Heritage
Environmental Protection Act 1994
Environmental Planning Branch
PO Box 155
Albert Street 4002
Ph: (07) 3227 6433
(see attached publication form.)

Australian Conservation Foundation
340 Gore Street
Fitzroy 3065
Ph: (03) 9416 1166

Gold Coast and Hinterland Environment Council
139 Duringan St
Currumbin 4221
Ph: (07) 55 341 412

Tyman and Associates Pty Ltd
P.O. Box 3
Wellers Hill Qld 4121
Ph: (07) 397 4133
(Landscape Design Magazine
The Queensland Water Management Journal)

Queensland Master Plumbers Association
P.O. Box 408
Fortitude Valley 4006
Ph: (07) 252 1266
(Contacts: Beverley Wilson, Allan Archie)

Queensland Nursery Industry Association
Unit 1 The Grove
Cnr Orange Grove & Riawena Roads
Salisbury 4107
Ph: (07) 3277 7900

State Projects - NSW Land & Water Conservation Department
Level 13 McKell Building
2-24 Rawson Place
Sydney 2000
Ph: (02) 372 7892

Information current as of June 30 1996

WaterWise Publications

The following is a list of WaterWise Publications.

To find out more please contact:

John Clowes - Manager Department of Natural Resources

G.P.O. Box 2454

Brisbane 4001

Ph: (07) 3224 2718

Fax to: (07) 3225 2131

- Public Communication Resource Kit MB 1
- WaterWise Demand Management Manual MB 2
- Water Is Necessary - Let's Save It MB 3
- Little Blue Drinking Water Booklet MB 4
- WaterWise Promo-Pointers MB 5
- The Teachers Resource Kit for Senior Students SE 1
- The Glass of Water Educational Video SE 2
- The WaterWise Senior Textbook SE 3
- The WaterWise Teachers Resource Booklet SE 4
- The WaterWise School Water Audit Kit SE 5
- The WaterWise at Home Brochure B 1
- National Water Conservation Rating and Labelling Scheme B 2
- The Let's Be WaterWise Brochure B 3
- The Future of Water Is In Our Hands B 4
- Seven Secrets to Saving Money on Your Water Bill B 5
- WaterWise on the Farm B 6
- Fact Sheet - The True Value of Water FH 2
- Fact Sheet - How to Conserve Water Inside the House FH 3
- Fact Sheet - How to Conserve Water Outside the House FH 4
- Fact Sheet - Rain Water Tanks FH 6
- Fact Sheet - Flow Reduction FH 9
- Fact Sheet - Garden Irrigation Systems FH10
- Fact Sheet - How to Save Water & Money In the Laundry FH 11
- Fact Sheet - WaterWise In the Work Place FW 2
- Tech Sheet - Why the need for Demand Management TH 2
- Tech Sheet - Water Efficient Shower Systems TH 3
- Tech Sheet - Consumer Education TH 4
- Tech Sheet - Techniques to Conserve Water TH 5
- Tech Sheet - Rain Water Tanks TH 6
- Tech Sheet - WaterWise for Employers TW 2
- Strip Sticker Garden P 1
- Strip Sticker Toilet P 1
- Strip Sticker Bathroom P 1
- Strip Sticker Kitchen P 1
- Bumper Sticker - Be WaterWise - Save Water, Save Money, Save the Environment. P2
- Bumper Sticker - Be Water Miser Use Water Wiser P 2
- Bumper Sticker - Every Drop Counts We're Counting on You. P 2
- Bumper Sticker - Slow the Flow Give WaterWise A Go P 2
- Bumper Sticker - Don't Take the Rap for a Leaky Tap P 2
- Ball Point Pens P 3
- WaterWise Rulers P 4
- WaterWise Pencils P 5
- WaterWise Bookmark P 6
- Balloons P 7
- Note Pads P 8
- Key Rings P 9
- Fridge Magnets P 10
- WaterWise Polo Shirts P 11
- Whizzy T-Shirts P 12
- Carry Bags P 13
- WaterWise Badges P 14
- WaterWise Trivia Cards P 15
- WaterWise Water Cycle Poster PO 1
- WaterWise at Home Poster PO 2
- WaterWise Catchment Poster PO 3
- WaterWise Town Poster PO 4

Information current as of June 30 1996

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   (International Hotels Environment Initiative, Butterworth Heinmann, Oxford, 1993.)
2. *Energy and Water Resource Management.*
   (B. Lansing, American Hotel and Motel Association, Educational Institute, 1988.)
3. *Environmental Action Pack for Hotels.*
   (International Hotel Association, International Hotels Environment Initiative, United Nations Environment Program Industry and Environment, London, 1995.)
4. *A Green Globe Environment Guide.*
   (World Travel and Tourism Council, London, 1994.)
5. *Sustainable Tourism - An Australian Perspective.*
   (Ed. Rob Harris and Neil Leiper, Butterworth - Heinemann, Australia, 1995.)
6. *A Guide to Innovative Technology for Sustainable Tourism.*
   (Commonwealth Department of Tourism, Canberra, 1994.)
7. *Best Practice Ecotourism - A Guide to Energy and Waste Minimisation*
   (Commonwealth Department of Tourism, Canberra, 1995.)
8. *Cut Waste and Energy Initiative - Create Green Jobs.*
   (Australian Conservation Foundation, Victoria.)
9. *Hotel Benchmark Study - Part 1*
   (Australian Institute of Hotel Engineering West Australian Branch, Perth, 1995.)

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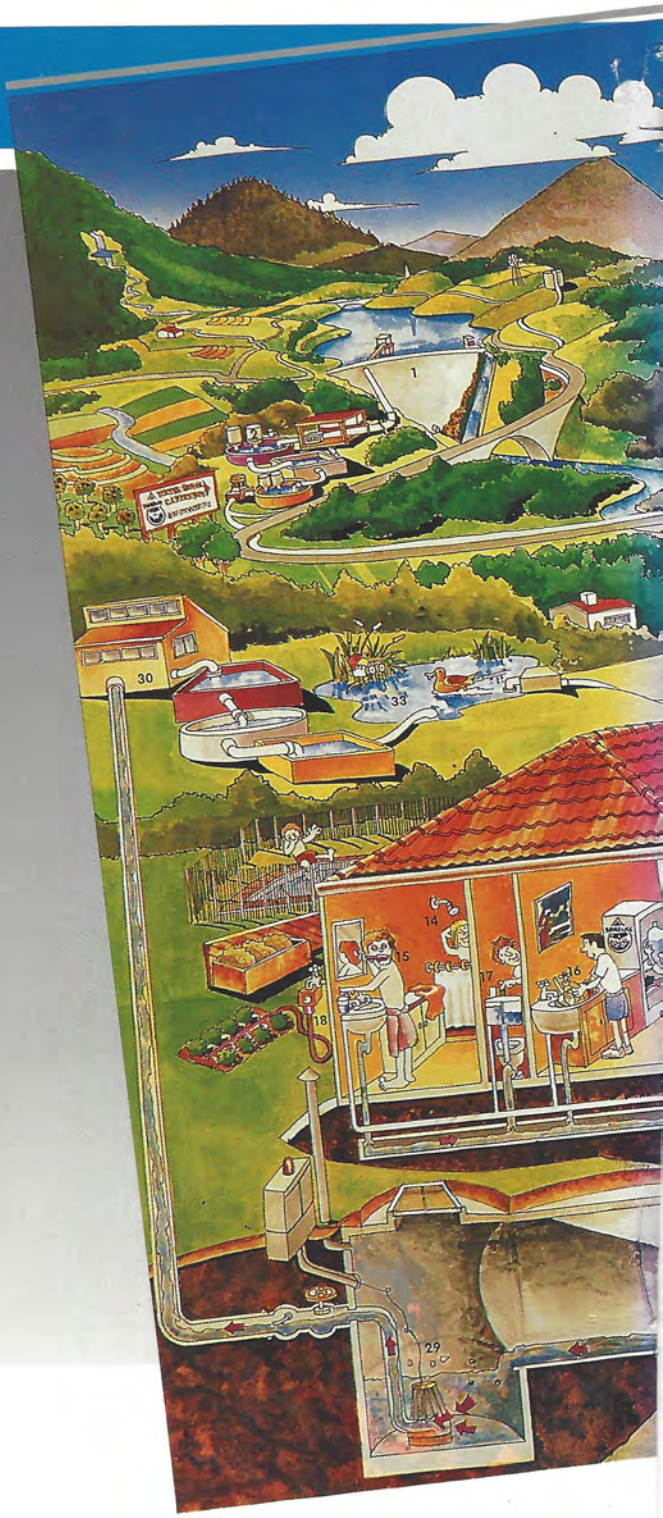
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