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Acronyms and Abbreviations

SPREP	South Pacific Regional Environment Programme
WHO	World Health Organisation
MoH	Ministry of Health
DoH	Department of Health
PET	Polyethylene teraphthalate
HDPE	High density polyethylene
SIDT	Solomon Islands Development Trust

Executive Summary

Action Plan

Waste Management Sector	Action			Responsibility	Timeframe
	Priority 1	**Priority 2**	**Priority 3**		
Implementing the Plan	• Workshop with government ministers, NGOs, business and community leaders, DoH and Dept. of Environment. • Prioritisation of actions and responsibilities	• Form a Solid Waste Committee • Appoint and train a Solid Waste Officer • Set targets for waste reduction	• Obtain funding for demonstration recycling schemes • Review funding of waste management • Report on future effects of tourism on waste management		
Waste Minimisation Initiatives	• Implement segregated green waste collection service	• Work with School of Natural Resources to implement a waste minimisation project at the campus • Negotiate cheap or subsidised shipping for waste materials for recycling	• Investigate possibility of national waste management fund		
Metal wastes	• Increase quantity of metals recycled through increased publicity for existing scheme	• Government to review support for project to crush large waste steel items			
Biodegradable Waste	• Designate area at landfill for green waste and organic waste • Notify public of segregated collection and dumping	• Implement shredding and composting of green and organic waste • Implement demonstration composting project at School of Natural Resources			
Plastic waste	• Separate PET and HDPE collection	• Implementation of packaging legislation	• Feasibility study into local plastic recycling or shipping to Australia or NZ		
Paper waste	• Separate paper collection				
Refuse Collection System	• Complete review of management and operation of collection system • Review charging system for waste collection • Improve collection of fees • Investigate funding to buy wheelie bins	• Review "Refuse Collection Agreement" • Plan for a segregated municipal waste collection of all recyclables			

Landfill	• Select new landfill site and programme development • Identify funding for new landfill • Management plan for Ranadi Landfill	• Plan to stop burning wastes at the landfill • Prepare a closure plan for the exisitng landfill	•		
Special Wastes	• Conduct full audit on National Referral Hospital and implement structured waste management system • Training for hospital staff in waste management system • Identify funding for hospital waste incinerator	• Investigate waste oil collection facilities and disposal facilities	• Implement waste batteries collection • Implement waste pesticide container collection		
Community Involvement	• Education programme for schools, businesses, community groups • Media campaign on new recycling schemes and segregated collection	• School collection schemes for recyclables • Publicity campaign on new recycling schemes and segregated waste collection • Demonstration projects for waste minimisation and composting in villages through SIDT	• Investigate curriculum changes		

1. Introduction

This report was financed by the European Communities from a grant of the European Development Fund and is presented by the consultant Sinclair Knight Merz Ltd for consideration of the Solomon Island Government. It does not necessarily reflect either the opinion of the latter or the European Commission.

Sinclair Knight Merz was commissioned by the South Pacific Regional Environment Programme (SPREP) to carry out the Solid Waste Characterisation and Management Plans Project in 8 Pacific Countries in including Fiji, Tonga, Vanuatu, Papua New Guinea, Kiribati, Tuvalu, Solomon Islands and Western Samoa.

This is the final report for the Solomon Islands, based on the findings of the fieldwork carried out by the author in Honiara from17th November – 26th November 1999. The aim of the report is to present the results of the waste characterisation work carried out while in the Solomon Islands and to describe the current waste management practices in Honiara. The report also aims to formulate options and priorities for an integrated solid waste management plan for Honiara. The terms of reference for this project are given in Appendix A.

2. Overview of Existing Solid Waste Management Practices, Methods and Regulations

2.1 Introduction

Solomon Islands comprises of a scattered archipelago of mountainous islands and coral atolls with a total land area of 27,566 square kilometers.

Honiara is the Solomon Islands largest municipal centre and has a population estimated at over 40,000 people. Urban migration is increasing and the population of Honiara is growing at about 10% per year. With the growing population pressures, there are concerns about the water, sanitation and waste systems in the capital.

The Environmental Health Division of the Honiara Town Council manages all aspects of waste collection and disposal in Honaira although a significant amount of industrial and commercial waste is taken to the dump by individuals. Previously waste collection and disposal was managed by the Public Works Division of the Council.

The World Health Organisation has funded two report on waste management in Honiara in 1991 and 1992 and both reports identified the need to upgrade both the refuse collection system and the landfill.

2.2 Honiara Landfill and Collection System

The landfill in Honiara is used for domestic, commercial and industrial wastes collected by the Honiara Town Council as well as individual industries and the general public. The landfill in Honiara is located on flat reclaimed land adjacent to mangrove swamps, about 6 kilomteres from town in the Ranadi industrial area. There is one adjacent neighbour operating a stone crushing business. This business is on land that used to be part of the dumpsite. The landfill is partially fenced but there is no gate or gatehouse. There is an access road along one boundary of the landfill with tipping occurring at all points along the road.

The landfill appears to be a large expanse of uncovered waste with areas of stagnant, anaerobic water in the middle .It is an open dump with no provision for daily cover although a limited amount of covering occurs on an ad hoc basis. At times tipping occurs on the road to the landfill because the entrance-way is blocked with rubbish. There is no segregation of waste at the landfill and all

types of waste are accepted. There are two landfill controllers who direct vehicles where to dump their loads. There appears to be little planning as to where waste is dumped. A bulldozer is hired from a private contractor for 1-2 days every 2-3 weeks to move and compact the waste and to clear the road into the landfill. This costs SBD$400/hour and a total of approximately $4000 per time.

There is no leachate treatment or control at the landfill.

There is no spraying of the landfill and there is a significant fly problem. There is some odour from the landfill although this is not likely to cause significant adverse effects off the landfill site.

Combustible rubbish is often burnt at the dump to reduce its volume although the waste seems to burn in an uncontrolled manner.

There is no collection of fees for dumping at the landfill.

There are scavengers working at the landfill, collecting scrap metal, and other goods of value.

Household rubbish is collected up to 2-3 times per week in Honiara by contractors employed by the Honiara Town Council. The town is divided into 11 residential areas and the markets for collection purposes and there are 12 different contractors, generally using 3 tonne open trucks and one using a 4 tonne truck. The contractors are paid approximately $300/day and are required to carry out a minimum of 3 loads to the dump. The contractors are bound by a standard agreement entitled “Refuse Collection Agreement” which was signed in 1995.

Collections generally start at 7am and are conducted in the morning only. The collection times are days are not reliable and waste is often left uncollected for longer periods of time. The contractors are unable to adhere to the conditions of the collection schedule because the contract prices are too low, breakdown of vehicles, and unsuitable collection vehicles and rubbish bins.

Rubbish is generally placed out for collection in 200 litre steel drums, or plastic bags. The drums are often shared by several houses and they become overloaded, spill at the time of collection and are not cleaned at all so that flies, mosquitos and smell are a problem. The open drum also fills with water when it rains and the rubbish becomes sodden and the bin unwieldy.

Commercial and industrial waste is collected as requested.

Waste collection fees charged by the Honiara Town Council are given in Table 2.1.

Table 2.1: Waste Collection Fees

Waste Type	Charge
Residential	Free
Hospital	Free
Industrial/Commercial	$5/collection
Offices	$2.50/collection

Market waste and some trade waste is collected by the Works Division of the Honiara Town Council under direction of the Environmental Health Division. The Council owns 4 small tipper trucks and one 4-5 tonne compactor for these collections. Market waste is collected every evening.

The Council specifies the type of waste receptacle that should be used as a 44 gallon drum, but these are often not used and waste is left in piles or plastic bags on the roadside. When drums are used, they are often unmanageable for the collection staff because they are too heavy and unwieldy. Sometime up to 8 households use the same drum, so it can be very full and often unclean. The uncovered drums also fill up with water when it rains and the waste becomes submerged in water. Waste that is dumped by the roadside without a bin is often scattered by dogs.

In summary the main problems with waste collection and disposal in Honiara are:

- Inappropriate waste receptacles
- Collection vehicles not suited to terrain or loads required
- Waste collection staff not trained
- Collection schedule not adhered to
- No waste segregation or minimisation of waste to dump
- Dump past its life due to inability to find another suitable site for sanitary landfill
- Land tenure problems
- Rapid growth of urban population
- Lack of data on waste volumes and types
- Lack of data on collection system operations

2.3 Existing Waste Generation Data

A limited household survey of the solid waste stream was undertaken in Honiara in 1990. The waste composition that was recorded during that study is given in Table 2.2.

Table 2.2: Waste Composition in Honiara in 1990

Waste Type	Weight %
Vegetable/Putrescible Material	16.7
Paper	2.2
Metals	8.2
Glass/Ceramics	1.9
Textiles	0.1
Plastics	3.9
Bones	0.7
Miscellaneous (small pieces of mostly organic matter)	66.3

Ref: World Health Organisation Mission Report, Ref ICP/RUD/001 dated 18 March 1991.

The data in Table 2.2 shows that there is approximately 83% organic waste in the domestic waste stream. All of this material could be composted. Based on the results of the study above, it was estimated that the average daily waste generation by the domestic sector was 0.38 kg/person/day and its bulk density was 270 kg/m^3. There was no data generate for commercial and industrial wastes.

2.4 Education and Awareness

At present there is very limited education in waste management in Honiara. There is a moderate level of awareness of waste management issues, but littering and illegal dumping of waste is still a problem.

Honiara Town Council has undertaken public awareness promotions about keeping the environment clean and free of health hazards generally through radio programmes or the newspaper. There is an annual week-long “Keep Honiara Clean” Campaign where commercial, residential areas and the general public clean up their respective environments.

It is widely recognised by stakeholders that the population needs to be educated over a long period before they will adopt waste minimisation practices. The general impression is that the population of the Solomon Islands in general do not see solid waste as a problem and this is probably why they are not concerned about throwing rubbish all over the place. Some people drew the analogy with malaria: it is so common and all-pervasive that the population

in general do not see it as a problem any more; it has become a part of life and people have learnt to live with it. It is recognised that it will take considerable effort over a long term to change this type of attitude.

However people in Honiara know the value of recycling the products that have a monetary value ie. bottles and cans. Therefore, one of the best ways to clean up the environment would be to explore options that would "transform" the wastes from "unwanted products" to "valuable resources".

2.5 Current Issues and Attitudes

A review of a report prepared in November 1995 entitled "A Collective Voice for Honiara Town Council on the Collection and Disposal of Household Solid Wastes" was carried out and the attitudes of the public are summarised as well as the comments made by the Honiara Town Council at the time. The issues identified at the time of the survey are still relevant to the operations and management of the waste collection system and any solutions need to be incorporated into the Solid Waste Management Plan.

The Council identified the following problems that contribute to poor waste collection services:

- Poor road conditions cause difficulty of access to residential areas
- Traffic congestion
- Lack of sufficient money to upgrade the service adequately
- Zones for collection are too large for the contractor
- No statistical data on the residential population has hindered development planning
- Breakdown of vehicles
- No legislation for landlord to provide suitable waste bins
- Rapid growth of Honiara
- No information of educational awareness
- Staff supervision lacking
- Poor access to settlements

Council identified the following needs:

1. Promoting awareness of rubbish collection and recycling
2. Replacement of 200 litre drums with proper bins
3. Supervision of the collection and disposal services
4. Reliable communication networks with the waste collection contractors

5. Formulation of household disposal policies to protect collection and disposal services.

Financial constraints were identified as one of the major barriers to improving the standard of the collection service.

2.6 Legislation

The following legislation covers aspects related to the management of solid waste in the Solomon Islands:

- *The Public Health Act (PHA) 1980 & The Public Health Regulation 1980*

This Act provides the mechanism for regulating and controlling domestic refuse, the establishment of refuse point, and covers health, sanitation, cleaning, scavenging and disposal of waste.

- *The Honiara Litter By-Law 1993*

This By-Law is supposed to prevent littering in public places, and the offenders are liable for fines if they do so. This is not enforced effectively at present.

- *The Environment Bill 1998 & The Environment Act 1998*

The Environment Bill 1998 was enacted by the National Parliament of the Solomon Islands on 20 October 1998. The resulting Act makes provision for the protection and conservation of the environment, the establishment of the Environment and Conservation Division and the Environment Advisory Committee.

As regards waste minimisation and management, section 3 (c) of the Act will specify the following as part of its objectives:

"to reduce risks to human health and prevent the degradation of the environment by all practical means, including the following -

(i) regulating the discharge of pollutants to the air, water or land;
(ii) regulating the transport, collection, treatment, storage and disposal of wastes;
(iii) promoting recycling, re-use and recovery of materials in economically viable manner; and
(iv) to comply and give effect to regional and international conventions and obligations relating to the environment."

The Act also allows for licences for discharges and penalties for non-compliance of fines up to SBD$10,000 or imprisonment of up to 12 months. Pollution abatement notices are also covered in the Act.

2.7 Recycling Initiatives

The "Sup Sup Garden" project (ie home vegetable gardening) was started in 1986 by HTC as the "Keep Honiara Clean Campaign" under funding support from the Ministry of Health and Medical Services (MHMS), WHO and UNICEF. The initiative was renamed "Keep Honiara Healthy Campaign" in 1989 to incorporate other relevant issues such as the linkages between personal hygiene and environmental cleanliness, nutrition, proper yard maintenance, home composting of organic wastes, etc.

As the project evolved over the years, a demonstration gardening and distribution centre was established under the project to educate participating householders, mainly housewives, on the techniques of vegetable gardening, composting and food preparation through a regular weekly gathering.

It is estimated that over 10% of all households in Honiara are participating in this project. However since each active participant is also able to sensitise two or three neighbours on the benefits of the project, it is estimated that the actual beneficiaries of the project are many more than the direct participants. This initiative has proven itself over the period of 13 years and continues to benefit the people of Honiara, although it has lost its original emphasis on waste management because of "over diversification". However several innovative approaches have been successfully tested and adopted under this project, and these experiences would also be of benefit to people in other parts of the Solomon Islands and in other Pacific island countries. Since this initiative still contributes to solid waste management, it is a worthwhile project to properly research and document in order to attempt to replicate similar initiatives in other urban centres. This could be undertaken as a consultancy under WASTE.

A perusal of the 1997 Solomon Islands Telephone Directory (Yellow Pages Section) showed that that one local and one Australian companies were involved in the recycling of scrap metal such as aluminium cans, copper, brass, aluminium, lead, stainless steel, hot water systems, batteries, radiators and all other non-ferrous scrap metal.

The local company (ie B.J.S. Agencies Ltd) was visited by the WASTE PC, and it was seen that this company is doing well in the

recycling business. It wants to expand its business to cover the other main islands of the country. However, the high shipping freight rates is the main constraint at present. In this context, the company has requested the WASTE Focal Point to explore the possibility of finding out whether empty Government vessels returning from the islands to Honiara could bring in the scrap metal at reduced freight rates.

Whilst B.J.S. Agencies Ltd is also interested in the recycling of ferrous metals (such as junk car and ship bodies), they have found that the prices offered for ferrous metals makes their recycling uneconomic.

A returnable bottle system also functions in Honiara, especially beer and soft drink bottles. However, it is commonly known in Honiara that the national brewer, SolBrew, is facing difficulties getting back up to a million beer bottles. This is because the empty bottles have been "stockpiled" by beer consumers who believe that the buy-back price will increase soon (as Christmas and the really hot season are just around the corner). These people are refusing to sell their "stocks" because they are not happy with the "returns" being offered by SolBrew and its agents: the former offers 40c/bottle delivered at its factory and the latter offer 30c/bottle. This is because when the buy-back scheme started, the returns were 10c/bottle higher, and those holding on to the bottles want SolBrew to reinstate these prices.

According to the partners consulted by the WASTE PC, there seems to be no waste paper and cardboard recycling business in Honiara.

3. Audit and Characterisation of the Solid Waste Stream

3.1 Introduction

In the Solomon Islands one of the factors that contributes to the poor management of solid waste is the lack of consistent data on the composition and quantity of solid waste being produced. The data will be necessary for the design of a new landfill site for the Honiara, in the event that this proceeds. It is also necessary for the setting of targets for waste reduction, reuse, recycling and will allow the measurement of success of any waste minimisation initiatives.

An initiation meeting was held at the Honiara Town Council conference room on 18th November 1999 to discuss the objectives of the project and the activities to be carried out during the fieldwork. Meeting were also held with the Department of Environment and the Honiara Town Council separately. The attendees of the meeting were as follows:

1.	Juliet Woodward	Sinclair Knight Merz
2.	Ethel Napolu	Ministry of Health
3.	Katherine Clarkson	Solomon Islands Water Authority
4.	Wyckliff Maebula	Solomon Islands Water Authority
5.	Nancy Jolo	Honiara Town Council
6.	Raymond Ginns	Honiara Town Council

The scope of work was agreed upon and the meetings with industry and community representatives discussed. Support for the project was given and it was agreed that a final workshop would be held to discuss results and priorities for Honiara.

3.2 Methodology

The following activities were programmed during the 2 weeks of fieldwork in Honiara:

- Waste classification at the Honiara Landfill
- Waste Audits on selected businesses
- Interviews with people involved in waste management

The fieldwork was followed up with a workshop for stakeholders, to present the results of the investigations and to determine options and priorities for a solid waste management plan for Honiara.

The methodology for the first three activities is given in Section 3.2 below and the results are given in Section 3.3.

3.3 Classification at the Landfill

Waste analysis was carried out on a mixed sample of waste from the waste trucks on four consecutive days. Domestic waste only was analysed and waste was taken from trucks that had collected from the following areas:

Day 1 West Kola (Zone 6)
Day 2 East Kola (Zone 6)
Day 3 (Zone 4)
Day 4 King George Area (Zone 10)

A sample size of approximately 1-2 m^3 was unloaded from the truck at an area within the landfill for sorting, and the remaining waste was dumped into the landfill area. Four local assistants were employed to work on the waste classification at the landfill. Sorting into the 9 primary categories and some of the secondary categories of waste was carried out on a large plastic sheet and each category was weight using a mechanical hanging weigh scale. The scales read up to 100 kg in 0.5kg intervals. Weighing was carried out using a 66 litre plastic rubbish bin and the scales were zeroed for the weight of the empty bin.

The density of the mixed waste was also checked by weighing the full 66 litre bin several times and averaging the results.

3.4 Waste Generation Rate

The weight of waste delivered to the landfill in each of the trucks that were sampled was calculated by taking the total weight of waste that was weighed during classification and multiplying this by the portion o f the total load that was sampled. Either one quarter or one half on the total load was selected for sorting and weighing. An assistant was sent with each of the waste collection trucks that was sampled during the collection round in order to count the number of houses that were collected. The total number of people collected from was calculated by obtaining the average number of people per household from the Department of Statistics. The number of collections per week for each of the areas sampled was ascertained and this was used to calculate the average daily waste generation rate per person.

3.5 Results

3.5.1 Results of Waste Classification at Landfill

Table 3.4 gives the typical average composition of the waste collected in the municipal collection system based on the waste classification carried out at he landfill on 19th – 24th November 1999. The results of the weighing and sorting on each day were entered into a spreadsheet and the average results were calculated. The spreadsheet with complete data is given in Appendix G. A total of 702.5kg of waste was sorted and weighed over the four days from loads totalling 1,812kg.

This data provides and indication of the waste composition but is based on a short period of time (4 days only) so will not allow for weekly or seasonal variations. The analysis should be repeated in the future at regular intervals to give more accuracy to the data and to allow trends to be identified.

Table 3.4 Waste Classification Results

Primary Waste Classification	Secondary Waste Classification	Average Percentage (wt%)
Paper	Cardboard boxes Other – magazines, newspaper, office, tetrapak, packaging Sanitary	5.9
Plastic	Polyethylene terephthalate (PET) Rigid High Density Polyethylene (HDPE) Flexible HDPE and other plastics	16.8
Glass	All glass	4.5
Metals	Aluminium cans Other metals	6.1
Biodegradable	All organic	64.6
Textiles	All textiles including clothing, carpets and curtains	1.8
Potentially Hazardous	All	0.1
Construction and Demolition	All	0.1
Other	Including rubber and other	0
Total		100%

Summary Points

- Plastics high at over 16%
- Very few returnable bottles reaching landfill – this recycling scheme is working
- Aluminium cans are only 0.5% - a high proportion of these are being collected before reaching the landfill
- There is still 6.1% other metals reaching the landfill
- Biodegradable material is very high at 65%.
- There is very little construction waste reaching the landfill as it is used by villagers for village purposes

3.5.2 Waste Generation Rate

The following data was gathered during the waste classification in order to be able to estimate the average daily waste generation rate for Honiara. An average number of people per house of 6 is taken from the Statistics Office data.

Table 3.5 Details of Waste Sampled

Day	Weight of waste sampled (kg)	Volume of waste sampled (litres)	Density of waste (kg/m3)	Total weight of load (kg)	Loads per week	No. of houses collected	No. of people	Average generation rate (kg/ person/day)
19/11/99	158.5	1006.5	157	475	2	35	210	0.65
22/11/99	229.8	1122	205	460	1	27	162	0.41
23/11/99	189.4	627	302	378	1	15	80	0.68
24/11/99	124.8	726	172	499	1	16	96	0.74
Average			**209**					**0.62**

Based on the waste generation rate of 0.62 kg/person/day and a population of Honiara of 48,000 (Statistics Office, Department of Finance), the total amount of waste generated in one year in Honiara would be over 10,862 tonnes or over 51,970 cubic metres of uncompacted waste.

An analysis of the total number of loads of waste taken to the landfill by the Contractors in 1998 has been carried out. The results are given in Table 3.6.

Table 3.6 Number of Loads of Waste Collected in 1998

Month	J	F	M	A	M	J	J	A	S	O	N	D
Number of loads	313	387	366	458	395	441	422	427	465	480	448	496
Average loads/day	13.6	19.4	15.9	20.8	17.2	20	18.3	18.6	21.1	20.9	20.4	21.6
Approx weight /load	453	453	453	453	453	453	453	453	453	453	453	453
Total weight collected tonnes	142	175	166	207	179	200	191	193	211	217	203	225

The total estimated weight of waste collected and disposed of to the dump at Ranadi for 1998 is 2,300 tonnes, which equates to approximately 11,500 cubic metres.

The average number of loads collected by the Contractors (assuming 5 working days per week) is 19 per day. If there are 11 Contractors working on the municipal collection (excluding the markets) then each Contractor is taking 1.7 loads to the landfill per day on average. This appears to be well below the required minimum of 3 loads per contractor per day. In fact the contract documents that were sited state that there should be a minimum of 4 loads per Contractor per day for the daily contract rate of SBD$300.

It is recommended that the contractual arrangement between the collection Contractors and the Honiara Town Council is reviewed and monitoring of the Contractors performance is put in place.

3.5.3 Consultation

3.5.3.1 People Consulted

Interviews were conducted with a range of industries and commercial operations in Honiara as well as all of the businesses involved in waste management and recycling. The purpose of the interviews was to identify what types of waste are produced and what the current waste management practices are in industries, businesses and the Councils, and to gauge the levels of awareness of waste minimisation concepts. The following organisations were interviewed:

1. Honiara Town Council
2. Solomon Islands Water Authority
3. BJS Agencies
4. Solomon Islands Development Trust
5. Quality Foods Ltd
6. Quality Packaging Ltd
7. Solbrew Breweries
8. Wings Supermarket
9. Asian Paints
10. Solomon Soaps
11. Kwans Trading
12. Department of Statistics
13. National Referral Hospital
14. Solomon Islands College of Higher Education
15. Goodman Fielders

All of the interviews are written up and given in Appendix H. A summary of the important points is given below:

- There is beer bottle recycling by the brewery.
- Quality Packaging reuses wasted resin from the process.
- Generally there is no other recycling or reuse of wastes carried out in industry.
- Industries practices very little awareness of waste minimisation principles within the industrial and commercial sectors.
- The only recycling that is carried out in Honiara at present is non-ferrous metals.
- Community groups and educational institutions are keen to become involved in waste management initiatives.
- There is an excellent opportunity to help implement a demonstration waste management scheme at the School of Natural Resources Campus
- There is am excellent opportunity to work with the Solomon Islands Development Trust to build on the Sup-sup Garden Project to incorporate village composting initiatives.

- The National Referral Hospital does not have an adequate waste management system and there are serious problems with the hazardous waste disposal.
- There is no hazardous waste management system in place in Honiara.

3.5.3.2 Workshop Issues and Concerns

The workshop to present the findings of the fieldwork was held at the Honiara Town Council conference room on 26/11/99. All of the waste management stakeholders were invited and all industries and businesses that had been interviewed. A full copy of the minutes of the final workshop is given in Appendix F. The discussion is summarised below:

1. There is a need to audit industrial waste
2. Operational costs need to be covered and mechanisms to ensure operations are successful and efficient need to be implemented
3. Users should pay for the service.
4. Legislation needs to be implemented to ensure that waste management strategies are implemented successfully.
5. HTC questioned the potential for and the effectiveness of reducing waste by a large, low-income population such as Honiara. It was stated that it can be achieved through sorting of waste at home, by education the public.
6. It was commented that people might react negatively to increasing charges especially when the service is inadequate. The reply was that the Council would have to improve the quality of the service before they introduce fees.
7. Recycling was discussed. It was stated that the logistics for recycling have to be viable in order for it to succeed. Political or legislative influence would be extremely helpful in making recycling successful.
8. The existing landfill is running out of space and the quantities received have increased. Three sites have been identified – White River, Betikama and Green Hill. Public opposition has restricted progress on acquiring any of the sites.
9. HTC does not own a bulldozer and this hampers work at the landfill site.
10. Ideas for options for improving the current situation:
    - Formation of a nation a committee
    - A business plan
    - Implementation of a leachate control system
    - Employment of a solid waste management officer
    - Introducing a green waste programme

- Education in schools
- Use of bins for collection systems

11. Recommendations
    - A National Committee has to be formed because it is a national issue, also to get the broad involvement of the population. Committee to be formed after the report is submitted to the Cabinet for directives.
    - SPREP should be consulted to help set up the committee.
    - Legislation should specifically look at toxic and hazardous wastes. Existing requirements to EIAs need to include all issues associated with waste management.
    - Solomons should be party to the WAIGANI Convention on the transportation of hazardous wastes
    - The National Committee should carry out the identification of a new landfill site.
    - A rigorous education and awareness programme should be implemented to address cultural and social issues.
    - An expert should be hired to research and identify the best methodology for overcoming cultural and social issues.
    - A demonstration composting scheme should be implemented at the
    - Solomon Islands College of Higher Education.

4. Evaluation of Waste Management Systems and Markets for Recyclable Materials

This section of the report reviews existing integrated waste management programmes and resource recovery systems and evaluates them for their applicability to conditions in the Solomon Islands. Access to markets for recyclables is assessed and the cost of utilising these markets is discussed.

The feasibility of establishing recycling markets within the country is examined with respect to scrap metals, glass, paper, plastics and compost.

Factors to be considered in strategic waste management planning is summarised in Table 4.1, taken from the World Health Organisation Publication titled "Healthy Cities – Healthy Islands".

This table is prepared to help decision-makers at national and local government level make strategic decisions for the improvement of their solid waste management services. The table shows issues that should be considered when prioritising waste management strategy actions.

Table 4.1 Strategic Issues for Solid Waste Management in Honiara

Requiring Special Attention	Special Characteristic of Solid Waste Management	Strategic Measures to Improve Solid Waste Management
Small country size	Excessive amounts of packaging - recycling is difficult due to lack of economies of scale and remoteness from recycling markets	Firm commitment of the relevant Authorities for better solid waste management - credibility of waste management authorities is vital
Economy of country – small economy – dependence on foreign aid	Difficulty in equipment maintenance - problems getting spare parts - lack of skilled mechanics	Strategic planning - waste management planning is essential to achieve cost-effective use of limited resources
Improvement of environmental health - through better solid waste management	Difficulty in site acquisition for landfill - lack of land - land ownership issues	Waste minimisation first - source reduction is the most important rule for solid waste management in the future
Protection of fragile environment - groundwater - coral and mangrove ecosystems are resource base for fisheries and tourism	Insufficient or not duly trained human resources for waste management	Improvement of collection service and cost saving - collection is the most expensive process in solid waste management; improvement and cost savings can generate financial resources for sanitary landfilling

Promotion of tourism - clean town and beaches will attract more tourists	Lack of cleanliness awareness among the public - urban dwellers not familiar with disciplines of urban living such as refraining from littering	Use of saved cost for final disposal improvement - careful siting and management are key to successful landfill

It is recommended that the people involved in solid waste management in Honiara Town Council and the Department of Environment and Conservation use the World Health Organisation document "Healthy Cities – Healthy Islands" as a reference for strategic planning of waste management in Honiara. This document contains specific recommendations and criteria for the collection service, vehicles, waste receptacles, composting, recycling, transfer stations, management of contractors, landfill site selection, controlled landfill requirements, operation of landfill, as well as management and organisation of solid waste.

4.1 Evaluation of Waste Management Programmes

4.1.1 Waste Reduction

Waste reduction activities are important to halt or slow down the increasing rate of waste generation per capita. Waste reduction has several aspects, all of which should be addressed. These include toxicity reduction and volume reduction as well as encouraging products that can be recycled more easily. There are many successful cases of reduction of wastes by individuals, commercial enterprises and agencies using their purchasing power, as well as governments and industries.

In Pacific Islands countries, almost all goods are imported to sustain people's daily needs. This generates an excessive amount of packaging waste which, because of the limited market, has very little possibility of recycling except for aluminium cans and beverage bottles. Waste minimisation measures such as recycling of package waste practicable in other parts of the world are not easily applicable in Pacific Island countries.

Waste reduction is therefore one of the most critical elements of a solid waste management strategy for Honiara and is a practical option for a Pacific Island country. There **must** be a major focus on waste reduction in Honiara in the future.

Recommendation

1. Prepare an action plan identifying how to reduce the amount of waste produced in Honiara, including education, media campaigns, legislation, home composting.
2. Set targets for waste reduction for various waste streams and monitor them at regular intervals.

4.1.2 Collection and Transfer of Wastes

The waste collection system in Honiara is generally unsuccessful in terms of providing for the efficient, effective and economic removal of waste from source to point of disposal. This is the case in many of the Pacific Islands. The domestic collection system has been privatised in Honiara but the benefits have not been achieved.
The collection system is an integral part of the waste management strategy for Honiara and in order to improve the current collection system and overcome the inefficiencies the following factors must be considered in a detailed analysis of how to improve the current situation:

1. Distance to disposal site
2. Suitability of individual household collection or communal bins
3. Size and type of waste receptacles
4. Conditions of roads and proximity to residences
5. Transfer station requirement
6. Size and type of collection vehicles
7. Frequency of service
8. Willingness to pay
9. Methods of charging and collection
10. Privatised operation or local government operation
11. Separation of policy setting, implementation and operations for collection and disposal of waste.

Recommendations
It is recommended that a complete review of the collection system arrangements in Honiara is carried out and the following issues are considered:

- Clarify the definition of services to be provided
- Ensure the contractors are competent
- Choose a fair fee structure – payment by either lump sum per month or payment by weight or volume of waste collected
- Effective monitoring and control – implementation and enforcement of the contractual agreement
- Foreign aid and privatisation – public sector assets donated by foreign aid may be leased by contractors

4.1.3 Legislation/Regulation

One mechanism for waste reduction is to examine the imports to a country and identify which materials will lead to significant quantities of wastes. Action by the Government to reduce the imports that create wastes, through legislation or tariffs could be

part of the waste management strategy. This type of intervention may not be appropriate due to the following reasons:

1. Reluctance to interfere with consumer choice
2. Contravention of World Trade Organisation agreements
3. Restricted sources of imported goods.

In the Solomon Islands the use of legislation or tariffs to influence the purchasing and distribution policies for imported goods is a waste management option that should be considered in detail.

Government can also have influence on the success of waste minimisation schemes through tax structures. The exemption of taxes for the export of recyclable materials from the Solomon Islands or other tax incentives should be considered as part of the waste management strategy.

It is not evident in Honiara that the new Environment Act 1998 has been implemented yet, although the provisions of the Act allow for regulating the transport, collection, treatment, storage and disposal of wastes as well as the regulation of discharge of all pollutants to the environment. An important part of the waste management strategy will be the implementation of this legislation as well as improving the enforcement of the Litter Bylaw. Factors that need to be considered to achieve this are:

1. Which authority will have responsibility for implementing the Environment Act
2. Multisectoral nature of waste management legislation
3. Number of officers for enforcement of Litter Bylaw
4. Training for enforcement
5. Level of fines
6. Regular review and updating of legislation
7. Financial resources for enforcement of legislation

Recommendations
Set up a working group to specifically examine, recommend and implement waste management legislation.

4.1.4 Recycling

There are two basic approaches to recycling. The first involves separating recyclable materials at source (by the waste generator) and separately collecting and transporting these materials to recycling markets. The second involves collecting mixed wastes and separating these at a central processing facility. The key factors in the success of pre-separation efforts are the cooperation and willingness of the waste generator to participate in the programme over the long term, and the additional collection and transport costs

that may be required. The success of centralised recycling plants depends on the processing costs and the quality of the recyclable material produced.

The highest recycling rates reported in15 countries in 1990, were in the range of 10-18%. There are many good examples of successful recycling programmes throughout the world.

A major recycling impediment is the question of continued viability and availability of secondary materials market. The key points are:

- Recycling only occurs when the separated material is incorporated into a product that can be sold.
- Separation of materials does not constitute recycling – markets must be found first.
- Recycled products must be of a quality and price that compete in the marketplace.
- The difference in cost of disposal and recycling must be examined – ie. the price received for the recycled material, the waste collection and disposal costs avoided, the cost of separation, the costs of collection and processing the separated materials.

"The remoteness, relatively small size of the country and high degree of dispersion pose severe difficulty in transportation and market fragmentation. As a result, procurement of solid waste management tools, equipment, machinery, spare parts and even fuel is not only expensive but in many cases, very difficult to obtain. Very often the procurement encounters excessive delay. This situation also creates many constraints in waste recycling and often renders many alternatives not feasible." (Ref; World Health Organisation Publication titled "Healthy Cities – Healthy Islands)

The transportation of recyclable goods is one of the highest costs and can be higher than the return on the commodity carried. The opportunity to backload recyclable goods should be investigated in detail. The significant imbalance of imports to exports in the Solomon Islands means that there are significant opportunities to utilise empty ships leaving Honiara. Negotiation of appropriate shipping rates will also be critical to the viability of recycling in Honiara. It is recommended that a working group is formed to examine the feasibility of shipping recyclable materials to Australia, New Zealand and Asia, including importers, shipping companies, container leasing companies, government and local government representatives.

Recycling has considerable to be potential, but is likely to be marginally viable in economical terms and may need to be subsidised by the community, government or another body wishing to dramatically reduce the amounts of material entering the landfill.

Recycling of some materials might be feasible in Honiara or within the Pacific Region. Government, community and business support will be critical to the success of recycling.

Recommendations
1. Form a working group on feasibility of shipping recyclable materials from Honiara to overseas destinations.
2. Gain government and business support for implementing recycling in Honiara.
3. Negotiate a deal for the recycling of materials that have been identified as feasible. Consider using the existing recycling agency (BJS Agencies) as the company to implement the project.

4.1.5 Incineration

Incineration/combustion processes use the controlled combustion of solid waste for the purposes of reducing its volume. The advantages are destruction of hazardous waste, reduction of volume by up to 90%, and the possibility of energy recovery. In Denmark, Switzerland and Luxembourg over 75% of the municipal waste stream is treated by combustion with energy recovery. In Sweden it is over 60%, in France 43% and in USA 17%. Japan uses waste combustion to treat over 75% of the waste remaining after recycling.

The disadvantages of incineration are high capital expense, complex technology, complex operations, air emissions and management of ash residues. Incineration in Honiara has not been very successful to date as the Hospital incinerator and the quarantine incinerator are currently not in use due to poorly designed/selected equipment that is difficult to use.

It is likely that incineration will be viable on a small scale for the disposal of hazardous wastes, if appropriate management systems are put in place. Detailed planning is needed prior to selecting a system, with investigations into waste composition, potential users, funding and operations and maintenance.

Recommendations
1. Conduct a feasibility study on an incinerator for hospital waste and quarantine waste.
2. Identify funding for a new incinerator.

4.1.6 Sanitary Landfills

The disposal of waste to landfills continues to be the predominant method used worldwide. The 1990 International Solid Waste Association report indicated that the percentage of waste disposed of by landfills ranged from 20% to over 90% for 15 countries that

were examined (Ref. Skinner, J.H. 1998. International Progress in Solid Waste Management in "Solid Waste in the Pacific". Proceedings 6th Annual Conference, Christchurch 1994).

Open dumping of waste on land without adequate controls as occurs in Honiara can result in serious public health and safety problems and severe adverse environmental impacts. Modern sanitary landfills are equipped with leachate collection systems, liner systems, systems for control of landfill gas, groundwater monitoring, closure and post-closure care plans. The objective is to ensure that the landfilling activities are performed in a manner that greatly reduces the chance of release of contaminants to the environment and that any release is quickly detected and corrected.

The issues that need to be considered in improved landfill management for Honiara are:

- Sources of funding and financial constraints
- Short term and long term planning
- Access to suitable land
- Lack of technical training
- Inappropriate selection of equipment

The provision of sanitary landfill services is a critical component of the integrated waste management strategy for Honiara.

Recommendations

1. A full review of landfill management in Honiara should be conducted by a working group and a programme and timeframe developed for the implementation of a new landfill and closure of the existing site.
2. A landfill management plan for the existing landfill at Ranadi should be prepared and implemented.
3. Identify funding for new landfill.

4.1.7 Composting

Due to the quantity of biodegradable waste being produced in Honiara it is recommended that composting be implemented as a major part of the waste management strategy. Composting produces a valuable product that can minimise the need to import expensive fertilisers. Composting is a well known technique and there are numerous proven operations around the world.

The issues that need to be carefully considered before implementing a composting scheme in Honiara are:

- Composting at community level or household level?
- Initial funding

- What is the economic value of the product - can it be sold?
- Private scheme or government operated scheme?

Assuming a community or municipal scheme, there is at least 7000 tonnes per annum of organic matter available in Honiara based on the current waste generation figures. Assuming an 80% capture rate for this material and an average compression ration of 20 to 1 from loose green matter to finished product then there is approximately 1,100 cubic metres per annum of compost as product available. (This figure is conservative). Assuming compost could sell at SBD$60/cubic metre (Aus$20/cubic metre), there is a potential return of SBD$66,000 per annum (Aus$22,000 per annum). Note: the value of the compost product in Honiara will have to be determined.

Home composting has already proven to be successful in Honiara under the scheme called Honiara Sup Sup Garden Project. Three key factors in the support of home composting are:

- Improvement in nutritional balance
- Waste reduction at source
- Reduction in importation of food items

Keys to successful home composting are – organise community group; use grass-root communications; and make the operation simple with use of local resources.

Recommendations

1. Build on the existing Sup Sup Garden Project to increase the number of home composting systems that are in use.
2. Implement a demonstration composting scheme at the School of Natural Resources. Use market waste initially.

4.2 Opportunities and Obstacles

A summary of specific opportunities and obstacles to the successful implementation of waste minimisation initiatives in Honiara is highlighted in Table 4.2.

Table 4.2. Opportunities and Obstacles for Waste Minimisation in Honiara

Opportunities	Obstacles
School of Natural Resources is willing to set up a demonstration scheme	Lack of funds for waste management initiatives
When new landfill is designed a recycling centre could be incorporated	Lack of public awareness on waste management issues
Metal recycling is viable and in operation –	Poor management of existing waste collection

can be expanded	scheme
SIDT is in a good position to educate community an promote community schemes	Lack of public ability to pay
Likely to be a market for compost	Lack of public “perception of waste”
Plastic manufacturer interested in using biodegradable plastics	No financial incentive to segregate waste at source
	Small volume of recyclable material available
	Cost of shipping material to Australia or Asia for recycling
	Brewery not willing to undertake recycling unless economically viable
	Paper recycling not successful due to climate (growth of fungus)

Further key opportunities that must be considered in justifying strategies and expenditure on solid waste management are related to the following significant environmental health impacts:

- **Fisheries** is an important economic resource which can easily be affected by improper solid waste management
- Protection of the "enchanting environment" as a valuable resource for the **development of tourism** is an important objective in the development of solid waste management. Tourism development has become an important economic strategy for the Solomon Islands. Tidy towns, clean beaches and healthy people will definitely attract more tourists.
- **Health impacts** from contamination of the groundwater lens can be significant – protection of this vital resource is a priority in solid waste management
- Preventative measures to control the outbreak of infectious diseases through the improvement of solid waste management will improve the **cost-effectiveness of health care**.

4.3 Existing Markets

The only recycling that is being carried out at present in Honiara is scrap metal recycling and glass bottle recycling at the Brewery. Paper recycling and tyre recycling have been tried in the past by BJS Agencies but these were not economically viable at the time.

- Scrap metals: Aluminium cans and aluminium – 85-95c/kg
  Brass - $1.05 – 1.10/kg
  About 84 tonnes per year recycled to Brisbane: 28 tonnes aluminium cans, 56 tonnes other non-ferrous metals
- Glass bottles about 75-80% $12 per crate of beer or coke bottles, of bottles are recycled

4.4 Potential Markets

Table 4.3 gives a rough indication of the prices at present in New Zealand and Australia paid for recyclable materials, the estimate of amounts available in Honiara and the current estimate of shipping costs.

Table 4.3 Potential Markets for Recyclable Materials

Material	Type	NZ$/tonne (bailed and shipped to NZ	Aus$/tonne (bailed & sorted to Asia)	Amount available in Honiara (tonnes/year)	Shipping cost SBD per tonne
Glass	Colour sorted	80 – 85		490	266 (NZ$107)
Paper	Cardboard Newspaper Mixed	100 – 140 100 40	160 112	640	266 (NZ$107)
Plastic	PET HDPE LDPE	Low density = 50 – 100 High density = 350 – 440		1800	266 (NZ$107)
Metal	Al cans Steel cans	1,500 25		660	266 (NZ$107)

Note:
Low density = loose to less than 500 kg/m^3
High density = 500 kg/m^3

4.4.1 Glass Recycling

There is the potential for further glass recycling to be implemented at two levels - increase the volume of recycled bottles returned to the Brewery, and shipping of crushed glass to Australia, New Zealand or Asia for recycling.

4.4.2 Paper Recycling

Paper recycling is available in New Zealand, Australia and Asia. The waste paper is sorted and bailed in NZ and shipped to Indonesia, Malaylsia and Australia for processing. It is recommended that only two grades of paper be used for recycling in the Islands – mixed grade and cardboard grade. The key aspects to making a paper recycling operation successful are:

- big equipment to bail a large volume of material,
- sufficient capital behind the operation to invest in equipment,
- the ability to withstand the fluctuations in the market price,
- the ability to put a large weight of material in a container to economise on shipping costs,
- the negotiation of cheap shipping costs,
- the volume, form and quality of the material.

A small paper bailer would cost approximately NZ$10,000 – 15,000 and could process about 5-6 tonnes paper per eight hour day. Assuming staff requirements for collection, sorting and bailing are 3 for collections and 4 for sorting and bailing and delivery to the wharf, at a cost of NZ$5/hour, and 5 tonnes processed per day then a cost of approximately NZ$84/tonne for collection and sorting is estimated. These costs and shipping costs must be kept to a minimum in order for paper recycling to be feasible.

4.4.3 Plastic Recycling

Plastics including PET, HDPE and LDPE are sent to Indonesia, Phillipines, Thailand and Australia for recycling. New Zealand can recycle HDPE. The process generally involves collection, sorting, grinding and packing before shipping to Australia or Asia for re-processing.

The sorting of plastics is more critical to the successful recycling of plastics. LDPE can only be processed if well sorted, HDPE is better if it is uncontaminated with other materials eg. Milk bottles are good, household chemical bottles require separation of parts. Clean plastic bags can be recycled also.

4.4.4 Metal Recycling

At present metal recycling is being carried out successfully by one well established recycling business, BJS Agencies. There is the potential to significantly increase the volume of metal being recycled. It is recommended that a small working group is set up, including a representative from BJS Agencies, to identify what actions are needed and what support from government is needed to increase the amount of metal recycled.

4.4.5 Composting

Composting is identified as a highly favourable option as the process can be carried out locally thereby removing the requirement for transportation of goods. The process makes a valuable product that is useful in Honiara. Composting will need to be carried out on a small scale initially to ascertain the best operating parameters. A demonstration composting project using market waste at the School of Natural Resources would be an ideal way to start composting in Honiara.

4.4.6 Prices for Recyclables

Table 4.3 gives prices for recyclable materials in 1992 in New Zealand as a rough indication of the value of various materials:

Table 4.3 1992 Prices for Recyclable Materials

Material	1992 Price (NZ$/tonne)
Glass (broken and sorted by colour)	58
Glass bottles for reuse	3-30 cents
Window glass	45-75
Cardboard	80-100
Newspaper	10-40
Mixed waste paper	35-40
Computer paper	100-120
Cardboard (kraft)	60-80
Plastics	50-350
Plastic film	10-350
Textiles (clean cotton)	300
Textiles (clean woollen)	100
Non- ferrous metals	180-3000
Scrap iron and steel	30-150
Car bodies	$15 per car stripped
Household batteries	No market
Compost	$5-7 per 40 litre bag
Compost (bulk)	$50 per cubic metre

4.4.7 Issues for Recycling from Pacific Islands to Overseas Destinations

1. Government needs to look at shipping costs
2. Container Leasing Companies need to be part of the negotiations – Is there a build up of containers in Honiara that need to be transported back to another centre?
3. Shipping to a hub will be required eg. New Zealand, Australia or Asia
4. The frequency of shipping is a key factor
5. Mixed containers can be utilised eg. half plastic, half paper
6. 44 gallon drums can be used for compression of recycled materials such as paper, metal, cans, and crushed glass.

5. Alternative Integrated Solid Waste Management Activities

5.1 Introduction

Alternative integrated solid waste management systems have been developed emphasizing source segregation, collection, composting, reuse, recycling and resource recovery as well as collection, transfer and disposal to landfill. The alternative systems have been evaluated and ranked for feasibility and compatibility with the needs of the Solomon Islands. Ranking characteristics include:

- Capital costs
- Technical requirements
- Administrative requirements
- Operational requirements
- Ease of implementation
- Operation and maintenance costs
- By-products
- Political acceptability
- Social acceptability
- Environmental impacts

5.2 Implementation

The strength of an integrated waste management system lies in its working towards sustainability using an integrated approach and emphasizing prevention rather than cure. The waste management hierarchy is an important tool for prioritising actions. The definitions of levels of the hierarchy are given below:

- Prevention: covers methods whereby wastes or emissions are prevented from being generated at their source.
- Reduction covers methods whereby the quantity or hazardous nature of wastes and emissions are reduced at source.
- Re-use covers methods whereby waste and emissions are re-introduced to the same production process or re-used for the same purpose. These wastes do not require processing prior to re-use.
- Recycling covers methods whereby wastes and emissions are re-introduced to the same process or made available for use in another process. Recycling can occur on-site or off-site and the wastes and emissions usually require some form of processing prior to re-use.
- Treatment covers methods whereby wastes and emissions are altered in some way to reduce their quantity, concentration or hazardous properties.

- Disposal covers methods whereby wastes and emissions are eventually returned to the earth or the atmosphere.

Good waste management also depends on a partnership between all levels of government and the community. The success of recycling collection schemes can be highly variable. Often the collection and sorting of recyclables has been emphasized rather than the development of recycling schemes which produce marketable products. The future of recycling schemes is dependent on establishing viable markets for targeted materials.

Options for implementation of these integrated waste management strategies include the following:

- Through national environmental or waste management legislation
- Through health legislation
- Through local legislation and regulations
- Research, education and promotion of environmentally sound waste management practices
- Technical and general advice to authorities, operators and industry
- Voluntary measures such as codes of practice
- Economic instruments
- Bans of particular materials or products
- Systems for recovery

The options can be implemented at all levels of the community including the following groups:

- Central Government
- Local Government
- Waste collection and disposal operators
- Commercial waste producers
- Manufacturers
- Importers
- Domestic waste generators
- Special interest groups
- The public

5.3 Ranking of Alternatives

Table 5.1 gives a ranking from 1 to 3 for various waste management options against criteria including cost, social, environmental and technical criteria. A ranking of 1 is generally indicates a more preferable options where 3 indicates a less preferable option. The cost criteria are added to give a costs total and cost ranking and then all criteria are added to give a total and overall ranking.

Table 5.1 Ranking of Waste Management Options against Criteria

	Costs				Effectiveness								Overall	
Criteria	**Capital Costs**	**O&M costs**	**Cost Total**	**Cost Ranking**	**Technical Requirements**	**Operational Requirements**	**Ease of Implement-ation**	**By-products**	**Political & Social acceptability**	**Environ-mental Impact**	**Effective-ness Total**	**Effective-ness Ranking**	**Grand Total**	**Overall Ranking**
Waste Management Option														
Disposal to landfill	2	1	3	**2**	2	2	1	3	1	3	12	**7**	15	**7**
Incineration	3	3	6	**5**	3	3	3	3	3	3	18	**8**	24	**9**
Municipal Composting	2	2	4	**3**	3	2	2	1	1	1	10	**5**	14	**6**
Home Composting	1	1	2	**1**	1	1	3	1	2	1	9	**4**	11	**3**
Recycling within country	3	2	5	**4**	3	3	2	1	1	1	11	**6**	16	**8**
Recycling overseas	1	2	3	**2**	1	3	2	2	1	2	11	**6**	14	**6**
Reuse	1	1	2	**1**	1	2	2	1	3	1	10	**5**	12	**4**
Legislation to ban products	1	1	2	**1**	1	2	3	1	3	1	11	**6**	13	**5**
Legislation to tax packaging	1	1	2	**1**	1	2	3	1	3	1	11	**6**	13	**5**
Segregation at landfill	2	2	4	**3**	2	2	1	1	1	2	9	**3**	13	**5**
Segregation at source	1	2	3	**2**	1	2	3	1	2	1	10	**5**	13	**5**
Education programme	2	1	3	**2**	1	1	1	1	1	1	6	**1**	9	**1**
Media Campaign	2	1	3	**2**	2	1	1	1	1	1	7	**2**	10	**2**
Glass recycling to supplier	1	1	2	**1**	1	1	2	1	1	1	7	**2**	9	**1**
PET recycling by Cococola	1	1	2	**1**	3	1	2	1	1	2	10	**5**	12	**4**
Paper recycling	1	2	3	**2**	2	2	2	1	1	2	10	**5**	13	**5**
Metal recycling	1	2	3	**2**	2	2	1	1	1	1	8	**3**	11	**3**

Note:
1. Cost total is equal to the sum of rankings for capital costs and O&M costs.
2. The effectiveness total is equal to the sum of rankings for technical and operational requirements, ease of implementation, by-products, political and social impact and environmental impact.
3. Overall total is equal to the sum of ranking for all criteria.

Based on the criteria described under effectiveness the prioritised options would be as follows:

Effectiveness Priorities
1 Education Programme
2 Media campaign / Glass recycling to supplier
3 Segregation at landfill / Metal recycling
4 Home composting
5 Municipal composting / Reuse / PET recycling by Cococola Amatil / paper recycling / Segregation at Landfill
6 Recycling both within Honiara and overseas / Legislation to ban or tax products
7 Disposal to landfill
8 Incineration

This ranking process gives the following overall priorities for waste management options in Honiara:

Overall Priority
1 Glass recycling to supplier / Education programme
2 Media campaign
3 Metal recycling / Home composting
4 PET recycling by Cocacola Amatil / Reuse
5 Paper recycling / Legislation to tax or ban products / Segregation of wastes at landfill
6 Municipal Composting / Recycling overseas
7 Disposal to landfill
8 Recycling within Honiara
9 Incineration

6. Rate Structure for Finance Waste Management Activities

This section of the report assesses the capital and operational costs of the waste management programmes and the benefits of income generating waste minimisation activities. Recommendations are made on fee collection systems/disposal costs.

6.1 Cost Priorities for Waste Management Options

Based on the ranking procedure carried out in Table 5.1 above based on cost criteria only the following priorities were determined for Honiara:

Cost Priority

1 Glass recycling to supplier / Legislation to tax or ban products/ Reuse / Home composting / PET recycling by Cocacola Amatil
2 Education programme / Media campaign / Segregation at source / Recycling overseas / Paper recycling / Metal recycling / Disposal to landfill
3 Segregation at landfill / Municipal composting
4 Recycling within country
5 Incineration

6.2 Recommendations on Fee Collections

The current rate structures for waste collection and disposal are given in Table 6.1 below for the eight countries in the Pacific that have been studied are part of the SPREP Waste Characterisation and Management Plans Study.

Table 6.1 Comparative Costs of Waste Collection and Disposal

Country	Collection per week	Domestic Waste	Commercial Waste	Industrial	Tip Fees	Skip/Bin (per load)
Solomon Islands - SBD	1 - 2	Free	2.50/ collection (Aus$0.79)	5.00/ collection (Aus$1.59)	Free	
Fiji - FJ$	2 - 3	Free	Free	-	3.30 ($2.5) – household 5.50 ($4.30)– trade/ commer. 16.50 ($12.85)- condemmed 22.00 ($17)- hazardous	30 (Aus$23)
Vanuatu - Vatu	3	6,000 (Aus$72)	9,000 (Aus$108)	60,000 – 360,000 (restaurants – hotels) (Aus$722-4,337)	100 – car ($1.2) 200 – Hilux ($2.4) 300 –Lorry ($3.6) 1,500 – Disclutcher ($18)	2,500 – 3,500 (Aus$30 – 42)
Tonga - Panga	1 - 2	6 (Aus$5.77)	12 – 18 (Aus$11-17)	24 (Aus$23)	Free	-
Kiribati (Aus$)	1	(Aus$17 – 29)	(Aus$50 – 600)	-	Free	-
Tuvalu (Aus$)		(Aus$30 10/load green waste)	(Aus$100 – 400)	-	Free	15
W. Samoa	2 - 7	Free	Free	Free	Free	-
Papua New Guinea (Aus$)	1-7	120 – 420 (Aus$60 – 208) (small) 395 – 1380 Aus4$196 – 685) (240l)	240 – 1380 (Aus$119 – 685)		2(2.5) - car/utility 7(3.5) -1.5Tonne 10(5) -K600 Truck 8(4) -industrial bin	
New Zealand (Aus$)	1	185 (Aus$145) 6.5(Aus$ 5.10) – recyclables			50 (Aus$39)	

Note:
Figures given in brackets are in Australian Dollars.
All other figures are in the local currency.

The table above shows that the charges for waste collection and disposal in Honiara are low compared with other Pacific Island countries. In Western societies the rate structure for waste management is moving towards full cost recovery. Full cost recovery for waste collection and disposal in Honiara is the ultimate aim. However the public "ability to pay" is a significant factor to be considered in Honiara. It is recommended that the costs of waste collection and disposal are accounted for on an annual basis and that charges are set for the public based on a survey of "ability to

pay", with increases towards full cost recovery over the medium term.

It is also recommended that a gate fee for using the landfill be implemented as this is an area where there is not enough revenue to maintain the facilities adequately. Records of vehicles entering the landfill and the amount collected should be kept as part of the daily operations.

7. Integrated Solid Waste Management Plan

7.1 Objectives of the Plan

The objectives for the Integrated Solid Waste Management Plan for Honiara are:

1. To create a framework for solid waste management in Honiara that integrates all levels of solid waste management from legislation, government involvement, municipal council management, waste management operations, businesses, community bodies and the public.

2. To ensure that solid waste is managed in the most appropriate manner for Honiara and the people that live there, both economically and environmentally.

3. To incorporate sustainable environmental management principles and waste minimisation initiatives into the plan so as to minimise the environmental effects of solid waste management.

The Plan will provide a basis for prioritising actions required by waste managers in Honiara in the short to medium term.

The Plan will be based on the information as presented in this report as well as economic factors, regional waste management activities and international best practice in solid waste management. The Plan will take into account the current situation for solid waste management in Honiara, the current waste generation rates and waste classification data. It will also look at factors such as future solid waste generation, population changes, wealth, social change, education, markets for recyclable materials and regional influences.

This draft report only discusses some of the priorities and options that have been identified during the fieldwork in the Solomon Islands, that may be incorporated into the final solid waste management plan. Other issues such as institutional strengthening will need to be addressed for the implementation of the Plan.

7.2 Waste Minimisation

- Implement segregated municipal waste collection for green waste

- Designate an area for green waste dumping at the current landfill or at another suitable area in town. Notify the public of the change to segregated collection and dumping of green waste. Arrange for separate municipal collection of green waste. Obtain a shredder and mulch or compost any green waste or organic waste at a demonstration scheme at the School of Natural Resources

- Work with the School of Natural Resources to implement a waste minimisation demonstration project at the campus.

- Increase the quantity of aluminium and other non-ferrous metals recycled through existing scheme by increased publicity and education. Work with the current scrap metal recycler to improve the efficiency of the metal recycling market.

- Negotiate a subsidised or cheap option for shipping of waste materials to Australia, New Zealand, Fiji etc. Consider using legislation or regulation to achieve this if necessary.

- Implement a packaging legislation to create an incentive for return of packaging for recycling eg American Samoa has recently implemented legislation.

- Fund a feasibility study into plastic recycling either at local plastic manufacturers or shipping to Fiji or Australia.

- Government to investigate the possibility of setting up a waste management fund for the support of waste minimisation and recycling schemes in the Solomon Islands.

- Local government /Government to review the implementation and support of a business to crush large thin gauge steel waste items such as car bodies and whiteware, for recycling.

7.3 Refuse Collection

- Undertake a complete review the management and operation of the domestic, commercial, industrial and market waste collection system. Make recommendations to improve the efficiency of the collection and the frequency and reliability of the system.

- Review the Honiara Town Council “Refuse Collection Agreement” incorporate and annual or biannual review in the future.

- Review charging system for waste collection and dumping of waste and move towards a user pays system where possible.

- Improve collection of fees for waste collection services and accounting of income and expenditure for waste collection system.
- Investigate funding to buy wheelie bins or other suitable receptacles for domestic collection.
- Plan for a future segregated municipal waste collection service in Honiara – for green waste, glass, metals, PET and paper.

7.4 Disposal of Refuse to the Landfill

- The site for a new sanitary landfill should be selected as soon as possible and a programme put in place for the development of the new site and the closure of the existing landfill site as soon as possible.
- Find funding for the development of a new sanitary landfill.
- Find funding for a bulldozer to be available at the landfill on a more regular basis, to prevent blockage of the access road.
- A management plan for the operation of the current landfill site should be prepared to ensure that the dump is operated in a safe manner that minimises adverse effects on the public and the environment. The plan will cover aspects such as monitoring of vehicles, monitoring of waste volumes and types on a regular basis, plan for areas for filling, monitoring of lagoon water quality, methods for daily compaction and cover of waste, pesticide control and segregated dumping for green wastes and organic wastes.
- Put in place measure to stop the practice of burning wastes at the landfill.

7.5 Special Wastes

- Conduct a full waste audit on the National Referral Hospital and implement a structured hospital waste management system
- Training for hospital staff in the proper management of medical waste.
- Identify funding for a new hospital waste incinerator

- Publicise and implement waste oil collection system for burning in a suitable industrial boiler. Implement an oil collection depot at the landfill or at one of the oil company premises.

- Implement waste pesticide container collection. Investigate options for disposal.

- Implement collection of waste batteries for proper disposal.

7.6 Community Involvement

- Education programme to raise public awareness of solid waste management principles and waste minimisation concepts. Concentrate on primary and secondary schools, businesses, church groups and women's groups in the community.

- Investigate curriculum changes to incorporate waste minimisation education into schools.

- Publicity on new recycling schemes and segregated collection systems eg. Posters, pamphlets, radio interviews, television

- School collection scheme for recyclables

- Implement demonstration projects for waste segregation, minimisation and composting in villages, through the Solomon Islands Development Trust. Source education material for the SIDT to use.

- Liaise with College of Higher Education, School of Natural Resources to implement a campus demonstration waste minimisation and composting scheme.

7.7 Organisation of Solid Waste Management

- Appoint a Solid Waste Management Officer to organise solid waste management and waste minimisation Honiara and to liase between the Department of Environment, Honiara Town Council, waste management contractors, local business and the public as well as international organisations that can assist in solid waste management in the Solomon Islands.

- Review the waste management systems and the organisational structure of waste management within the Honiara own Council and the Government Departments. Act on recommendations of review with the aim of improving the efficiency of waste management in Honiara.

- Identify responsibilities, funding and staff for the improved enforcement of littering and illegal dumping of wastes.

7.8 Implementing the Plan

- Hold a workshop with government ministers, NGOs, business and community leaders, Honiara Town Council, Department of Environment, waste management contractors and community leaders. Discuss, revise and agree on the components of the Plan. Prioritise actions, responsibilities and timeframe for the Plan. Set measurable targets for waste minimisation.

- Form a Solid Waste Committee with representation of all waste managers, government and community, to set and monitor on-going waste minimisation objectives.

- Obtain Government or overseas agency funding to implement a demonstration scheme for composting

- Review local, national and international funding of on-going waste management and waste minimisation projects (both in urban and rural areas), to identify new and increased levels of funding.

- Report on the effects on waste management of the future tourism developments in the Solomon Islands. Examine the options for future waste management.

Appendix A - Terms of Reference

Appendix B - Study Methodology

Appendix C - Curricula Vitae

Appendix D - List of Contacts

Solomon Islands : List of Contacts

Name	Organisation/Company	Position	Phone/Fax
Joe Horokou	Department of Natural Resources		Ph: 677 25849 Fax: 677 21245
Abednigo Maeohu	Environmental Health Division Honiara Town Council	Senior Health Inspector	Ph: 20230/20433 ext 27
Moses Harisimae	Environmental Health Division Honiara Town Council	Chief Health Inspector	
Ethel Napolu	Environmental Health Division Ministry of Health	Food Safety Officer	
Katheryn Clarkson	Solomon Islands Water Authority	Environmental Engineeer	
Wycliff Maebula	Solomon Islands Water Authority	Quality Control Officer	
Nancy Jolo	Environmental Health Division Honiara Town Council	Food Safety Officer	
Raymond Ginns	Environmental Health Division Honiara Town Council	Health Inspector	
Sunil Bhasale	Asian Paints Ltd	General Manager	Ph: 677 30484 Fax: 677 30429
Juan Porras	BJS Agencies	Manager Operations	Ph: 677 22393 Fax: 677 21027
Abraham Baeanisia	Solomon Islands Development Trust	Director	Ph: 677 23409 Fax: 677 21131
Steven Siapu	National Refferal Hospital	Hospital Secretary	Ph: 677 21910
Mr Chan /Mr Nihao	Wings Supermarket		Ph: 20108
	Shell Oil		Ph: 21838
James Wini	Kitano Mendano Hotel	Personnel Manager	Ph: 677
Averne Pantin	Solbrew	Technical Manager	Ph 677 30257 Fax: 677 30852

Name	Organisation/Company	Position	Phone/Fax
Evelyn Truman	Solomon Soaps Ltd	Manager	Ph: 677 30266
Shaun Joiles	Fielder Industries (SI) Ltd	General Manager	Ph: 677 30146 Fax: 677 30399
Denis Kwan	Kwans Trading	Manager	Ph: 677 30880
Mr Lot Kaisi	Quality Foods	Supervisor	Ph: 677 30157
Jack Usuli	Quality Packaging	Production Manager	
Alex Makini	Solomon Islands College of Higher Education	Head, Department of Natural Resources	Ph: 677 Fax: 677 30390
Janet Ta'ake	Honiara Womens' Training Centre	Manager	Ph: 677 25623

Appendix E - References

1. Ministry of Foreign Affairs and Trade, NZ. Trade and Economic Prospects in the Pacific Islands. 1997.

2. SPREP, UNEP. Guidelines for Municipal Solid Waste Management Planning in Small Island Developing States in the Pacific Region. June 1999. ISBN 982-04-0200-X.

3. Suresh, Raj. Solomon IslandsDuty Travel Report – Lome IV Pacific Regional Waste Awareness and Education Programme. Project No 7 ACP RPR 584 (Reg/7714/000). October 1998

4. Project Work Plan. Pilot Study: Kukum Campus (SICHE) Solid Waste Management Project.

5. Solomon Islands Development Trust, 1998 Annual Report.

6. Government of Solomon Islands, The Environment Act 1998.

7. Galokepoto, C. A collective Voice for Honiara Town Council on the Collection and Disposal of Household Solid Wastes. 27th November 1995.

Appendix F - Notes of Meeting with Industry

Meeting with:Solomon Islands Development Trust
Honiara, Solomon Islands
Date: 18/11/99
Attending: Abraham Baeanisia Director
Juliet Woodward

1. There are 12 village demonstration workers (VDWs) in Honiara, and 256 workers throughout Solomon Islands. There are 52 workers in the office. This is the 18th year of operation for SIDT.
2. SIDT uses radio, theatre, a magazine and demonstration projects to educate. The messages in drama are very effective here in the Solomons.
3. The current offices are on reclaimed land that they prepared by infilling with organic waste. Composting and inter-planting of vegetables and flowers is practised in the compound as an example to the community.
4. The Supsup Garden project has been successful and aims to teach village people how to compost wastes and to plant vegetable near to the homes to improve nutrition. The benefits are food, nutrition, cutting costs and cutting wastes.
5. Have done trials/survey to find out how much compostable material is in the homes and this was 75%.
6. Demonstration projects at grass roots level is the key to changing behaviour.
7. 2 loads of market waste were trialed for a composting scheme but then the Council stopped bringing the waste.
8. Believes that waste management should start at the home, and should involved community groups such as women, the church and youth. The community leader needs to be involved in making successful changes in the community.
9. Schools have organised “cleanathons” on the main roads in the past.
10. Littering is a problem here. People do not understand or recognise what waste is – this is the biggest problem. TO the locals “rubbish is something that stinks”, not just something that is unpleasant for the eyes.
11. There should be a sharing of responsibility for waste taught.

Meeting with: Quality Foods
Honiara, Solomon Islands
Date: 19/11/99
Attending: Mr Lot Kaisi
Juliet Woodward

1. Manufacture ice-cream and iceblocks for the local market. Company is Australian owned. 30 employees.
2. Produce about 4000small iceblocks per day and 4000 large iceblocks per day.
3. The plastic containers for ice-cream are brought from Australia. There are 125ml. 1, 2, 3, 4, 5, 6 litres containers.
4. Raw materials come in plastic sacks – these are reused by locals for carry bags.
5. Cardboard boxes are used for packing ice-cream. These are from Australia (cheaper than local cartons).
6. Waste is put into 3 x 200 litre drums, and emptied 3 times per week i.e. 1800 litres of waste per week. They take their own waste to dump – free of charge.
7. There are 2 delivery trucks – waste oil given away for lubrication and old batteries go to the dump.
8. Old equipment is stored for parts.
9. Green waste goes to the dump.
10. Would pay if the Council requests it – thought hopes it would be a small fee.

Meeting with: Quality Packaging
Honiara, Solomon Islands
Date: 19/11/99
Attending: Mr Jack Usuli Production Manager
Juliet Woodward

1. Manufacture plastic bags (LDPE and HDPE) and PET bottles.
2. Resin comes from Philippines, Australia, Middle East (Qatar).
3. Have 3 grades or bottles: 1st grade is used for water ($1.24/bottle 500ml, $1.5/bottle 1.5litre); 2nd grade is used for oil ($1/bottle 1.5litre, $0.75 500ml). 3rd grade is sold to locals.
4. Sell bottles to Solbrew, soap factory, Total Water and Schweppes. Total bottles sold are approximately 8700 per month.
5. Carry bags are sold to Arko, local businesses, Tobacco Company, to Gizo. 150,000bags/month carry bags and 60,000 poly bags/month sold.
6. Waste LDPE is recycled in the recycling machine. Waste HDPE is not recycled but is used for packaging sometimes.
7. Wastage is calculated regularly - approximately 5%. Workers are encouraged to minimise waste.
8. Waste is 1-2 25kg bags per week.
9. Resin purchased is 16.5 tonnes every 6 months. Costs $12/kilo.
10. Resin sacks are sold to locals.
11. Are looking at using biodegradable resin in the future if management can be convinced. If there was support from Council this would be easier.
12. Would be willing to work with Council on waste initiatives.
13. Believes that there are no proper guidelines on waste management from the Council. There are no restrictions on what is dumped. A bylaw is needed and more enforcement of littering.

Meeting with: Solomon Breweries
Honiara, Solomon Islands
Date: 19/11/99
Attending: Mr Averne Pantin Technical Manager
Juliet Woodward

1. Produce beer, Coca-Cola, fanta and sprite.
2. Waste is taken to the dump once every 2 days – 400litres i.e. about 1200litre per week.
3. Wastes are: spent malt – 32,000 kg/month; yeast – 20litres/month; labels; broken glass – 252 tonnes/year.
4. Waste rate is 0.8 – 1% bottles. Bottles are reused 10 times.
5. 60,000 bottles beer per day is produced and 10,000 Coca-Cola bottles per day.
6. Spent malt could be used by farmers as fertiliser or animal feed. Tried to give it away but not enough was taken and there was a backlog so it now goes to the dump. Yeast has to be baked to 150 degrees to kill it before it can be reused as fertiliser.
7. Sludge from the wastewater treatment system is emptied once per year to dump.
8. There are 116 employees. There is in-house training for efficiency and waste reduction.
9. Company is owned by Germans – are audited 4 times per year – all production data is sent to Germany regularly.
10. Management would not be willing to pay for the dump unless it was legislated.
11. Coca-Cola is implementing a quality system that includes some environmental management. They will be required to upgrade their wastewater treatment system, which at the moment consists of sedimentation and direct discharge to the sea.
12. 95% of raw materials are imported from Germany. The sugar and malt is from Australia.
13. Raw materials come in paper and polyethylene bags. Paper is dumped and plastic bags are reused by locals.
14. Caps are dumped.
15. Wooden pallets are reused.
16. Old machinery is sold.
17. Glass recycling is not economically viable.
18. Beer is sold in cartons – cartons are not reused because they look too tatty. Use 40,000 cartons per month.
19. 75-80% of bottles are returned remainder is dumped or broken. Some people stockpile bottles are a form of saving and may cash them in at Christmas etc. Refund price is $12 per crate for beer and coke.
20. Company does do sponsorship of sporting and community activities – mainly from a marketing point of view.

Meeting with:	BJS Agencies Ltd Honiara, Solomon Islands	
Date:	19/11/99	
Attending:	Mr Juan Poras Acting Director Juliet Woodward	Manager Operations

1. Have 1 truck and driver and 2 assistants. Go to the dump and buy the scrap non-ferrous metal from scavengers there. Also visit a number of contacts around town to collect or people ring up and ask for collection. Also buy of aluminium fabricators such as R&R and China Aluminium Works.
2. Have 12 cages around town for can collections at hotels. Clubs and government residences.
3. Business is self funded with no assistance from government. Some businesses have been started up in the past with overseas assistance and they do not work e.g. Can Care with international funds lasted 18 months.
4. The price fluctuations on the world metal market affect the profits of BJS as the prices paid for scrap in the Solomon Islands can not be changed all the time.
5. At present they pay: Aluminium – 85-95c/kg; Brass – $1.05-1.10/kg.
6. There is a great need for something to be done in the outer islands. Tried to set up a scheme in Munda where they sent a can crusher for free and involved the youth group but in 18 months they have only sent 1 load. All of the payment they received in Munda went towards the shipping costs. They cost of freight is prohibitive. Suggested using an old barge they have up there but this has not happened.
7. Send about 1 container per month to Metal Corp in Brisbane. Pay SBD$4000 per container to Brisbane- this is cheaper than containers coming up ($5400). Shipping company is called Tradco (Gerald Stencil).
8. There is 6-8 tonnes per container, which is about 1/3 aluminium cans and the rest is other metals. This equates to 84 tonnes per year – 28 tonnes Al cans and 56tonnes other metals.
9. Would like to do about 2- container per month and cover the outer islands. There are good opportunities in Malaita, Gizo, Munda and Noro. Charges for inter-island freight a re prohibitive e.g. SBD$160/m3 for Munda to Honiara.
10. BJS is the only operation in Honiara. There is one private guy who sends his own sometimes.
11. Have tried to do thin gauge steel e.g. whiteware and cars but this was not profitable. Need a machine to cut up the cars easily.
12. Other areas could be included if they had a furnace e.g. extruded aluminium, but the cost of the furnace is prohibitive (Aus$9-10,000)

13. Have tried paper recycling sending shredded paper to Australia but this didn't work as it was often rejected because it had a fungus on it.
14. Tyres are not worth it.

Meeting with: Wings Supermarket
Honiara, Solomon Islands
Date: 19/11/99
Attending: Business Manager
Juliet Woodward

1. Use the Council collection 2 times per week. About 40-50m3 each load.
2. Waste is mostly cartons (85%) and organic (15%).
3. They import 4-5 (14tonne) containers per month from Australia, NZ, Singapore, Indonesia and Malaysia. The Wings Wholesalers import 3-4 containers of beer and 8 containers in total per month.
4. Some cartons are reused by locals.
5. There is no policy on packaging minimisation or environmental products. Consumers don't want environmentally friendly products – people are very brand conscience.
6. Collection of waste packaging is not viable – Solomons is too isolated.
7. Plastic bags are bought locally and from overseas – costs about 5-10cents per bag.
8. Don't have a place to collect bottles, too difficult, people can take their own back to the brewery.
9. The issues for the community are economic, health and subsistence (food) – are not concerned with the environment!!!
10. Have huge exports to the provinces – 12-15 containers per month.

Meeting with:	Solomon Islands Water Authority Honiara, Solomon Islands	
Date:	18/11/99	
Attending:	Katheryn Clarkson	Environmental Engineer
	Wycliffe Maebula	Quality Control Officer
	Juliet Woodward	

1. Authority is partially privatised.
2. Covers water supply and wastewater disposal.
3. Water is from ground water and river water sources.
4. Treatment is chlorination only, at 6-7 sites. Use dosing pumps which often break down.
5. Most houses are connected to reticulated water. They pay 35c/kilolitre for domestic and 65c/kilolitre for commercial.
6. New water mains have been laid with the construction of the new main road through the town.
7. Wastewater is 50% sceptic tanks, 50% reticulated. System was built in the 1960s.
8. There is no treatment, just ocean outfall. There are 14 outfalls, 1 is 20metres long and the rest are broken and discharge at the bank. There are 2 direct discharges from sceptic tanks to the river.
9. The sceptic tank sludge is discharged at Point Cruz and at Ranadi Point.

Meeting with:	Honiara Town Council Honiara, Solomon Islands	
Date:	17/11/99	
Attending:	Mr Abednigo Maeohu	Senior Health Inspector
	Juliet Woodward	
	Maleli Naiova	

1. The Environmental Health Department, Honiara Town Council, has responsibility for waste.
2. Trade refuse is collected by the Works Division under the responsibility of the Health division
3. Charge $2.50 per collection for businesses.
4. The Council specifies the receptacles, as 44 gallon drums, although this is often not followed.
5. Residential collection is free. Hospital is free.
6. The Ranadi dumpsite on the coast about 6km from town is open dumping and there is no restriction of types of waste. There are likely to be leachates enter in the sea.
7. Three new sites have been identified in the past. This is the responsibility of the Ministry of Lands and Housing. Land tenure and site selection is very difficult.
8. The dump is not fenced. There are scavengers at the dump.
9. Budget for waste management – 1998 = SBD$800,000; 1999 estimate = SBD$750,000.
10. A bulldozer is hired 1-2 days every 2-3 weeks (private contractor), costs $400 per hour.
11. There are 12 waste collection contractors. The start collecting at 7am and work Monday - Friday. They must do a minimum of 3 loads each day. Contractors are paid $300 per day. Residential should be collected twice per week.
12. There are 2 tip controllers that record number of loads, contractor, loads per day.
13. HTC has 1 compactor (4-5 tonne), and 3 small trucks and 1 big truck for waste collection.
14. There are 4 markets in Honiara – the main one and 3 small ones. The main market is collected in the evening and there are 2-3 small compactors full of waste.

Meeting with: Asian Paints Ltd
Honiara, Solomon Islands
Date: 2/11/99
Attending: Mr Sunil Bhasale General Manager
Juliet Woodward

1. Make all types of paint for local market only. Approximately 20T/month. Sell to dealers or marine paint directly.
2. Lautoka is the largest plant in the Pacific.
3. Raw materials are from Fiji, NZ and Australia. Most come in 25kg paper bags, or solvent in drums.
4. Have Council collection of waste once per week – Council is very unreliable, and often have to ring them to get them to come.
5. Have a concrete enclosure where loose rubbish is thrown (about 6m3). Full once every 2 weeks. Council collects it from here.
6. Pay $5 per year for collection.
7. Rubbish consists of paper bags, damaged tins.
8. Washings from the process are put into a 200 litre drum and are taken to the landfill and tipped out. About 400 litres per month of waste based washing and 200 litres per month solvent-based washings. It will contain small amount of pigment e.g. Titanium dioxide, ferrous oxide or chrome pigments.
9. All sorts of solvents are used but the main ones are Kerosene and Xylene.
10. Wastage is not measured but calculated at about 3% at the end of the year. Staff are taught to minimise wastage.
11. Aims to have a wastewater treatment plant on site on day.
12. Believes that one of the most important things would be a communal trade waste treatment system for town, maybe run by the Council.
13. Could also have an incinerator for burning paper wastes.
14. Thinks that the existing dumpsite could be managed more efficiently.
15. Believes that is the Town Council was more reliable then more people would use then and not their own trucks. Believes that efficiency is the key and not lack of funds.
16. Problems with aid projects have been that everything is set up and then handed over but no thought is given to the operations and maintenance of that project – 2-3 years later everything collapses due to lack of funds and training. Need to think of the long-term life of the project. Training is needed for staff to run the projects.
17. Scholarships for study in waste management would be good.
18. Believes that all industries are run on a commercial basis and would only participate in community schemes if there was some benefit to them.

19. Would be willing to participate if there was training e.g. workshops on waste minimisation, how to set up a waste management system in own business.
20. Would use recycled paper bags if they were available.
21. In India the pigments are bought in 1 tonne bags which are reused – these are not available in the Pacific, and the volumes are not there.

Meeting with: Solomon Soaps Ltd
Honiara, Solomon Islands
Date: 22/11/99
Attending: Evelyn Truman Manager
Juliet Woodward

1. Produces laundry soap, liquid detergents, baby soap, washing detergent and toilet soap. Produce 6,400 tonnes per year for the local market only.
2. Some of the machinery is as old as 1929, but the plant started in the 1970s. It is locally owned with one expatriate shareholder and also the DBSE. Are looking at expanding in the future.
3. Raw materials are coconut oil, palm oil (local), chemicals from Germany, base from Australia, packaging from Australia.
4. Plastic bottles are bought locally, cost $3.50/bottle and are not reused.
5. Take their waste to the dump, once per fortnight, loose in the truck. Main waste is paper bags from raw materials – to dump. Oil wastes from the process go through 3 settling tanks then to a soakhole. There is caustic soda in the wastewater.
6. Do not buy raw materials in bigger packages because of handling difficulties.
7. Pallets are reused or taken for firewood.
8. Shrink wrap goes to the dump.
9. Office paper is recycled.
10. Staff are taught to minimise waste.
11. Coconut oil drums are reused.
12. Old drums are sold for $2.
13. Have installed a washwater recycling scheme where the soap from the wash water will be recovered by heating with steam.
14. Sludge is dug out once per year – no idea how much; this goes to the dump.
15. Problems are the waste oil used for dust suppression in the roads. Also biggest problem is getting the right information about waste management.
16. Company would be willing to work with the Council on any schemes – it is a local oriented company that like to help the community.
17. Have a well but it is not able to be used now – may be blocked. Use town supply and rain water.
18. At the Trade Fair last year the Council did a really good job of keeping the town clean – lots of bins and signs.
19. Also manages the City Centre building in town - Council collection is very unreliable.
20. Town desperately needs compost as there is very little topsoil around.

21. Home composting schemes may cause a risk of mosquito breeding – need to be very careful. A municipal scheme may be safer.

Meeting with: Kwans Trading Ltd
Honiara, Solomon Islands
Date: 22/11/99
Attending: Denis Kwan Manager
Juliet Woodward

1. Produce snack foods (twisties) for local market, although is scaling this business down as cannot compete with Fielders. Works 3 days per week at present with 9 workers. Produces 450 cartons per day, 800gm per carton, 48 bags per carton i.e. 67,000 cartons per year, 54 tonnes per year, 3.24 million bags per year.
2. Raw materials are flavour and rice from Australia, oil, cartons and plastic bags from Singapore.
3. There is a 20% wastage for bags - the machine is no good and doesn't seal properly.
4. Also runs a wholesaler operation, mainly to supply store in Kukum. Imports about 7-8 containers of goods per year.
5. Goes to the dump once per week – main wastes are plastic and oil tins and waste twistie material.
6. Council collects waste in Kukum – is not reliable. The store has lots of waste cartons, although most are burnt, some are reused.
7. Would be willing to pay a fee at the dump if it were improved.
8. Main problems are that the streets are not cleaned and the waste is not collected reliably. Council used to have a street sweeper, now depend on the business community to clean the streets.
9. Have not paid the Council bill for the last few years are they have not been billed, but the waste is still being collected!! Doesn't believe that many people are paying for waste collection.
10. Waste bins are a problem as they get pushed or stolen by young boys.
11. Use a lot of plastic bags in the store (500,000 per year). Would be willing to use biodegradable if it were affordable.

Meeting at:	Goodman Fielders Honiara, Solomon Islands
Date:	2311/99
Attending:	Juliet Woodward Shaun Joiles Manager

1. They produce flour and mill run (wheat cattle food by-product of flour), snacks eg twisties and curlies, bakery products – bread, pies, cakes, and biscuits.
2. All produce is sold to the local market. They are the main produced in Solomon Islands
3. 180 staff
4. Produce about 250 kg waste per day. Take it to the dump in their truck. This waste consists of organic – about 50kg per day, plastic, paper, cardboard. Old drums are sold, nylon bags are used by locals, cardboard boxes are reused. Have about 20 x 200 litre drums for rubbish on site.
5. Packaging comes from Asia – there is a 5% wastage of packaging
6. Snacks and biscuits are packed in cartons and sent to wholesalers or shops
7. 20 litre plastic containers are al reused or sold.
8. Efficiencies are monitored each day and are reported.
9. Waste oil goes to the dump.
10. There is a process oil sump to catch fats – this sludge goes to the dump.
11. Old machinery is stored and sold overseas.
12. Product waste is <5%
13. Raw materials are purchased in bulk where possible.
14. Would be willing to participate in community schemes on waste.
15. Will be implementing and Environmental Management System in late 2000 (ISO14001)

Meeting at: Solomon Islands College of Higher Education
School of Natural Resources
Honiara, Solomon Islands
Date: 24/9/99
Attending: Juliet Woodward
Alex Makini

1. Is keen on setting up a pilot project in solid waste management at the School. Have been approached by Biologic International from Brisbane Australia, who want to secure European Union money to do this pilot project and feasibility study.
2. Believes that they should start by educating the Campus community and this will spread to the rest of the community.
3. At present there is no one available in the department to pick this project up. Will be advertising for an environmental science graduate.
4. Biologic are pressing STABEX in the EU for the money – but they need local approval and local partners to do this
5. Are looking at how to involve the community and the students in the project.
6. At present they sell chicken manure form the farm for $5 for a 10-15 kg bag. Local households buy chicken manure all the time and use it in their backyards and Sup sup gardens. They cannot supply enough.
7. The proposed project covers recycling and minimisation and waste segregation as well as composting.
8. The School has Agriculture and Forestry courses at present, next year aim to have a Resource Management course -–will be advertising or a Head of Department and an expatriate assistant.
9. They have 60 students at present – 40 in agriculture and 22 in forestry for 2 year each, and 15 doing a post grad diploma of agriculture.
10. Is looking for a project assistant with expertise in waste management. May use Shane who is presently at Lincoln University in New Zealand doing a Masters in Soil Science on a scholarship from NZ Vice-Chancellor.
11. Should use youth, church and women's groups to education the community.
12. The biggest problems in waste management at present are finances, the rubbish collection and the storage of waste. Also the education of people about how to dispose properly of waste is a big problem.

Meeting at:	National Referral Hospital Honiara, Solomon Islands	
Date:	21/11/99	
Attending:	Juliet Woodward	
	Jennifer	Head Nurse
	Thaddeus Siota	Chief Nursing Officer

1. 200 bed hospital. All types of medicine, surgery, medical, paediatrics, obstetrics, orthopaedics, general out patients. Covers all provinces of the Solomon Islands.
2. They have an incinerator on site, but it is not used any more. It is 4-5 years old and is made locally from concrete. They have had the same type of incinerator for 20 years. Incinerator is apparently too difficult to load (top opening).
3. Kitchen and general waste goes into drums or wheelie bins and is collected by the Town Council and taken to the dump. It is collected twice per week but this is not reliable.
4. Sharps are put into a sharps container (either yellow plastic or special white cardboard sharps container) and are put with the general waste and taken to the dump.
5. There is Hepatitis A and B but not very much Aids in Solomons.
6. Previously they have tried burning the needles in the incinerator with the general medical waste but the needles did not burn properly. They also tried having separate bins for needles and tried burying them, also tried locking 22 litre drums with the needle waste in them for storage but this did not work.
7. Paper waste goes to the dump.
8. There is a cleaner who is responsible for emptying the drums and burning the medical waste
9. Medical waste is supposed to be put in separate bins and emptied by the nurses at the end of their shift. The cleaner then burns the waste on an open bonfire down near the beach. The fire makes a lot of black smoke. Ashes are generally left on the ground. There was a old burning pit left uncovered.
10. Body parts are either burnt or buried on site.
11. Staff do not generally follow procedures for solid waste. There was some training of the nurses conducted a few years ago by a local man, about sharps. There are written procedures but they get lost.
12. The Quarantine uses an open fire and well, near Ranadi dump.
13. Often medical waste is put into the general waste bins – six wheelie bins were checked and 5 had medical waste in them!
14. The general waste is left on the roadside for collection and the bin with sharps is left near the road inside the front gate. This bin is uncovered and would fill with water in the rain – cardboard sharps boxes could disintegrate.
15. Expired drugs are either used if cleared by Australia laboratory or are taken to the dump. They are supposed to be crushed are

destroyed before dumping but there was evidence of pills at the dump.

16. Generally the hospital is underfunded and consequently understaffed. Sometimes there can be a ward of 56 patients with only 2 nurses.
17. Waste disposal at the hospital has been a problem for some time.
18. There is a Hospital Service Committee that includes all department heads, the medical superintendent, the nursing superintendent and the hospital secretary (about 20 people).
19. The Hospital Secretary makes the decisions – Steven Siapu.
20. There is also the Minister of Health, and then the Prime Minister office (called the Public Service).