

FIJI

NATIONAL SOLID WASTE MANAGEMENT STRATEGY 2011 – 2014

— OUR VISION —

“INFORMED AND RESPONSIBLE COMMUNITIES COMMITTED TO SUSTAINABLE SOLID WASTE MANAGEMENT”

This slide features a central graphic of the National Solid Waste Management Strategy logo. The logo is circular with a green border containing the text "NATIONAL MESSAGE" and "WAIAGI LISA". Inside the circle is a stylized map of Fiji with arrows pointing North, South, East, and West. The background of the slide is light green with faint, repeated logos of various Fijian companies and government entities.



REPUBLIC OF FIJI

ACKNOWLEDGEMENTS

The Ministry of Local Government, Urban Development, Housing and Environment acknowledges the valuable contribution as Co-partners and Authors of the National Solid Waste Management Strategy 2011 - 2014 of the following persons and organisations:

- SPREP for technical and financial assistance to develop and finalizing this plan.
- HYDEA for technical support and advice in drafting and finalizing the plan.
- All stakeholders who were consulted during the development and finalization of this plan.

To you all our humble gratitude for your assistance in completing Fiji's National Solid Waste Management Strategy 2011 - 2014.

FOREWORD

I am pleased to present the revised document Fiji's National Solid Waste Management Strategy 2011 – 2014 which is a major achievement in "Working towards a Cleaner and Greener Fiji." .

I see this document as another step towards responsible solid waste management. However, our villages, urban centres and highways are still strewn with rubbish and litter and burning and uncollected garbage. Burning garbage is a health hazard, it is also illegal. Rubbish is still thrown into rivers, waterways, bushes, beaches or even dumped in open areas and is a constant nuisance.

To combat these issues the Polluter-Pay Principle states that those causing pollution should pay for the cost waste management and the Producer Responsibility Principle states that producers/importers bear a degree of responsibility for the environmental impacts of their products.

The National Solid Waste Management Strategy 2011 – 2014 sets out how we should address our problems through Sustainable Financing, Legislation and Enforcement, Policy and Planning, Solid Waste Management, Capacity Building, Awareness Communication and Education and Environmental Monitoring

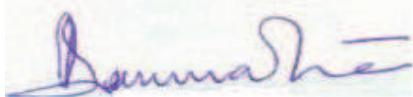
The Waste Management Regulations under the EMA 2005 provide for the mandatory prohibition of open dumping and establishment of sanitary landfills. The National Solid Waste Management Strategy 2011 – 2014 now reinforces this and provides policies for its' implementation.

The strategy is a holistic integrated approach to waste management and recognises that waste management should be extended into the rural communities. The implementation of this Strategy and enforcement of legislation is expected to significantly reduce the amount of rubbish, litter, burning of waste and reduce the amount of uncollected garbage.

There is much work to do and I trust with the Inter-Ministry Working Party and the Fiji Waste Management Authority, Fiji will make rapid progress toward a cleaner and more prosperous Fiji.

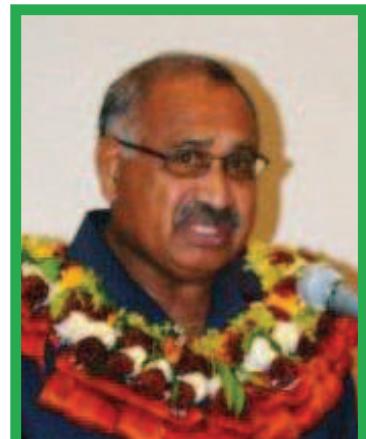
I therefore congratulate the Department of Environment and the Co-Authors for the realisation of the National Solid Waste Management Strategy 2011 – 2014 after two years of collation and compilation.

I commend Fiji's National Solid Waste Management Strategy 2011-2014 to you in providing; "*Informed And Responsible Communities Committed To Sustainable Solid Waste Management*".

A blue ink signature in cursive script, appearing to read "Samuela A. Saumatau".

Colonel Samuela A. Saumatau

Minister for Local Government, Urban Development, Housing and Environment



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ACRONYMS

CBA	Cost Benefit Analysis
CBH	Central Board of Health
DOE	Department of Environment
DOLG	Department of Local Government
EC	European Commission
EIA	Environmental Impact Assessment
EMA	Environment Management Act
EMP	Environmental Management Plan
EPA	Environmental Protection Agency
EU	European Union
FMS	Fiji Meteorological Service
FS	Feasibility Study
HEC	Hydrologic Engineering Centre
HELP	Hydrologic Evaluation of Landfill Performance
HMS	Hydrologic Modelling System
LFG	Landfill Gas
LG	Local Government
MOF	Ministry of Finance
MOH	Ministry of Health
MRF	Materials Recycling Facility
MRD	Mineral Resources Department
MSW	Municipal Solid Waste
NAO	National Authorising Officer
NSWMS	National Solid Waste Management Strategy 2011 - 2014
NSWMS&AP	National Solid Waste Management Strategy and Action Plan 2008 - 2010
SWM	Solid Waste Management
T/yr	Tonnes per year
TA	Technical Assistance
TOR	Terms of Reference
TS	Transfer Station
WMPCU	Waste Management and Pollution Control Unit

1 EXECUTIVE SUMMARY

Fiji recognizes that waste management is a pressing issue that needs immediate action. It is recognized as a major concern with the potential to cause negative impacts on our national development activities including public health, the environment, food security, tourism and trade. To address these impacts, the National Solid Waste Management Strategy and Action Plan 2008-2010 was formulated and in the two years since the launching of the Strategy, there has been some progress on improving the management of solid waste. However, most solid waste is still currently being thrown in open dumpsites, illegally disposed off in the sea or on unused land, or in the streets. Burning of municipal waste is also quite common, with the population being continuously exposed to the harmful health effects of carcinogenic toxins.

This revised strategy, developed in consultation with stakeholders, strives to address the environmental, health, and economic impacts of wastes over the period 2011-2014, by building on the progress and successes achieved under the 2008-2010 strategy. It is supported by an implementation plan which sets out the key actions that will be taken to deliver the vision of the strategy.

The vision of this National Solid Waste Management Strategy 2011-2014 is for ***Informed and Responsible Communities Committed to Sustainable Solid Waste Management***. The proposed goal is ***to increase the proportion of solid waste that is managed in a cost-effective, financially-sustainable, legally-compliant, and environmentally-sound manner***.

This goal will be accomplished through an integrated approach involving various actions in eight thematic areas, which are Sustainable Financing, Legislation, Awareness and Education, Capacity Building, Environmental Monitoring, Policy and Planning, Solid Waste Industry and Integrated Solid Waste Management.

The key performance indicators for measuring success of the strategy are:

- Amount of MSW generated per capita
- Amount of waste generated by tourism
- Amount of commercial waste generated
- Amount of industrial waste generated
- Percentage of total waste landfilled
- Percentage of total waste diverted (includes reuse and recycle)
- Unit cost of MSW management (per capita or per tonne of MSW)
- Percentage of waste management budget subsidized by government sources.

Implementation of the strategy at the National Level will be coordinated by the DOE, in conjunction with an Inter-Ministry Working Party to include the DOE, Department of Local Government, Central Board of Health, Ministry of Finance, Department of National Planning, Department of Town and Country Planning and other specifically selected stakeholders including private waste operators.

Furthermore there are proposals to establish a Fiji Waste Management Authority to manage waste in much the same way as other utility services, such as Fiji Water Authority and Fiji Electric Authority as it is a service that should be provided to all communities equally. An option that is being considered is to amalgamate Water and Waste within one Authority as there are many areas of future synergy between the two utilities.

2 INTRODUCTION

2.1 General Context

Fiji, like all other Small Island Developing States in the Pacific region, recognizes that waste management is a pressing issue that needs immediate action. It is recognized as a major concern with the potential to cause negative impacts on our national development activities including public health, the environment, food security, tourism and trade.

The Fiji Government, together with relevant stakeholders formulated a National Solid Waste Management Strategy and Action Plan which was endorsed by Cabinet in 2006, and launched in June 2008. The Strategy provided a medium to long-term program addressing waste management issues in Fiji, so as to avoid or minimize the adverse effects of improper waste disposal.

In the two years since the launching of the strategy, there has been some progress made (see Appendix 1), such as the sanitary landfill developed in Suva, and a JICA funded recycling promotion project in Lautoka and Nadi. However, most solid waste is still currently being thrown in open dumpsites, illegally disposed off in the sea on unused land, or in the streets. Burning of municipal waste is also quite common, with the population being continuously exposed to the harmful health effects of carcinogenic toxins.

Poorly managed wastes can have negative effects on tourism, by detracting from the “Pacific Paradise” image that Fiji promotes, and through association with health warnings about infectious and vector-borne diseases. There is also the potential for contamination of food supplies, which can have impacts on local markets or revenue from export crops.

The generation and disposal of wastes also has direct and indirect linkages to economic development. Waste materials represent wasted money, in terms of the original cost of the materials, the disposal costs, and also the potential value of the material as a recyclable, reusable resource.

This revised strategy strives to address the environmental, health, and economic impacts of wastes, by building on the progress and successes achieved under the 2008-2010 strategy to address the issues that still exist today. As much as possible, the Government of Fiji will look at resourcing the proposed activities and actions but in some cases, external resources will be required and our development partners will be invited to participate on these aspects of the strategy.

2.2 General Country Information

The Fiji archipelago is located between longitudes 174° East and 178° West and latitudes 12° South and 22° South and comprises of 332 islands, encompassing 18,270 km², of which only about 110 are inhabited. These islands are mainly of volcanic origin with a few having limestone and coral island features. Fiji's closest Pacific Island neighbour is Tonga which is approximately 680km due Southeast off Fiji.

The Republic of Fiji gained independence from Great Britain in the Year 1970, and is currently governed by an interim government with the Head of Government being Commodore Josaia Voreqe Bainimarama. The Republic of Fiji presents itself as the hub of the pacific as it is the gate way to and from the Pacific hinterland.

The population of the Fiji Republic is some 835 230 (2007 Census) and these are mainly concentrated in the coastal towns and cities of the major islands. The urban sector population during the 2007 census was 412,425 while the rural sector population was 424,846.

2.2.1 Administration

All the Municipalities in Fiji are governed by the Local Gov Act, Chief Executive officers from Cities and Town report directly to the director of LG concerning the Administration and decision of their respective Municipal Towns and City's. These councils implement the LGA within their specified boundaries registered under the Local Act.

Areas outside the defined municipal boundaries are governed by the Rural authorities under the Public Health Act. The scope of activities under the Rural Authorities includes but is not limited to development control, health and hygiene and health and sanitation which include proper waste management. The rural villages are also administered by the Rural Authorities.

2.2.2 Economy

Fiji constituted a GDP worth some \$4.76 billion in the year 2009. The various industry sectors involved in 2009 for this are Agriculture and Forestry which contributed approximately \$0.5 billion, Fisheries which contributed some \$0.1 billion, Mining and Quarry stood at \$0.02 billion, Transport and Communications at \$0.72 billion and Real Estate and Business at \$0.4 billion. Government expenditure for Environmental protection for 2009 totalled \$0.01 billion.

2.2.3 Weather

The Fiji islands lie within the tropic of Capricorn and can be classed as having a tropical maritime climate. Average rainfall can range from about 210 mm in leeward regions such as Nadi to 290 mm in windward regions such as the Greater Suva Area. Cooler temperatures averaging 22 degrees Celsius can be experienced from May to October, while November to April sees an average of 27 degrees Celsius.

2.2.4 Land Ownership

A large portion of the Land in Fiji is owned by native Fijians (i-Taukei) and is administered by the Native Lands Trust Board. The remainder from this 84% is divided up amongst State owned and Freehold land each of which constitute approximately 8%.

3 STRATEGIC CONTEXT

3.1 *International and Regional Context*

Fiji has ratified, acceded to, or endorsed a number of international and regional treaties relating to waste management and pollution prevention, including:

- Basel Convention on the Transboundary Movement of Hazardous Wastes and Their Disposal,
- Stockholm Convention on Persistent Organic Pollutants,
- Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade,
- International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978 (MARPOL 73/78),
- United Nations Framework Convention on Climate Change,
- Nouméa Convention For The Protection of The Natural Resources and Environment of The South Pacific Region,
- Waigani Convention to Ban the Importation into Forum Island Countries of Hazardous and Radioactive Wastes and to Control the Transboundary Movement and Management of Hazardous Wastes within the South Pacific Region,
- Pacific Regional Solid Waste Management Strategy 2010-2015,
- Pacific Islands Framework for Action on Climate Change 2006-2015,
- Pacific Ocean Pollution Prevention Programme Strategy 2011-2014,
- WHO.

As a party or signatory to these treaties, Fiji is required to meet certain obligations as outlined in Appendix 2. These obligations are incorporated into this National Solid Waste Management Strategy.

3.2 *National Context*

3.2.1 Strategic Development Plan 2007-2011

At the national level, Fiji's overall development is guided by the Fiji Strategic Development Plan 2007-2011, whose vision is for "A Peaceful, Prosperous Fiji". The Strategic Development Plan recognizes environmental sustainability as a key strategic priority, and outlines the policy objectives, strategies and key performance indicators (Appendix 2). These objectives strategies and key performance indicators have been aligned with this National Solid Waste Management Strategy.

3.2.2 National Implementation Plan for the Stockholm Convention, 2005

This plan proposes certain actions to meet Fiji's obligations under the Stockholm Convention in order to reduce persistent organic pollutants. Relevant areas from the National Implementation Plan which relate to solid waste management have been incorporated into this Strategy so as to improve integration of both documents.

4 CURRENT WASTE MANAGEMENT SITUATION

4.1 Institutional Arrangements for Solid Waste Management

4.1.1 Department of Environment:

The Department of Environment is primarily responsible for the implementation, monitoring and enforcement of the environment and waste management acts and regulations, and the development of policies on waste management. It is also the agency responsible for the management of the Naboro Sanitary Landfill, which it manages through a private contractor.

4.1.2 Ministry of Health

The Ministry of Health is involved in solid waste management through the Public Health Act. It is the Health Inspectors, which come under Ministry of Health and are given powers under the Public Health Act who monitor the disposal of garbage making them one of the key players in this issue. The Health Inspectors in the Municipal Councils and the Rural Local Authorities also report to the Ministry of Health.

4.1.3 Ministry of Fijian Affairs

The Ministry of Fijian Affairs has a role player in solid waste management through the Fijian Affairs Act whereby the Provincial Councils are given power to monitor solid waste management in villages.

4.1.4 Ministry of Labour (OHS Department)

The Ministry of Labour plays a vital role in solid waste management through the OHS regulations 2007 whereby all the industries are required to ensure that handling of all hazardous waste complies the OHS regulations

4.1.5 Department of Local Government

The Ministry of Local Government through the local government Act has a responsibility to ensure the health, welfare of the environs of towns and cities, and establishing by-laws it implement the collection and disposal of garbage.

Analysis: The Department of Environment has the primary function of protecting the Environment, whilst the other bodies have responsibilities where the primary function is not the protection of the Environment but principally Health, Welfare and Amenities of citizens and workers. With regard to waste management the DOE is responsible for ensuring that waste management acts and regulations, and the development of policies on waste management are in place to safeguard the Environment. The CBH, Councils, etc administer their waste duties for the protection of health but must ensure they comply with the waste management acts and regulations enforced by the DOE. The CBH and Councils have bye-laws that they also need to enforce. Councils also play a vital role towards the environment through enforcement of Litter Promulgation 2008, Public Health Act, enforcement of Opens Fires By-Laws, recycling activities, collection of garbage and provision of other services, street sweeping etc.

4.2 Legal Instruments

TABLE 1: WASTE MANAGEMENT IS COVERED UNDER SEVERAL PIECES OF LEGISLATION

LEGAL INSTRUMENT	RESPONSIBLE AGENCY	SUMMARY
Fijian Affairs Act (Cap 120)		Allows Provincial Councils to enact their own by-laws and impose rates or fees to be paid by Fijians as may be authorised by regulation. It also limits the fines that may be charged for breaching such by-laws to a maximum of forty dollars, and in the case of a continuing offence, no more than four dollars a day, in addition to payment of any expenses incurred by a Provincial Council as a consequence of breaching the by-law.
Public Health Act (Cap 111)		<ul style="list-style-type: none"> - Requires persons engaged in carrying or removing garbage to apply for a permit from the local authority - Allows local authorities to formulate by-laws in respect of the storage, collection and disposal of garbage, and prescribing the fees to be paid for removal of garbage - Regulates (i.e., garbage dumps, and incineration of garbage or refuse) - Health Care management Policy and Guidelines
Environmental Management Act 2005	Department of Environment	<p>Requires the establishment of Waste Management and Pollution Control Unit in the Department of Environment to:</p> <ul style="list-style-type: none"> - Administer Part 5 of the Act (waste management and pollution control) - Formulate, implement, and monitor the National Solid Waste Management Strategy - Develop criteria and guidelines for landfill sites and dumps - Formulate, implement and monitor strategies for minimization of packaging wastes, special wastes, liquid wastes and any other types of wastes - Establish the National Chemical Management Plan based on the National Chemical Profile
Environment Management (EIA Process) Regulations 2007	Department of Environment	Requires that any environmental impact assessment conducted must include a description of the possible environmental and resource management impacts of the proposed activity, including any pollution or waste that may be generated during construction, operation, decommissioning, and abandonment phases of the activity.
Environment Management (Waste Disposal and Recycling) Regulations 2007	Department of Environment	The purpose is to prevent environmental pollution by controlling the discharge and disposal of solid and liquid wastes, air emissions, and hazardous substances. It also prescribes permitting conditions for landfills, waste dumps, waste transport, waste recycling facilities, importing/manufacturing plastic bottles, and lead acid battery handling.
Litter Promulgation 2008	Department of Environment	<ul style="list-style-type: none"> - Prohibits littering, where litter is broadly defined and includes: <i>building, household, shop, garden and trade refuse or waste; human, animal, fish and vegetable refuse or waste; containers and packaging of any description, whether manufacture in whole or in part, of wood, glass, metal, paper or plastic; household, shop and factory furniture, appliances and machinery or part thereof; timber, wood, glass ,iron, concrete, sand, earth, gravel, stone and clay; or any matter or thing which causes or contributes to or tends to the defacement or defilement of any street, land or public place and includes dangerous</i>

LEGAL INSTRUMENT	RESPONSIBLE AGENCY	SUMMARY
		<p><i>litter, discarded chewing gum and tobacco.</i></p> <ul style="list-style-type: none"> - Dangerous litter includes: <i>any bottle (whether broken or not), glass or article containing glass; sharp metal or trap; any substance of a toxic or poisonous nature; any oil, diesel, fuel grease spill or similar discharge; and any derelict abandoned vehicle</i> - Requires the placement and maintenance of litter receptacles in places where litter is likely to be deposited, and also in vehicles. - Prohibits the discharge of litter from vehicles in public places
Biosecurity Promulgation 2008	Biosecurity Authority of Fiji	<ul style="list-style-type: none"> - Provides border control surveillance of import and export for tourism and goods.

Analysis: With the passing of the Environment Management (Waste Disposal and Recycling) Regulations 2007 and the Litter Promulgation 2008, Fiji's legislative framework is much improved. However, there are still some areas that lack clarity, such as the Local government Act Cap 125 which requires Councils to "do all such things as it lawfully may and as it considers expedient to promote the health, welfare and convenience of the inhabitants". However they are not empowered to levy the required fees as they may consider necessary, which is a right assigned to the Central Board of Health under the Public Health Act. Notwithstanding this lack of clarity, enforcement of these laws remains a problem due to the limited resources available to monitor and prosecute offenders.

4.3 Policies

4.3.1 Medical Waste Management

A draft policy for health care waste management was developed and adopted by the Ministry of Health in 2002, and revised in 2010. The vision is for environmentally sound management of Health Care Waste in Fiji in an integrated manner that is environmentally and economically sustainable while being occupationally safe and safe to the public. Under this policy, HCWM shall be integrated with other national programmes of the Ministry of Environment and with other programmes of national and district bodies.

4.3.2 Industrial or Trade Waste Policy

The Department of Environment is currently being consulted by the Water and Sewerage Department of Fiji on a Trade Waste Policy for Fiji. Amended draft policy external consultation with stakeholders currently ongoing.

4.3.3 Container Deposit Legislation and Refund System for Fiji (CDL)

The main objective of CDL is to ensure that used beverage containers (UBC) are collected and recycled. Currently vast majority of UBC either go to landfill – at a cost to local government- are burnt in small fires, or become litter with associated pollution. CDL is a form of Extended Producer Responsibility (EPR) where manufacturers are legally obliged to share responsibility with consumers, for the costs of recycling the products they produce.

The CDL process starts with the Manufacturers and Importers adding a compulsory deposit of 10 Cents for every Beverage produced or imported. The funds are paid into a revolving fund account of the Managing Agency.. The Managing Agency (established by the Beverage Industry and will act as the Producer Responsibility Organisation for Beverage Producers/ Importers) in turn maintains a fund from the deposits collected from beverage manufacturers and importers and uses it to pay out refunds to collectors and processors for the returned

bottles. The consumer consumes the Beverage and can return the Used Containers to Licensed Collectors or collection points and claim back a refund of up to 10cents.

The system as proposed would implement Part 7 of the Environment Management (Waste Disposal and Recycling) regulation 2007. Such Part of the regulation would be amended to broaden the current scope in covering all beverage containers rather than just plastic bottles. Under the new proposed regulation, companies that produce or import beverages are required to obtain a beverage container permit from the Department of Environment in order to do so.

4.3.4 *The use of Degradable Plastic Shopping Bags by Retailers*

Similarly to CDL, a national policy on the use degradable plastic bags is under consultation with the relevant stakeholders. This market base mechanism will see a fee levied for every plastic shopping bag issued by the seller. Non-degradable plastic shopping bags will be prohibited to be manufactured locally and imported into Fiji.

Analysis: The items listed above are currently being implemented which will have the medium term effect of reducing the amount of waste in line with the 3R's policy of reduce, re-use and recycle. These initiatives will not only reduce the amount of waste generated but will help to improve nature conservation and bio-diversity

4.4 Financing

Fiji's average annual national solid waste management budget is, broken down as follows:

TABLE 2: DEPARTMENT FINANCING

ITEM	BUDGET BY DEPARTMENT			
	TOTAL ANNUAL BUDGET	DOE	DOLG	CBH
Waste collection (survey CBH)	\$225,000		N/A	\$225,000
Waste disposal			N/A	
Other (e.g., awareness, policy development, etc)	\$150,000	\$150,000	N/A	
National Implementation Plan for Stockholm Convention	\$80,000	\$80,000	N/A	
TOTAL	\$455,000	\$230,000		\$225,000

None of this budget is recovered through tipping fees at the Naboro landfill, nor from the Provincial Council charges (which are shown in the table below). Funds are recovered through annual waste permit fees etc, while the rest is subsidized by the Government.

TABLE 3: RATES FOR WASTE SERVICES

DIVISION	COUNCIL	HOUSEHOLDS GENERAL RATES INCLUDED WASTE CHARGE	SEPARATE ANNUAL GARBAGE COLLECTION RATE CHARGED
CENTRAL	LAMI	None	\$80/household
	NAUSORI	None	\$85/household
	NASINU	None	\$81.00 VIP/household
	SUVA	\$50.30/household VIP from general Rates	\$28.13 VIP/Household
WESTERN	NADI	\$41.24/household	\$24/Household
	LAUTOKA	\$183,335	No Separate fee
	BA	Included in General Rates \$80,000	No, but charge \$24 for extra bin
	TAVUA	Included in General Rates \$20,000	No, but charge \$24 for extra bin
	SIGATOKA	Not Provided	Not Provided
	RAKIRAKI	Not Provided	Not Provided
NORTHERN	SAVUSAVU	None	\$24/Household
	LABASA	Included in General Rates \$86,000	No Separate fee
EASTERN	LEVUKA	Not Provided	Not Provided

Whilst Table 3 above details the charges that City and Town Councils are levying for the collection and disposal of waste the maximum amount paid is less than FJD 1.7/HH/week, in many instances these rate charges are unpaid by the householders.

In the report "Economics of rural waste management in the Rewa Province and development of a rural solid waste management policy for Fiji" (2007) -Willingness to pay (WTP) for waste removal

"The results suggest that on average the WTP of a rural household FJD 1.75/HH/week. WTP ranged from a low of FJD 0.50/ week to a few households willing to pay FJD 3/week; the majority of households surveyed were willing to pay around FJD2/week for collection and disposal of their solid wastes."

If the majority of rural households in 2007 were willing to pay around FJD2/HH/week for collection and disposal of their solid wastes then you would think that households in the Urban areas would be willing to pay at least this amount if not more, but as stated above in many instance these rates charges are unpaid by the householders.

Analysis: Some sources¹ suggest that about 1-2 percent of a country's requirement is for full solid waste services. For Fiji, this is equivalent to \$47.60 – \$95.20 Million dollars, based on 2010 GDP of \$4.76 Billion dollars. The actual cost for Fiji's solid waste management system has not been fully assessed although an estimate for Municipal Household waste is given in Table 9 under sustainable financing. Is there really a willingness to pay for proper waste collection and disposal services this would not seem to be the case with the Town and Cities. It is clear that the current level of financing is insufficient, and the problem is compounded by the poor cost recovery

¹ Cointreau, S., and Cravio, F.G. (2005). Finance for Solid Waste System in Developing Countries. Retrieved March 2011 from <<http://siteresources.worldbank.org/INTUSWM/Resources/FinanceForSW.pdf>>

rates in the Provincial Councils, which negatively affects the quality of service delivered. An improved and sustainable system of financing and fee collection is required.

4.5 Solid Waste Generation and Composition

Nation wide detailed solid waste generation and composition data is still lacking. In 2011, a survey questionnaire on waste generation was completed by the councils in the four divisions, which is compared to earlier data given in the NSWMS&AP 2008 - 2010, and more recently, under the JICA Waste Minimization and Recycling Promotion Project, detailed waste composition data has been generated for Lautoka City and Nadi Town (Table 4).

TABLE 4: WASTE GENERATION STATISTICS FOR 2011 AND 2004 BY PROVINCE

DIVISION	PROVINCIAL COUNCIL	2011			2004 DATA		
		POPULATION	HOUSEHOLD WASTE COLLECTED (TONNES/YR)	GENERATION RATE (KG/PERSON/DAY)	POPULATION	WASTE COLLECTED (TONNES/YR)	GENERATION RATE (KG/PERSON/DAY)
CENTRAL	Lami	20,223	1,240	0.33	-	-	-
	Nausori	24,383	3,280	0.37	-	-	-
	Nasinu	87,446	12,965	0.41	-	-	-
	Suva	85,691	12,653	0.40	-	-	-
WESTERN	Nadi ¹	12,000	3,409	0.78	20,000	2,730 – 4,420	0.37 – 0.61
	Lautoka ²	44,226	6,305	0.39	45,000	11,201	0.68
	Ba ³	15,000	2,045	0.37	16,000	1,053	0.18
	Tavua	1,402	156	0.30	5,000	933	0.51
	Sigatoka ⁴	9,262	1,183	0.35	3,500	1,872	1.46
	Rakiraki	4,952	N/A	N/A	-	-	-
NORTHERN	Savusavu	6,000	756	0.34	-	-	-
	Labasa	7,706	N/A	N/A	-	-	-
EASTERN	Levuka	1,131	N/A	N/A	-	-	-

Footnotes:

¹ In the 2004 data, Nadi recorded a population of 20,000. However, a recent survey showed that only 12,000 people were served with waste collection/disposal. The waste generation rate (0.78 kg/person/day) is the highest for the councils surveyed. Accurate and detailed information is also available from the JICA Waste Minimization and Recycling Promotion Project. It is possible that the waste generation figure for Nadi includes market waste and as reported in JICA Report a large amount of business waste.

² The change in data between 2004 and 2011 for Lautoka is due to a better understanding of the waste stream resulting from the installation of a weighbridge at the Vunato dumpsite. The 6,305 tonnes for 2011 is household waste only, however, there are also 1,284 tonnes of drain/street sweepings, 1,201 tonnes of business waste, 609 tonnes of factory waste, and 1,987 tonnes of other waste (which totals 11,386 tonnes).

³ Whilst Ba's population has only increased by 1,000 (6.7%) from 2004 to 2011, the waste generation rate has doubled from 0.18 to 0.37 kg/person/day. This might be due to wider collection or increased waste generation.

⁴ The Sigatoka figures are based on a collection estimate of between 18 and 22 tonnes per day, from Sigatoka, adjacent villages and hotels.

In addition to the household waste composition shown above, there are specific waste streams for which there is a lack of data:

4.5.1 Industrial or Trade Waste

Industries have been known for many years to be one of the main waste generators in Fiji, ranging from general, to hazardous substances. Currently, the majority of these well-known industries have applied for a permit under the watch of municipal councils, public and the Department of Environment. So far, over 1000 facilities have applied for a permit Fiji wide, where some have more than one location.

4.5.2 Sugar Mills

Huge amounts of bagasse, mill mud and ash are produced in one cane crushing season. Some bagasse is used as a source of fuel for the mill boilers, however stockpiles still develop and proper disposal of such wastes are still being explored. Each sugar mill should have an Operations Management Plan that details how these wastes are handled and contained so that they do not cause pollution and environmental nuisance to their surroundings. The Management Plan needs to cover the complete operation including the emission from mill boilers and discharges of pollutants.

4.5.3 Saw Mills

There are 61 sawmills around the country, and with the waste disposal permit system in place under the Environment Management Act, facilities have been required to provide waste management plans on how best they would dispose waste generated in an environmentally friendly manner.

4.5.4 Gold Mine

A major source of solid waste from the mine is tailings, which are retained in tailings dams at the mine site. For all mines, facilities would need to apply for a waste disposal permit, an important criterion of which is submitting a waste management plan stating the methods and pre-treatments for waste disposal.

4.5.5 Tourism waste (transient waste stream)

The tourism sector is a major generator of waste. The composition of tourism generated waste would be significantly different from other waste sources with a higher proportion of plastics, packaging and cans. The adoption of waste minimization principles have been incorporated in the permit conditions under the Waste Disposal Permit System, which all hotels must comply with.

4.5.6 Municipal Liquid Waste

General public and Industries are major generator of municipal wastes that are mixed in water and passed into the sewer lines of Water Authority of Fiji. WATER AUTHORITY OF FIJI (WAF) under its Liquid Trade Waste Acceptance Policy provides facilities to treat these through the treatment plants.

The permits are issued by the Water Authority of Fiji to all discharges of wastes through the sewer lines. Currently not all municipal councils have this agreement with industrial facilities, these include Rakiraki, Tavua Levuka, Savusavu,

Analysis: Many Provincial councils still lack accurate waste generation and composition data, which should be the foundation for effective policies and action. Unfortunately, the collection of this data is not part of the annual business plans for the councils and is often neglected. Furthermore, there is no standard method promoted for the collection and analysis of the data, which makes comparison across Provincial councils very difficult. Under the Waste Permit for commercial and industrial waste these operators are required to provide waste returns bi-annually and annually to the Department of Environment. Operation permits for industrial

users must be reviewed and where appropriate new operating conditions placed on these facilities. An emphasis could be based upon facilities producing large quantities of waste.

4.6 Waste Minimization and Recycling

Solid waste minimization and recycling remains priority strategies for Fiji, and several initiatives have been or currently are being implemented:

- The 3-year Western Region Waste Minimization and Recycling Promotion Project funded by JICA which started in October 2008 focuses on waste minimization activities such as promoting home composting of organic wastes, provision of subsidized compost bins, encouraging source segregation of recyclable wastes, green waste collection and recycling system at Vunato Disposal Site, promotion of 3Rs through a Clean Schools Programme, and improvements to the Vunato Disposal Site. Additional supporting activities have also been completed such as waste characterization survey of Nadi Town and Lautoka City, compost demand and market survey, time and motion survey. As a result of this project, there has been an increase in recycling of 5% increase in recycling in Lautoka and Nadi Town areas.
- The United Nations Development Programme (UNDP) has funded a project to introduce Container Deposit Legislation (CDL) into Fiji, building on the experience gained from their successful projects in Kiribati and the Federated States of Micronesia. The initial feasibility study identified that the value of recyclable materials currently being landfilled in Fiji is high which contributes to the high cost in collection and landfill space. Implementation of the project will involve the establishment of a Project Management Unit in the Department of Environment to oversee project implementation, formulation of the legal framework for the CDL system (mainly amendments to Part 7 of the Environment Management (Waste Disposal and Recycling) Regulations 2007), establishment of the management framework (Management Agency), and development of a comprehensive communication strategy for public awareness. The current intention is to introduce the CDL system in 2012.
- A feasibility study of options to reduce single use plastic shopping bags. Study of single use plastic shopping bags in Fiji was undertaken in May 2010, with the under-mentioned key recommendations. A draft regulation and a communication strategy (to be implemented in 2012) were developed to assist with the implementation of the recommendations:
 - Place a price signal of at least the smallest coin in circulation on all bags by making it illegal to give away bags;
 - Require all bags that are manufactured or imported into Fiji to be degradable (that is: contain an additive during manufacture that ensures a rate of degradability that is acceptable to the Department of Environment);
 - Require all bags produced or imported to be printed with the manufacturer or importers name to assist identification of source;
 - Ensure that all imports comply with the degradability and identification requirements so as ensure a level playing field with the local manufacturers;
 - Make it an offence to supply non-degradable shopping bags to either the public or retailers to discourage those who might seek to game the system with cheap non-degradable bags marked otherwise.

Medical waste minimization requires good practices for the segregation of infectious wastes from non-infectious wastes. At present the segregation of all wastes generated at all hospitals and clinics is under review. The purpose is to ensure that infectious wastes are not mixed with non-infectious waste. This is to minimise the quantity of waste that requires incineration.

Minimizing the generation of other types of wastes such as electrical and electronic wastes, asbestos, hazardous wastes, and contaminated soils is also crucial and can be pivotal in reducing waste management costs. The Fiji National Implementation Plan for the Stockholm Convention outlines strategies for the control and disposal of certain hazardous materials such as PCBs, Pesticides, and POPs. However, there is currently no management framework for other hazardous wastes such as electrical and electronic wastes, asbestos, and contaminated soils.

Minimising of farm waste includes considering both animal and agricultural waste separately. The reduction or minimising of animal is not a strategy that can be developed, however the containment and use of this waste as a biogas potential should be explored. The major component of agricultural waste is currently controlled by the FSC through their harvesting and processing of the raw materials. FCS limits the amount of potential waste that generate in their process by maximising the use of the sugar cane by-product for energy production purposes.

Analysis: The JICA-funded Waste Minimization and Recycling Promotion Project is a successful model that has achieved measurable results. There is a need to build on the success of the project by rolling out similar programmes to other areas in Fiji, taking into account the lessons learnt. Appropriate management frameworks also need to be established to deal with other waste streams such as electrical and electronic wastes, asbestos, and contaminated soils.

4.7 Waste Collection System

The household solid waste collection service varies from 3 per week in urban areas to infrequently in rural areas. Provincial councils are responsible for providing this service to the urban areas and may do so by engaging the private sector, while the government provides an infrequent service to rural areas. Some council collect the commercial waste from offices and shops but some commercial premises and the industrial sectors are responsible for making arrangements to transport their own solid waste to the disposal site. Solid waste from institutions such as schools, hospitals, and government ministries are collected by the Councils or by private operators.

The type of collection vehicle that the Councils use for collecting MSW varies between councils. Some council are fortunate to have been funded and use small rear end compactor type vehicles. Many of the councils and CBH use open sided trucks with wire mesh greedy boards for collecting green waste. The small compactor vehicles used by the councils are more suited to collecting waste and delivering to transfer stations where the delivery distance is short and the vehicle is always driven on a metalled or paved road.

In general waste is not transported long distances; however this is not the situation in the Central Division. Waste is transported from Nausori to Naboro a round trip of almost 80km. For many years a transfer station has been considered a priority but nothing has transpired to date.

A transfer station in the Suva/Nasinu area will benefit these councils tremendously by reducing the unit cost of transport to Naboro and by giving greater utilisation and efficiency of resources. Table 5 below shows that in 2008, Suva made 6,895 trips to Naboro but with an average load of only 2.9 tonnes. If the waste had been bulked into 35cu.m rollon-off (hook-lift) containers the load per trip with a trailer would (i.e. two containers) have been circa 30 tonnes. This would have reduced the number of trips for Suva's waste alone to 666 trips, which is about 10% of the current trips.

TABLE 5: TRIPS TO NABORO SANITARY LANDFILL

COUNCIL	WASTE COLLECTED IN 2008 (T)	NUMBER OF TRIPS TO NABORO LANDFILL	QUANTITY OF WASTE (T) PER TRIP
Lami	1,150	353	3.26
Nasinu	8,667	1,749	4.96
Nausori	3,060	680	4.50
Suva	19,968	6,895	2.90
Suva, Nasinu and Nausori Combined	31,695	9,324	3.39
Alternatively at 30 tonnes per load	31,695	1,057	30.0

Bulky waste is collected by councils during clean up campaigns, households are advised of these in advance and can place these items for collection.

In terms of medical waste, collection is done by either municipal councils or private operators; the waste collected is generally incinerator ash or non infectious waste. The equipment used is standard municipal compactor vehicles or similar and the collection is either twice weekly or as requested when containers are full.

Analysis: Waste collection is predominantly carried out in the urban areas and some Rural Authorities, the main issues with collection is lack of suitable vehicles, and the distance of delivery. If a system of establishing a divisional disposal facility is progressed then a system of transfer stations to service the collection is required which will reduce the haulage costs. Waste is bulked up at each transfer station and the unit cost for delivery to the disposal facility is minimised.

4.8 Waste Treatment and Disposal

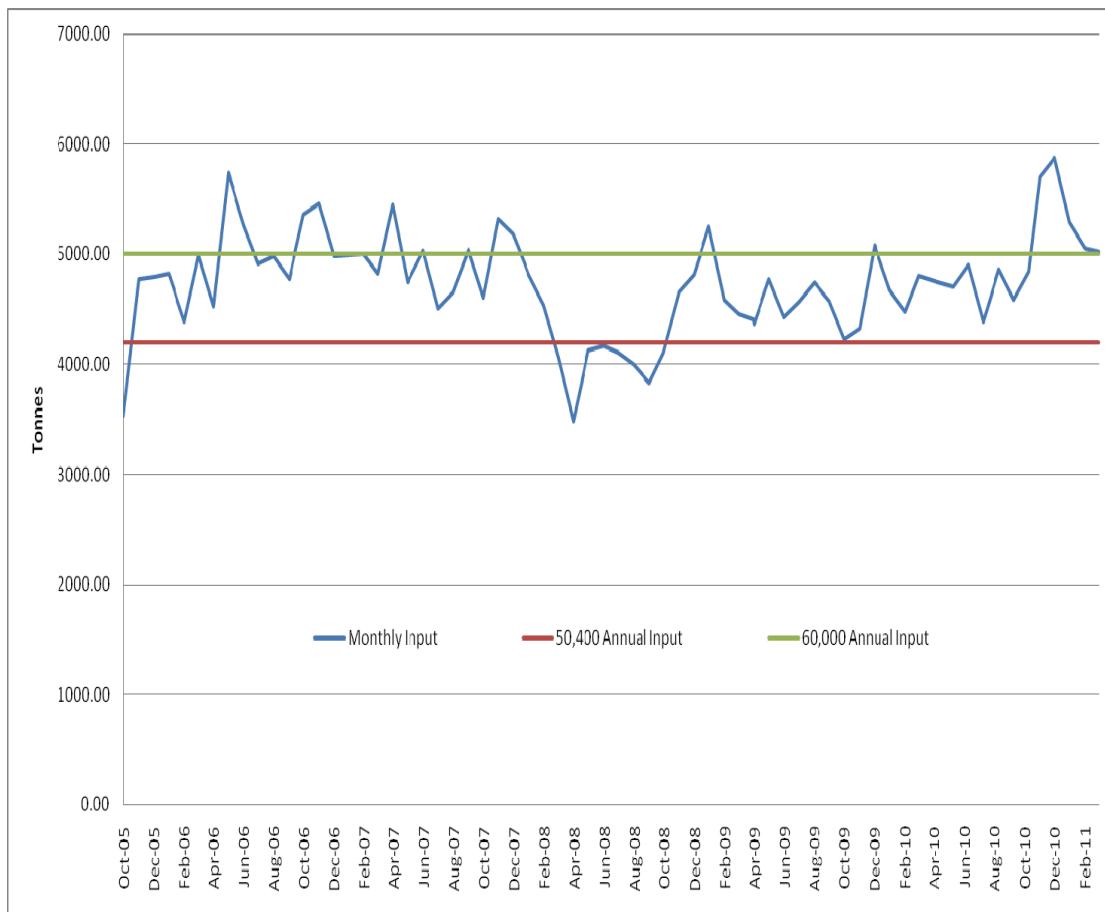
The predominant method of waste disposal in Fiji is still open dumping; however, there have been some significant improvements within the last decade:

- The Naboro Anaerobic Sanitary Landfill which was opened in October 2005 and is located in Suva, caters to waste from Suva City Area, Nasinu Town Council, Nausori Town Council, Navua Rural Local Authority and Korovou Rural Local Authority. Construction of the facility was funded by the European Union, and it is operated under private contract monitored by the Department of Environment. The Government relies on revenue generated from gate fees to make payments to the operator. The current contract (2005 – 2010), is based upon a lump sum with an input of up to 100,000 tonnes of waste annually. However, the amount of waste received in the first five years of operation has averaged of 57,000 tonnes annually. A summary of the monthly inputs to Naboro is shown in Table 6 below.

The shortfall has occurred for a number of reasons, partly due to additional costs of transporting the waste at a greater distance to Naboro, illegal dumping continuing, prevalence of burning of waste within Suva and the greater Suva area, lack of enforcement control and, lack of funds and resources for collection. As a result of this shortfall, the Government is contractually obliged to meet the full operating costs through a subsidy. In hindsight it would have been better for the Government to have set a gate price that fully recovers the operating costs and then assist the councils with their transportation costs.

A new contract based upon a lower annual input of 50,400 tonnes (4,200 tonnes monthly) indicated by the red line in Table 6 is anticipated to be awarded in 2011.

TABLE 6: NABORO MONTHLY TONNAGE INPUTS VERSUS ANNUAL INPUTS OF 50,400 AND 60,000 TONNES



- The Lami Dump, which was closed in 2005, was posing serious environmental risks including the emission of leachate and gas and the risk of fire. In April 2009, the European Union funded a project to rehabilitate the Lami Dump site in order to minimize environmental risks. This project also involves institutional strengthening of the Department of Environment.
- Under the JICA-funded Waste Minimization and Recycling Promotion Project, some improvements have been made to the Vunato Waste Disposal Site, which services Nadi Town and Lautoka City. These improvements include the establishment of a composting operation, the installation of a weigh bridge and data collection systems, the procurement of heavy equipment, compaction and placement of waste, and development of a site operational plan.

Many other areas are still serviced by uncontrolled dumpsites which pollute air, water, and land. There have been on-going discussions and trainings with provincial councils and local authorities on implementing low-cost solid waste dump improvements, with a focus on moving towards environmentally sound operations and meeting the requirements under the Environment Management (Waste Disposal and Recycling) Regulations 2007. A key issue is the need to improve the efficiency of waste transportation and disposal, perhaps through developing a system of strategically located transfer stations such that waste is bulked-up for transporting to centralized waste disposal facilities, thereby reducing the unit cost for transport.

Waste incinerators for infectious wastes have been installed in various locations, often as a result of donor funding. However, because of maintenance and operational costs, and insufficient operational budget, the only major incinerators still operating at the end of 2010 were those at the Central Hospital in Suva and at two base (Divisional) hospitals. The ash is disposed off at the Naboro Sanitary landfill.

Difficult, Hazardous/Special wastes such as asbestos, contaminated soils; odorous wastes are disposed separately in special cells at the Naboro Sanitary Landfill. Customers are asked to pre-notify the site operator of the intended delivery of these loads so that the landfill site operator can ensure that the disposal location is prepared in advance. The landfill site operator also requests that all such loads are delivered before 2pm; this allows the landfill site operator ample time to cover down these loads thereby ensuring that this waste is deep buried.

Analysis: The current system of open dumping is unsustainable, there needs to be a system of regional disposal facilities for all waste types. The disposal of all solid waste types needs a disposal facility, this must include Difficult, Hazardous/Special wastes.

4.9 Education and Awareness

To incorporate better solid waste management practices into the school curricular; initiate targeted research on appropriate solid waste management practices, technology and issues, and to develop and implement an integrated communication plan for the NSWMS 2011- 2014 which includes communities.

To enhance the coverage of aspects pertaining to waste management practices/issues in current primary and secondary school curricular; and courses offered by tertiary institutions:

- Assemble a team to work with CDU to incorporate aspects of waste management (including waste) into the formal curriculum.
- Pilot the waste minimization measures to be identified as part of student projects for school based assessment or under themes such as Environment Day and Arbor Day.
- Encourage FNU and USP to develop or consolidate course offerings in waste management (including solid waste).

Analysis: Awareness is one of the main issues changing on how people regard waste, in some instances it is a matter of changing habits of a lifetime but the best way is to tackle the issue through education starting at schools. Children will influence their parents and parents in turn will learn to recycle, to reduce the amount of waste they produce etc.

4.10 Implementation Capacity

The key resources available within the Government service for waste management are shown in Table 7 below:

TABLE 7: IMPLEMENTATION CAPACITY FOR THE NATIONAL SOLID WASTE MANAGEMENT STRATEGY

AGENCY	NO. OF PROFESSIONAL STAFF	ACTIVITIES AND EXPERTISE
Department of Environment	6	EIA, Waste permitting, Inspections, stop notices
Ministry of Health (CBH)	119	Implement the Public Health Act, in particular waste management issues in rural areas
Occupational Health & Safety	7	To ensure workplace safety in the handling and use of hazardous waste materials
Provincial Councils	14	To ensure proper disposal of all waste generated in the villages and communities with regard to EMA and the Public Health Act
Municipal Councils	42	To ensure proper collection and disposal of all waste generated within the Municipal Boundaries with regard to EMA and the Public Health Act
Department of Local Government	6	Regulate the local Government Act with Health Officers of Municipal Councils

Analysis: There is a lack of resources in individual departments specifically for regulating and enforcement either with the DOE, CBH and/or Provincial councils. Possible integration of DOE staff and CBH Health Inspectors and coordination with other Ministries could target specific problem areas.

4.11 Bulky Solid Waste

Other major contributors of solid waste include bulky waste such as large scrap metal, tyres, and end-of-life motor vehicles and parts. An assessment of derelict vehicles and their management was undertaken by Japan Automotive Recyclers Association in August 2009 –August 2010. Due to the amounts generated, the report recommended that the most feasible method for managing this stream is to re-use these car-bodies for educational purposes with institutions such as Fiji National University.

A permitting system has been established for anyone interested in getting involved in scrap metal recycling. This system should assist with controlling the management of this waste stream.

4.12 Solid Waste Mixed With Liquids

The solid wastes that are mixed with water or any other wetting agents are covered under liquid waste management, and regulated by Environment Regulations 2007.

Water Authority of Fiji will issue permits under their trade waste policy 2005.

4.13 Hazardous Waste Management

Hazardous waste means toxic, inflammable, corrosive, reactive, infective or explosive waste, and includes waste which is potentially hazardous to human health or the environment. Increasing urbanization and importation of numerous consumer products ranging from cosmetics to laboratory chemicals used in the education sector and chemicals imported mainly under the agriculture, manufacturing and mining sectors contribute to accumulation of hazardous waste materials in Fiji. Hazardous waste found in Fiji includes asbestos, POPs, electrical and electronic waste (WEEE-waste), waste oil, and lead acid batteries.

The Agriculture sector for example has stockpiles of waste/obsolete agrochemicals. Given the absence of appropriate disposal facilities and management mechanism, a lot of these hazardous chemicals have found their way into our ecosystems via leachate from rubbish dumps like the Lami dump, or through intentional dumping by some people.

4.13.1 Asbestos

Asbestos is a serious health hazard, and naturally occurs in minerals that are mined from the earth. Asbestos fibres are so small they must be identified using a microscope, and are also virtually indestructible and resistant to chemicals. Most asbestos containing materials found in Fiji are in the following form:

- Roofing shingles,
- Siding shingles in old (post 1970) residential buildings,
- Wall and ceiling texture in older buildings and homes,
- Joint compound in older buildings and homes,
- Brake linings, boilers, insulations, pipes and clutch pads.

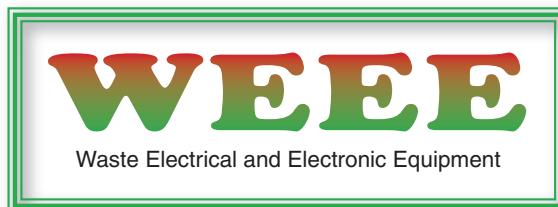
The disposal of asbestos is handled by the National OHS Authority, under the Health and Safety Regulations 2006. There is also a National Asbestos Policy in place, and a Code of Practice for removal of asbestos in place.

4.13.2 Waste Electrical and Electronic Equipment – WEEE Wastes

Waste Electrical and Electronic Equipment is defined simply as any unwanted device that has an electrical plug or runs on batteries. WEEE wastes contain non-hazardous materials such as glass, wood, non-ferrous and ferrous metals, and hazardous components such as lead, mercury, arsenic, cadmium, and flame retardants. The Waste Electrical and Electronic Equipment problem will generally increase with increasing affluence of the population, as more people gain access to technology, and as rural and remote locations are electrified. Waste Electrical and Electronic Equipment generation can rapidly increase if there is a lack of appropriate standards to control the quality of electrical equipment being imported (i.e., poorly manufactured or inferior electrical equipment will quickly become WEEE-wastes).

In the absence of a formal Waste Electrical and Electronic Equipment survey in Fiji, it can be generally noted that items such as mobile phones are increasing and there's a need for such items to be managed appropriately to minimize any negative environmental impact. Currently most WEEE-wastes such as computers, televisions, and office equipment are normally taken to landfills, or dumps for disposal.

Analysis: There is clearly a lack of information on the scale of the Waste Electrical and Electronic Equipment problem and a lack of an appropriate and sustainable management framework for this waste type.





Waste Electrical and Electronic Equipment

Legislation would aim to reduce the amount of electrical and electronic equipment being produced and to encourage everyone to reuse, recycle and recover it. The Waste Electrical and Electronic Equipment legislation also aims to improve the environmental performance of businesses that manufacture, supply, use, recycle and recover electrical and electronic equipment.

4.13.3 Lead Acid Batteries

The main source of waste lead acid batteries are vehicles, and to a lesser extent renewable energy systems (photo-voltaic systems). Due to the commercial value, most batteries are exported to overseas markets for recycling, however these exports are in contravention of the Waigani Convention requirements since there is no reporting done. It is also believed that the acid from these batteries are inappropriately discharged to the environment before exporting the 'dry' battery.

More recently in Fiji, a private company, Pacific Batteries, has established a battery recycling and manufacturing plant, with the capacity to recycle all of Fiji's waste batteries, however, the amount paid per battery is lower than that paid by overseas recyclers.

Small batteries (dry cells) are also considered an issue for Fiji, where they are discarded with the general waste and end up in landfills or dumps. To date, there is no environmentally sound system in place for disposal; however, a few waste recycling companies have shown interest in the collection of dry cell batteries.

Analysis: The export of waste batteries is clearly in contravention to the Waigani Convention requirements and there is lack of regulation with regards to the disposal of acid from these batteries. The interest of the private sector in this area is positive and has the potential to relieve the government of the management responsibility allowing it to focus on regulation.

4.14 Quarantine Waste

Fiji is a major transport hub for the Pacific region, which means that there is a large quantity of quarantine wastes from incoming vessels that must be managed. Under the Biosecurity Promulgation 2008, Biosecurity entry points must, as far as possible, provide facilities and suitable containers for garbage collection and incineration or other disposal methods. Currently, all quarantine waste is burnt without separation, as a safeguard against the introduction of non-native pests and plants. However, the waste may contain large quantities of recyclables such as aluminium cans, and bottles, which then become wasted resources since they cannot be recovered after burning.

4.2 Stakeholders

Table 8, summarizes the key stakeholders involved in the waste management sector in Fiji. This list is possibly not exhaustive, but is only indicative and meant to provide a quick snapshot of key stakeholders that should be consulted for various waste management activities.

TABLE 8: MAJOR WASTE MANAGEMENT STAKEHOLDERS IN FIJI

KEY STAKEHOLDERS	ROLES	ISSUES
Department of Environment	<ul style="list-style-type: none"> Coordinate the implementation of the NSWMS 2011 -2014 To implement the requirements of the EMA To regulate and enforce 	<ul style="list-style-type: none"> Lack of human and financial resources. Waste management is not a priority in other line Ministries Lack of sufficient legislative support
Department of Local Government	<ul style="list-style-type: none"> Coordinate the implementation of the local Government Act and council by-laws To ensure implementation of the EMA and the Public Health Act To enforce relevant legislation dealing with solid waste management 	<ul style="list-style-type: none"> Lack of adequate financial support Inability to levy sufficient waste collection rates
Municipal Councils	<ul style="list-style-type: none"> Coordinate the implementation of the local Government Act and council by-laws To ensure implementation of the EMA and the Public Health Act To enforce relevant legislation dealing with solid waste management 	<ul style="list-style-type: none"> Lack of adequate financial support Non payment of garbage rates Insufficient resources for enforcement Increase in squatters settlements Inability to levy sufficient waste collection rates
Ministry of Health	<ul style="list-style-type: none"> Coordinate the implementation of the Public Health Act and the EMA To enforce relevant legislation dealing with solid waste management Empowered to set Municipal Council garbage collection rates 	<ul style="list-style-type: none"> Lack of human and financial resources. Lack of sufficient legislative support
Ministry of Education of Education	<ul style="list-style-type: none"> To incorporate better solid waste management practices into the school curricular 	<ul style="list-style-type: none"> Lack of adequate awareness about waste management and health issues
National Planning Office	<ul style="list-style-type: none"> To provide policy support to line Ministries in regard to solid waste management. 	<ul style="list-style-type: none"> Waste management is not considered to be a mainstreamed national issue
Department of Indigenous Affairs	<ul style="list-style-type: none"> To ensure implementation of the village by-laws in respect of waste management 	<ul style="list-style-type: none"> Lack of adequate awareness about waste management and health issues Lack of human and financial resources.

KEY STAKEHOLDERS	ROLES	ISSUES
Office of the Solicitor General	<ul style="list-style-type: none"> To provide legal advice and support to all Government Ministries on waste related issues for regulation and enforcement Draft new legislation to ensure a legal framework to complement existing legislation. 	<ul style="list-style-type: none"> Lack of specialist environmental lawyers
Department of Agriculture, Forestry & Fisheries	<ul style="list-style-type: none"> Promote the use of agriculture waste to enhance productivity of the land Promote the beneficial production of Fiji's Forest products Promote and safeguard Fiji's marine environment to ensure a sustainable Fisheries sector 	<ul style="list-style-type: none"> Lack of adequate awareness about agriculture waste to cause pollution Marine based resources are regularly impacted by land and sea based pollutants
Department of Tourism	<ul style="list-style-type: none"> Promote a clean Fiji to encourage tourism expansion, by projecting the bio-diversity and the natural environment. 	<ul style="list-style-type: none"> Uncontrolled disposal and burning of waste in Cities, Towns and rural areas detract from the natural beauty.
Donor Agencies (JICA, EU, ADB, AUSAID, US)	<ul style="list-style-type: none"> Provide technical assistance to the Fiji Government 	<ul style="list-style-type: none"> Project sustainability in both technical and financial support
NGO's	<ul style="list-style-type: none"> Provide technical assistance to the Fiji Government 	<ul style="list-style-type: none"> Project sustainability in both technical and financial support
Training and Productivity Authority of Fiji (TPAF)	<ul style="list-style-type: none"> TPAF provides training and undertakes projects on various issues. Environmental issues like waste management is one of them. A more recent one is the "Waste Recycling Competition" for schools in Fiji 	
Private sector companies	<ul style="list-style-type: none"> Provide technical assistance to the Fiji Government 	
Academic Institutions	<ul style="list-style-type: none"> To incorporate better solid waste management practices into the school curricular 	<ul style="list-style-type: none"> Lack of adequate awareness about waste management and health issues
General Public	<ul style="list-style-type: none"> To be responsible citizen in terms of waste management. 	

5 THE WAY FORWARD

The proposed way forward is based on the preceding analysis of the existing situation and was developed using a participatory and consultative approach. The skeleton of the National Solid Waste Management Strategy 2011-2014 was developed based on the 2008-2010 Strategy, during a national consultation workshop with 39 stakeholders in November 2010. This was followed by a second consultation workshop in March 2011 to further refine the Strategy. A list of stakeholders consulted during these workshops can be found in Appendix 3. The resulting Strategy and Action Plan takes into account progress in waste management, and changes in priorities and practices.

5.1 Guiding Principles

In defining the strategy for waste management in Fiji, the following principles have been chosen as the foundation on which to build the actions that will transform current waste management practices.

5.1.1 Polluter-pays Principle

Those responsible for causing pollution or generating waste should pay the cost for dealing with the pollution, or managing the waste (collection and disposal) in order to maintain ecological health and diversity. Financial resources in Fiji are very limited; it is therefore essential to develop funding mechanisms based on the polluter-pays principle which will sustain waste management in the future without constant reliance on donors, while at the same time encouraging individual responsibility for waste management.

5.1.2 Precautionary Principle

Lack of scientific data/information certainty should not be used as a reason for not acting to prevent serious or irreversible environmental damage or degradation.

5.1.3 Consultation Principle

All levels of Government, people and organizations should be consulted throughout the development and implementation of waste management strategies and action plans.

5.1.4 DUTY OF CARE - Producer Responsibility

This simply places a responsibility on a Waste producer for his waste until final disposal. As the producer of the waste he is responsible for ensuring that any waste received by an approved collector from him and reaches a final permitted disposal facility.

The producer is responsible from “Cradle to Grave”

Duty of Care - Producer Responsibility

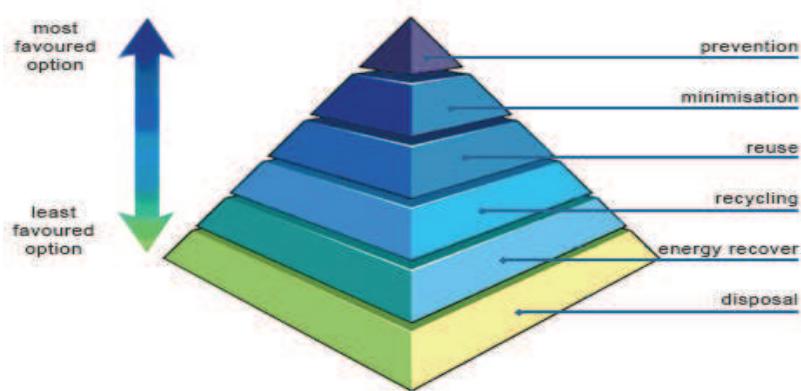
Manage your Liability

5.1.5 BATNEEC Principle

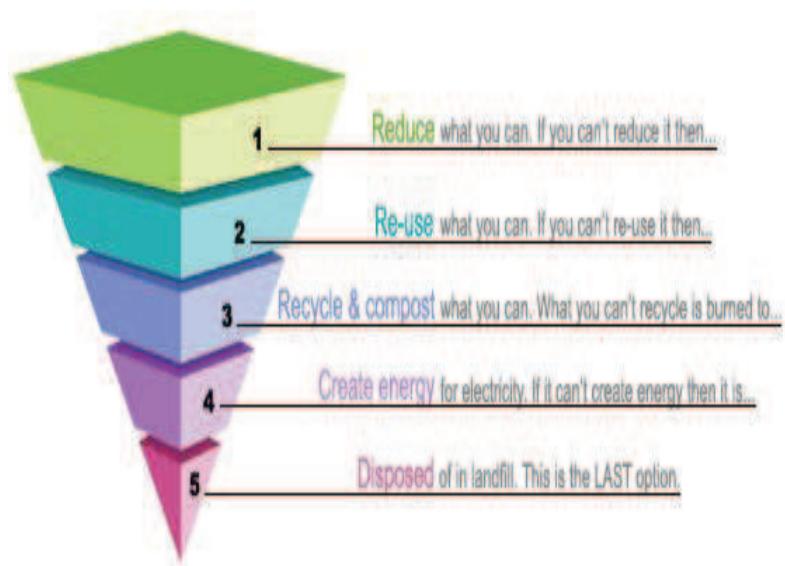
BATNEEC (Environment) is a principle applied to the control of emissions into the air, land and water from polluting processes, in order to minimise pollution without the use of advanced technology or expensive methods.

BATNEEC: BEST AVAILABLE TECHNOLOGY NOT ENTAILING EXCESSIVE COST

5.1.6 Waste Hierarchy



The Waste Hierarchy is a strategic tool which prioritizes actions for solid waste management. The general hierarchical model that will be used consists of 3 'R's - **Reduce** (which includes Refuse), **Reuse**, and **Recycle**. This model prioritizes waste avoidance and reduction methods, before reuse, recycling, and final disposal.



5.2 Vision

INFORMED AND RESPONSIBLE COMMUNITIES COMMITTED TO SUSTAINABLE SOLID WASTE MANAGEMENT

5.3 Goal

The goal of the National Solid Waste Management Strategy 2011-2014 is singular: to increase the proportion of solid waste that is managed in a cost-effective, financially-sustainable, legally-compliant, and environmentally-sound manner. This goal will be accomplished through an integrated approach involving various actions in eight thematic areas as explained below.

5.4 Scope

The Strategy covers the following waste types:

- All solid wastes from household, commercial, industrial, and institutional sources
- Medical or health-care wastes from hospitals and clinics
- Agricultural wastes (specifically Animal Waste)
- Electrical and electronic wastes
- Hazardous solid wastes including asbestos, mining waste and contaminated soils
- Difficult solid wastes such as end-of-life vehicles, and tyres

5.5 Implementation Period

This Strategy covers a 4-year implementation period from 2011-2014.

5.6 Coordination

Implementation of the strategy at the National Level will be coordinated by the DOE, in conjunction with an Inter-Ministry Working Party to include the DOE, Department of Local Government, Central Board of Health, Ministry of Finance, Department of National Planning, Department of Town and Country Planning and other specifically selected stakeholder including private waste operators. The Inter-Ministry Working party will consider and recommend to the Government a National Waste Management Policy and Divisional Operational framework.

5.7 Thematic Priorities

To achieve the stated goals, 8 priority thematic areas were identified through wide stakeholder consultations. These thematic areas in no order of priority, are (A) Sustainable Financing; (B) Legislation and Enforcement; (C) Policy and Planning; (D) Integrated Solid Waste Management; (E) Awareness and Education; (F) Capacity Building; (G) Environmental Monitoring; and (H) Solid Waste Industry.

Each of these thematic areas is expanded in the following chapters by (1) briefly summarizing the key issues to be addressed, (2) setting targets to be achieved within the implementation period, (3) outlining the strategies for achieving those targets; and (4) identifying the key performance indicators for evaluating success. It should be noted that the strategies are numbered continuously from one thematic area to the next.

6 SUSTAINABLE FINANCING

6.1 *The key issues*

At present, the provincial councils charge general rates or specific garbage collection rates to householders to cover the costs of waste collection and disposal. However, the majority of Councils have substantial arrears which currently limit their collection service to the urban areas. Waste collection from rural areas is funded by the Government, but this service is limited and irregular. Commercial and industrial customers typically pay for waste disposal through the gate fees at the Naboro Sanitary Landfill, however not all dumpsites have implemented gate fees.

Other forms of financing have been through government subsidy, but mainly for the Central Division, where government subsidises the shortfall in gate receipts by over \$1.2 million annually at Naboro Sanitary Landfill.

The actual amount needed for Fiji's solid waste management system has not been assessed, however Table 9 below makes an assessment of the total cost for the collection and disposal of waste based upon the collection and transport costs of the four councils delivering waste to Naboro and the disposal costs. It is clear that the current level of financing is insufficient, and the problem is compounded by the poor cost recovery rates in the Provincial Councils, which negatively affects the quality of service delivered. An improved and sustainable system of financing and fee collection is required.

TABLE 9: AN ASSESSMENT OF ANNUAL COST TO FIJI FOR WASTE COLLECTION AND DISPOSAL

DIVISION	POPULATION ²	MSW GENERATED KG/PERSON/DAY ³	MSW GENERATED TONNE/YEAR	COST OF COLLECTION AND DISPOSAL \$/TONNE ⁴	TOTAL COST FJD\$ MILLION
Central	342,386	0.4	49,988	115	5.748
Western	319,611	0.4	46,663	130	6.066
Northern	135,961	0.4	19,850	150	2.977
Eastern	39,313	0.4	5,739	150	0.861
Totals	837,271		122,240		16.652 ⁵

The MSW (Household) Generation figure of 0.4Kg/person/day is used as this is representative from the input data from Naboro. The figure specifically excludes market waste from Suva which makes up almost 20% of Suva's waste. When this was excluded the figures for Suva and Nasinu for MSW were very similar on a per capita basis see Table 4 above

JICA in their 3R Promotion Manual (February 2011) suggested a Generation rate in excess of 1.0Kg/person/day but this includes all waste, market, Street Sweeping, Park, Drain, Hotel, Commercial (restaurant) much of which could be considered to be commercial waste.

² Population based upon 2007 Census

³ Waste Generation based upon averages of latest survey data January 2011 see table 2

⁴ Cost of disposal based upon current costs in Central Division, greater costs in Western Eastern and Northern Divisions due to a greater proportion of the waste being generated in the rural communities

⁵ This represents a total cost for collection and disposal for MSW but DOEs allow for the capital cost of constructing the requisite facilities

6.2 What we want to achieve

- Efficient and cost-effective waste management services to all waste producers.
- The costs for delivering these services are distributed equitably among recipients of the service in proportion to the amount of waste produced, or in proportion to the extent to which the service is used.
- Self-funding through user pays.
- Regional Medical Waste Incinerator.
- Create a system that generates value in WEEE-Waste.

6.3 How will we achieve the targets?

1. Undertake an evaluation of the costs of delivering waste management services Fiji-wide, and a cost benefit analysis (CBA) of possible cost-recovery measures that take into account the socio-economic situation, with a view to recommending the optimum mix of cost-recovery measures and an implementation timeframe and modality for these measures. Cost and benefits that should be considered include the ease of administering the measure and recovering the revenue. Cost recovery measures that could be considered include:
 - a. (GST) is charged on most goods and services and every item we purchase day to day has had or has an effect on the environment, therefore include in VAT an element for waste management, this system of payment would reflect affordability and the ability to pay reflect the principle of "Polluter Pays" and also, VAT on certain essential basic items could be either at a reduced rate or zero rated so that the poorest are not adversely affected.
 - b. E-Tax on specific imported goods.
 - c. Fuel Taxes - Taxes on motor fuels and the annual vehicle licence duty are options that could be considered.
 - d. Climate Change Levy - Industrial Energy Use.
2. Encourage investment in new vehicles and additional equipment for waste disposal services the Government to introduce a reduced or zero import levy on equipment either purchased by councils, private operators or provided through funding agencies.

6.4 How will we know that we have achieved the targets?

- Increase in the proportion of the waste management budget generated from sustainable sources with less reliance on subsidies and donor aid.
- Increase in the proportion of revenue actually collected.
- Additional and new vehicles and equipment.
- Investment in Transfer stations.
- Regional Medical Waste Incinerators constructed or under construction.

7 LEGISLATION AND ENFORCEMENT

7.1 The key issues

With the passing of the Environment Management (Waste Disposal and Recycling) Regulations 2007 and the Litter Promulgation 2008, Fiji's legislative framework is much improved. However, non-compliance with the legislation is common due to lack of awareness and carefree attitudes. There is also limited human and financial capacity to enforce the legislation, with limited delegation of enforcement responsibilities among agencies. To improve this situation, a training manual on the Environment Management Act 2005 was prepared; however, a similar manual does not exist for the regulations.

There are also some areas that lack clarity in the relevant waste management laws, and result in overlap of functions and responsibilities. There needs to be clarity that the current EMR 2007 covers for bulky waste, dumping of bulky waste on the roadside is an offence, possibly the penalty for this offence need to be reviewed as it was clearly thought this is a significant problem.

There are concerns that there is limited Prosecution capabilities and that the Judiciary process is slow, there is also a lack of specialised lawyers with an Environmental Law background.

There are areas where existing legislation needs to be extended to include specific wastes that are not currently included or where the emphasis needs to be directed towards the producer in terms of responsibility of waste, this applies to Waste Electrical and Electronic Equipment Waste, Packaging Waste, Scrap dealers etc.

<p>EXTRAORDINARY REPUBLIC OF FIJI ISLANDS GOVERNMENT GAZETTE PUBLISHED BY AUTHORITY OF THE FIJI GOVERNMENT</p> <p>Vol. 8 FRIDAY, 15th AUGUST 2008 No. 63</p> <p>[1346]</p> <p>LITTER PROMULGATION 2008 (PROMULGATION NO. 21 OF 2008)</p> <p>Arrangement of Sections</p> <p>PART I – PRELIMINARY</p> <p>1. Short Title and Commencement 2. Interpretation</p>	<p>Environment Management Act 2005 Fiji Islands ENVIRONMENT MANAGEMENT ACT 2005 ACT NO. 1 OF 2005</p> <p>I assent.</p> <p>[I.S.]</p> <p>RATU JONI MADRAPIWIWI Acting President [17th March 2005]</p> <p>AN ACT</p> <p>FOR THE PROTECTION OF THE NATURAL RESOURCES AND FOR THE CONTROL AND MANAGEMENT OF DEVELOPMENTS, WASTE MANAGEMENT AND POLLUTION CONTROL AND FOR THE ESTABLISHMENT OF A NATIONAL ENVIRONMENT COUNCIL AND FOR RELATED MATTERS</p> <p>ENACTED by the Parliament of the Fiji Islands.</p> <p>PART I - PRELIMINARY</p> <p><i>Short title and commencement</i></p> <p>1. (1) This Act may be cited as the Environment Management Act 2005 and comes into force on a date appointed by the Minister by notice in the <i>Gazette</i>.</p> <p>(2) The Minister may appoint different dates for the coming into force of different sections or Parts of this Act.</p> <p><i>Interpretation</i></p> <p>2. In this Act, unless the context otherwise requires—</p>	<p>ENVIRONMENT MANAGEMENT (WASTE DISPOSAL AND RECYCLING) REGULATIONS 2007</p> <p>Table of Contents</p> <p>PART I – PRELIMINARY</p> <p>1. Citation and commencement 2. Definitions 3. Requirements for permits</p> <p>DIVISION A – WASTE DISPOSAL</p> <p>PART 2 – SOLID AND LIQUID WASTE PERMITS</p> <p>4. Requirement for a solid waste permit 5. Requirement for a liquid waste permit 6. Criteria for issuing a solid waste permit 7. Testing for water quality 8. Categories of solid or liquid waste permit 9. Prohibited areas and zones 10. Standard and signature disposers and dischargers 11. Hazardous waste endorsement</p> <p>PART 3 – LIVESTOCK WASTE PERMITS</p> <p>12. Livestock facilities 13. Requirement for a livestock waste permit</p> <p>PART 4 – AIR POLLUTION PERMITS</p> <p>14. Requirement for an air pollution permit 15. Exemption from an air pollution permit 16. Air quality standards 17. Monitoring of air quality 18. Compliance with standards 19. Conditions of air pollution permits 20. Air pollution management plans</p> <p>PART 5 – CONTROL OF AIR POLLUTION</p> <p>21. Emissions to air from certain activities 22. Incineration of waste</p> <p>DIVISION B – WASTE RECYCLING</p> <p>PART 6 – LEAD ACID BATTERIES</p> <p>23. Requirement for a batteries handling permit 24. Conditions of batteries handling permits 25. Customs clearance of batteries 26. Duties of sellers of batteries</p>
<p>EXTRAORDINARY REPUBLIC OF FIJI ISLANDS GOVERNMENT GAZETTE PUBLISHED BY AUTHORITY OF THE FIJI GOVERNMENT</p> <p>Vol. 11 MONDAY, 24th MAY 2010 No. 61</p> <p>[913]</p> <p>GOVERNMENT OF FIJI (DECREE NO. 21 OF 2010)</p> <p>LITTER (AMENDMENT) DECREE 2010</p> <p>In exercise of the powers vested in me as President of the Republic of Fiji and the Commander in Chief of the Republic of Fiji Military Forces by virtue of the Executive Authority Decree 2009, I hereby make the following Decree—</p> <p>TO AMEND THE LITTER PROMULGATION 2008</p> <p><i>Short title and Commencement</i></p> <p>1.—(1) This Decree may be cited as the Litter (Amendment) Decree 2010.</p> <p>(2) This Decree shall come into force on the date it is gazetted.</p>	<p>1. (1) This Act may be cited as the Environment Management Act 2005 and comes into force on a date appointed by the Minister by notice in the <i>Gazette</i>.</p> <p>(2) The Minister may appoint different dates for the coming into force of different sections or Parts of this Act.</p> <p><i>Interpretation</i></p> <p>2. In this Act, unless the context otherwise requires—</p>	

7.2 What we want to achieve

- A level playing field where offenders who refuse to comply with waste management laws are punished.
- A review of penalties for offences such that the penalties are actually deterrents or sufficiently large such the offender doesn't benefit from their offence.
- Efficient implementation of responsibilities.
- Increase Resources and capacity building.
- Update/review current legislation.
- Regulations written to specifically target waste types such as a Recycling Decree.
- Better control of scrap metal.

7.3 How we will achieve the targets

3. Step-up enforcement efforts by engaging and empowering other agencies to assist the Department of Environment.
4. Review Penalties and ensure that they are large enough that they deter offenders from repeating.
5. Effective fixed penalties/spot fines.
6. Extend waste permitting system to include Scrap metal dealers and Scrap yards.
7. Enact a Recycling Decree.

7.4 How will we know that we have achieved the targets?

- Number of citations under the Environment Management (Waste Disposal and Recycling) Regulations 2007 and the Litter Promulgation 2008.
- Decrease on the incidents of fly tipped waste.
- Increase staff levels at DOE and other enforcement agencies.
- Revised or amended laws.
- Larger penalties being imposed.
- More successful prosecutions.
- Recycling Decree enacted.



8 AWARENESS AND EDUCATION

8.1 *The key issues*

Most awareness efforts on waste management utilize the mass media, but are ad hoc with no continuous and effective awareness-raising strategy in place. In 2009, the Government with the assistance of SPREP undertook the preparation of a draft Integrated Communications Plan for the National Waste Management Strategy. However, this is yet to be finalized. The JICA-funded Waste Minimization and Recycling Promotion Project successfully use awareness tools to encourage home composting and source segregation of recyclables, and there are some useful lessons learnt that could be applied in the draft Communications Plan.

The need for further education and awareness is clearly evident by observing the level of litter and illegal dumping in many urban areas.

8.2 *What we want to achieve?*

- Every citizen (individual and corporate) to practice responsible waste management behaviour and participate in waste management programmes, and activities, while complying with the applicable laws.

8.3 *How we will achieve the targets*

8. Finalize and implement the draft Integrated Communications Plan for the National Solid Waste Management Strategy, to promote appropriate waste management behaviour.
9. Engage and assist relevant NGOs, public and private sector organizations, and other interested parties to adopt or incorporate the Integrated Communications Plan into their normal activities.
10. Assemble a team to work with the Curriculum Development Unit to incorporate aspects of waste management into the formal curriculum.

8.4 *How will we know that we have achieved the targets?*

- Reduction in incidence of communicable diseases such as dengue, typhoid, and leptospirosis.
- Reduction in contravention of applicable laws.
- Increase in non-government driven waste management activities.



9 CAPACITY BUILDING

9.1 *The key issues*

The Environment Department has responsibility for the operational and regulatory aspects of solid, liquid and hazardous waste management. However, there is only 5 staff members who are solely responsible for the multitude of issues involved in waste management, with 4 of these also tasked with responsibilities for EIA, and setting up of mechanisms under the Environment Management Act and a range of other responsibilities. The limited human resources will result in a slow implementation of the National Waste Management Strategy, and areas such as bulky and difficult waste management may be affected.

There is a shortage of appropriately trained people in waste management in Fiji. With this, there is lack of awareness raising at all levels, including communities, general public, business arena, and schools.

Environmental law and policy development capacity within the country is also limited, which causes some degree of stagnation in this area.

9.2 *What we want to achieve*

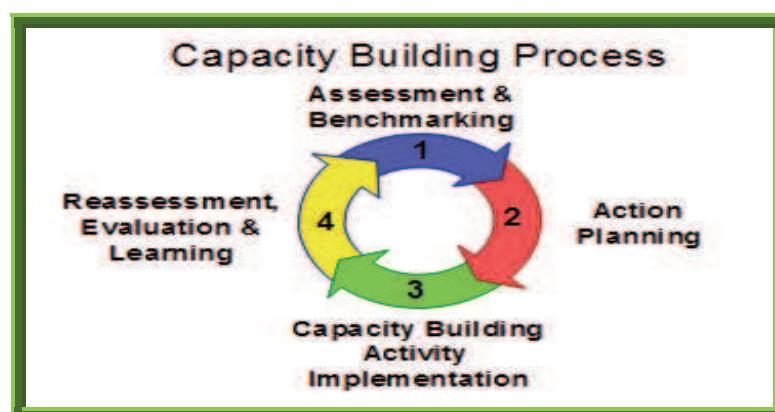
- Sufficient human resource capacity (numbers and qualifications) in relevant agencies to realize the vision and objectives of the National Solid Waste Management Strategy 2011-2014.

9.3 *How we will achieve the targets*

11. Undertake a capacity assessment to identify the gaps with respect to the implementation of this Strategy, and implement the recommended capacity building programmes from the assessment. The capacity assessment should include local capacity for drafting of environmental law, and possible modalities for building capacity should include technical/vocational, and attachments (e.g., at SPREP and USP).
12. Collaborate with FIT, FSM and USP to develop or consolidate course offerings in waste management.
13. Train and empower Council Health Inspectors to enforce the provisions of the EMA.

9.4 *How will we know that we have achieved the targets*

- Increase in numbers and type of trained officers in waste management.



10 ENVIRONMENTAL MONITORING

10.1 *The key issues*

There are many waste management and disposal sites throughout the country, with many considered illegal dumps. The current waste disposal and recycling permitting system has seen many waste generators such as commercial and industrial facilities undertake proper waste disposal, and improve operations of dumps and waste transportation. However, there is still a lack of a comprehensive and consistent environmental monitoring or reporting program in place. There is also no environmental testing equipment available with the Department of Environment, with a lot of reliance on costly testing with institutions.

10.2 *What we want to achieve*

- Protection of the natural environment and public health from the harmful effects of waste management.
- Rural Local Authorities capacity for Waste management System and services to be strengthened to reduce the incidence of illegal dumping.
- Establish Biogas Digester for Large farms and sedimentation ponds for small farms as more feasible and sustainable in terms of cost.

10.3 How we will achieve the targets

14. Develop and implement an environmental monitoring program, which includes water quality monitoring, and appropriate response and mitigation measures.
15. Increase laboratory capacity for environmental testing in order to reduce costs of environmental monitoring either by developing basic in-house testing capacity.
16. Increased waste returns from all holders of permits regarding the waste they generate.
17. Secure funding for Biogas Digester.

10.4 How will we know that we have achieved the targets?

- Reliable, up-to-date information readily available on environmental quality and possible impacts of waste management activities.
- Increased percentage of farms that have animal waste treatment facilities.



11 POLICY AND PLANNING

11.1 *The key issues*

Policy and Planning encompasses the institutional arrangements, and data which are necessary to develop effective policies for solid waste management and to meet Fiji's current obligations under international and regional agreements.

In terms of institutional arrangements, waste management is generally not properly coordinated, leading to non-systematic financing and lack of improvements in systems such as waste collection and transportation. There is also some lack of clarity in roles and responsibilities between Central Board of Health and Department of Environment with respect to enforcement in the rural and urban areas. The Central Board of Health give greater impetus on health issues than environment issues in the rural areas but have limited funds to deal with the collection and disposal of waste.

There is also much more emphasis on waste management in the urban areas to the neglect of waste management in rural communities, coastal, and flood prone areas. Furthermore, in the case of the Department of Environment, responsibilities for monitoring, enforcement, and operation are vested in a single agency which leads to the situation of self-regulation, however this self-regulation was established by the Government and only applies to Naboro Landfill and it can only be said that Naboro is a very well managed site that is an example of what should replace the outdated dumpsites throughout Fiji.

Collecting and analysing solid waste data is necessary for proper waste management policy planning and operation, since it establishes baseline conditions and allows for the evaluation of progress towards achieving the objectives set in this strategy. However waste data collection is not a regular component of each provincial council business. There are currently no systems for regular collection, collation, storage and analysis of data that can be readily retrieved, such as waste generation and composition, recycling rates, environmental quality, importation of certain products which become hazardous waste (e.g. WEEE-waste), community awareness levels, etc. The figures that are obtained in terms of tonnages are only reliable from two (2) sources i.e. Naboro and Lautoka Landfill figures supplied by other councils are based on vehicle capacity and a questimation of the tonnage. Whilst not completely accurate these figures do at least provide for comparison between surveys.

Fiji currently has obligations under several international and regional conventions such as the Waigani Convention which regulates transboundary movement of hazardous waste. Most of these obligations are not well incorporated into policies and into business as usual. For example, Fiji exports lead acid batteries and imports waste oil without meeting the Waigani Convention requirements.

Kyoto protocol is a mechanism for the trading of carbon emissions from any industry that emits global warming potential (GWP) gases.

Ozone depleting substances under the Montreal Protocol prohibits the use of ozone depleting gases this is a requirement for all countries that have ratified the Montreal Protocol.

11.2 What we want to achieve

- More efficient coordination of waste management activities by designated agencies at the national level
- Accurate and updated national waste statistics (including relevant information from all businesses, industries and communities) regularly available through a central agency, which can be used as the basis for developing and reviewing policies and strategies.
- Compliance with international and regional waste-related conventions.
- A Centralised Planning, Review and Approvals system such that all applications for major activities including waste management are coordinated made through one Government body such as Town and Country Planning or National Planning. This Planning body would be responsible for coordinating the application and would circulate copies of the application to all relevant stakeholders and Ministry Departments as Statutory Consultees.

11.3 How we will achieve the targets

18. Undertake an institutional review for solid waste management with a view towards reducing duplication, maximising functionality of existing organizational structures, simplifying and enhancing cost recovery, and vesting different agencies with responsibilities for waste management operation, monitoring and enforcement, and policy development. This review must also include a consideration of Fiji's existing obligations under solid waste-related international and regional conventions.
19. Develop a data collection and analysis protocol for the waste types covered in this Strategy, which should include specifying national standard methods for various waste studies, identifying roles for various agencies (e.g., Statistics Department should be central point for storage and dissemination of collated data, Provincial Councils should undertake regular waste audits within their boundaries, etc.), and outlining reporting requirements for private businesses (e.g. hotel operators, industries). These responsibilities must be given recognition by incorporating into the annual corporate plans of the various agencies.
20. Introduce a system of returns for all waste recycled such as lead acid batteries, this should be part of the existing permit system.

11.4 How will we know that we have achieved the targets?

- Roles and responsibilities for solid waste management are clearly defined and understood by stakeholders
- Reliable, comparable, and updated statistics on waste management in Fiji readily available and accessible by all (number of solid waste data reports submitted)
- Increasing number of solid waste management policies/decisions based on reliable and updated statistics



12 SOLID WASTE INDUSTRY

12.1 *The key issues*

A vibrant solid waste industry can create competition which leads to lower prices and better services. It can also reduce the management and operational burden at the national and local government levels, where the focus can then shift to monitoring and enforcement. The solid waste industry in Fiji currently encompasses the private sector involved in waste collection, transportation, and landfill management – who are directly contracted by government agencies, and also reuse and recycling – whose involvement is driven by market forces such as the commercial value of the recyclable materials, and demand for equipment repair services.

There is also an informal aspect to the solid waste industry, which comprises waste pickers who extract recyclable materials from dumpsites often under unsanitary conditions, and itinerant waste collectors who move around from door to door collecting unwanted items (such as scrap textiles). While this sector operates under significant health and safety risks, it is a source of income for many and provides a valuable service in reducing final waste disposed. In Lautoka City Council, waste pickers are lightly regulated, since they pay a small monthly fee (\$20) for a license to operate and must provide their own personal protective equipment.

There is generally a lack of supporting policies for the solid waste industry, which encourage innovation and efficiency towards better solid waste management. Further, the role of the informal sector is often unrecognized and they continue to operate under unhealthy and unsafe conditions.

However, there is also a lack of investment by industry and all parties because waste management is perceived in Fiji as being a simple low cost operation not recognising the true costs of providing a quality service and like any other business must be profitable to survive and to re-invest in repairs maintenance and new equipment. There needs to be recognition of the true cost for collection and disposal. There needs to be regulation that allows only permitted waste carriers to collect, handle and dispose of waste.

Industry companies such as H. G. Leach, Carpenters, Waste Corps, Waste Recyclers, Waste Clear etc should consider forming an Industry Association that can lobby Government for legislation and other areas of change and assistance that will help them to develop a thriving well managed and effective waste management service. The companies need to raise the profile of their businesses and services that they are able to provide.

Waste producers need to be aware that as producers they are responsible for their waste “From Cradle to Grave” that they need to employ reputable waste management companies to manage their waste and be able to demonstrate that their waste has been disposed of at a permitted facility. There should be an auditable trail such that for every individual load of waste can be traced.

12.2 *What we want to achieve*

- A thriving solid waste industry that supports waste management and delivers increased quality of waste management services that is cost-effective and at minimal risk to those involved.

12.3 *How we will achieve the targets*

21. Implement economic incentives and subsidies for the solid waste management industry, which takes into account fluctuating market conditions (e.g., inflation, fluctuating price for recyclables). Such incentives might include:

- a. Duty concessions for importers/operators of waste management equipment and technology.
 - b. Duty incentives on environmentally-friend products, coupled with dis-incentives on the non-environmentally friendly alternative (e.g., incentives for importing fully biodegradable nappies, and disincentives for non-biodegradable disposable nappies).
22. Regulate the informal sector to ensure protection of human health, and to recognize and record the contribution (in terms of waste diversion) of the sector. This must necessarily involve:
- a. Training to the sector on occupational health and safety issues.
 - b. Specifying minimum health and safety requirements including personal protective equipment.
 - c. Developing a licensing system that is not expensive, or overly burdensome and complicated.
23. Encourage industry to establish an Industry Waste Management Association that are represented as a stakeholder and can work with councils and government departments to develop a sustainable thriving solid waste industry.

12.4 How will we know that we have achieved the targets?

- Increasing number of registered and environmentally compliant companies (or individuals) involved in solid waste management activities
- Better equipped waste management companies providing better services.



13 INTEGRATED SOLID WASTE MANAGEMENT

13.1 The key issues

13.1.1 Waste reduction, reuse and recycling

The JICA-funded Waste Minimization and Recycling Promotion Project is a pilot project in Nadi Town and Lautoka City that aims to promote the 3Rs. There are valuable lessons learnt from this project that could be applied Fiji-wide, and these should be incorporated into a replication strategy.

The Government has also undertaken an evaluation of options to reduce plastic bag consumption and the recommendations from that report have been accepted and are expected to be implemented. Furthermore, with the assistance of the UNDP, the Government is implementing a Container Deposit Legislation project targeting PET bottles.

13.1.2 Waste Collection

Waste collection in urban areas is by means of a variety of vehicles from purpose built compactor trucks to trucks with wired cages being specifically used for green waste collection.

A number of councils have compactor trucks for collecting household waste, but some councils use open trucks with no compaction similar to the one shown below collecting green waste. Some council have their own collection vehicles whilst others contract the collection to private operators.





Table 10 below reviews the entire waste collection vehicle currently delivering waste to Naboro, both councils and private operator vehicle. The average vehicle load was determined from input figures into Naboro, these figures have then been used to estimate the probable daily tonnage input for each vehicle type.

From Table 10

The capacity for collection by Municipal vehicles running to Naboro is 65.64tonnes/day
 The capacity for collection by open cage vehicles running to Naboro is 75.96tonnes/day
 The capacity for collection by Skip vehicles running to Naboro is 80.83tonnes/day

This equates to about 222 tonnes/day.

Table 11 uses the same average weights for each vehicle type but estimates the collection capacity if a transfer station is Suva and Nasinu is used.

From Table 11

The capacity for collection by Municipal vehicles running to Transfer Station is 143.57tonnes/day
 The capacity for collection by open cage vehicles running to Transfer Station is 218.01tonnes/day
 The capacity for collection by Skip vehicles running to Transfer Station 138.95tonnes/day

This equates to about 500 tonnes/day.

It is assumed that all vehicles other than Front End Loader Vehicles (FEL) operated by Carpenters and Waste Corps Would use the transfer station.

Therefore if a transfer station was available in Suva/Nasinu the collection capacity of the existing vehicles would be increased substantially, thereby providing wider collection, increased utilisation and efficiency of both council and private waste collection.

TABLE 10: COLLECTION CAPACITY OF VEHICLES TO COLLECT AND DELIVER TO NABORO SANITARY LANDFILL

NUMBERS AND TYPE OF COLLECTION VEHICLES IN SUVA AREA													
COUNCILS	Municipal Compactor				Open Cage				Front End Loader		Skip Vehicle		
	Number of Vehicles	Average Capacity T/Load	Loads per day To Naboro	Total Tonnes/day	Number of Vehicles	Average Capacity T/Load	Loads per day To Naboro	Total Tonnes/d ay	Number of Vehicles	Average Capacity T/Load	Loads per day To Naboro	Average Capacity T/Load	Total Tonnes/ day
Suva	6	5.09	1.24	37.87	19	2.11	1	40.09					
Lami	2	3.92	2	15.68	1	1.22	3	3.66					
Nausori	1	4.49	1	4.49	1	3.56	1	3.56					
Nasini					5	4.88	1	24.40					
PRIVATE COMPANIES													
Carpenters	1	1.84	1	1.84	1	3.4	1.25	4.25	1	7.62	1.7	12.95	5
Waste Corps									2	7.26	0.7	10.16	3
Waste Clear	2	1.44	2	5.76								3	3.03
FHL												1	2.31
Enviroclean		1										1	
Totals	13	16.78	7.24	65.64	28	15.17	7.25	75.96	3	14.88	2.4	23.11	13
												9.53	10.79
												80.83	

TABLE 11: COLLECTION CAPACITY OF VEHICLES TO COLLECT AND DELIVER TO TRANSFER STATION (T/S) SUVA/NASINU

NUMBERS AND TYPE OF COLLECTION VEHICLES IN SUVA AREA																
	Open Cage						Front End Loader						Skip Vehicle			
	Number of Vehicles	Average Capacity T/Load	Loads per day To T/S	Total Tonnes/ day	Number of Vehicles	Average Capacity T/Load	Loads per day To T/S	Total Tonnes/ day	Number of Vehicles	Average Capacity T/Load	Loads per day To T/S	Total Tonnes/ day	Number of Vehicles	Average Capacity T/Load	Loads per day To T/S	Total Tonnes/ day
COUNCILS																
Suva	6	5.09	3	91.62	19	2.11	3	120.27								
Lami	2	3.92	2	15.68	1	1.22	3	3.66								
Nausori	1	4.49	3	13.47	1	3.56	3	10.68								
Nasinu					5	4.88	3	73.20								
PRIVATE COMPANIES																
Carpenters	1	1.84	3	5.52	1	3.4	3	10.20	1	7.62	1.7	12.95	5	1.91	5	47.75
Waste Corps									2	7.26	0.7	10.16	3	2.28	5	34.20
Waste Clear	2	1.44	6	17.28									3	3.03	5	45.45
FHL													1	2.31	5	11.55
Enviroclean	1												1			
Totals	13	16.78	17	143.57	28	15.17	15	218.01	3	14.88	2.4	23.11	13	9.53	20	138.95

A SELECTION OF ROADSIDE WASTE COLLECTION POINTS IN SUVA



Rubbish is scattered around on the collection day and according to the Municipal Councils and the Rural Local Authorities this is mainly due to:

- By-Laws that specify the use of proper rubbish bins with tightly fitting lids are not regulated and enforced
- Stray animals
- Not enough awareness for the general public on how to keep the garbage out for collection.



There are only a small number of private professional waste management companies throughout Fiji that collect waste, much of their equipment is old and their bins and containers are in need of repair or replacement.

The servicing (emptying) of their bins by the Front End Loader vehicle (FEL) is inadequate either because their customers do not request emptying until the bins are overflowing and waste is lying around the bin or the companies have insufficient resources to provide a reliable service. In addition the cost base for collection and disposal is too low and therefore companies will not invest.



There are many instances also where waste that has been collected is not sufficiently secure on/in the collection vehicle and is deposited on the highway, it could be argued that this is a breach of LTA regulations (insecure load), this could also be legislated against through waste management regulations making it an offence not to confine and control litter but to allowing litter to escape. Is this covered in the Litter Promulgation Decree?

Waste collection in rural areas is intermittent and infrequent and is dependent upon government funding and is organised by the Central Board of Health (CBH).

13.1.3 Waste Disposal

The Naboro Sanitary Landfill is the only sanitary landfill in Fiji. There have been limited operational improvements on dumpsites including Lautoka, Labasa, Rakiraki, and Sigatoka, however, other than Lautoka these sites still lack data recording and segregation procedures for recyclables and hazardous wastes and

in many instances waste is still burnt.



In other areas, uncontrolled dumping is still the predominant method of disposal, there are even within the Central Division which has a divisional Sanitary Landfill site many instance of illegal dumping and burning of waste

Naboro Sanitary Landfill and



Vunato Disposal Site in Lautoka is equipped with a weighbridge, which assists in gauging the amounts of waste generated in these two districts.

Uncontrolled dumping presents a threat to the environments both air quality and a threat to groundwater as well as a threat to local amenity, the two sites below located at Ba and Sigatoka are examples of uncontrolled dumping that must be stopped.



Ba Dump is uncontrolled dumping of waste with no safeguards to the environment. The site is situated in a hilly area in a pine forest approximately 7km away from the town centre, outside the urban boundaries. Sugar cane plantation and farms surround the dumpsite.

There is no lining on the base of dump to prevent waste water seeping into the ground water. Therefore, not only is there contaminated runoff from the site into the valley floor and beyond to sugar cane plantations and farms that surround the dumpsite, but also groundwater is contaminated by infiltration of contaminants leaching into the groundwater, the extent of this is unknown as there are no monitoring boreholes.

Sigatoka Dump is also uncontrolled and is situated adjacent to the National Heritage site the Sigatoka Sand dunes.



13.1.5 Environmental Concerns

The site is sandy soil and its inadequacy that hinder the implementation of controlled disposal, site too windy and refuse are easily blown over the area and road thus creating an unsightly scene, creates a good breeding ground for rodents, flies and mosquitoes, depreciation of the recreational value, no control over the type of wastes that enters the dump, lack of space for expansion (as expansion would cause the dumpsite to overlap with the sand dunes which is a tourist attraction), smoke from the burning waste at the dumpsite becomes a road menace for drivers, as the dumpsite is located along the main highway.

13.1.6 Open burning and Illegal Dumping

Open burning is an option utilized for waste disposal mainly outside the collection area of the town/city councils. It is practiced at the dumpsites as well. The fumes emitted from this are a health concern as these fumes can be toxic such as Dioxin and Furans.



Waste that are not accepted at the dumpsite, are disposed unlawfully by the public. Certain wastes are also dumped off at the roadsides and backyard and even in the coastal areas.

13.1.7 New Disposal Facilities

The development of any new facilities should be governed by guidelines that are provided to protect the environment and safeguard valuable resources. These could include the following principles:

- the distances from the boundary of the site to residential and recreation areas, waterways, water bodies and other agricultural or urban sites;
- the existence of groundwater, coastal water or nature protection zones in the area;
- the geological and hydrogeological conditions in the area;
- the risk of flooding, subsidence, or landslides on the site;
- the protection of the nature or cultural heritage in the area.



13.1.8 Alternative Technologies

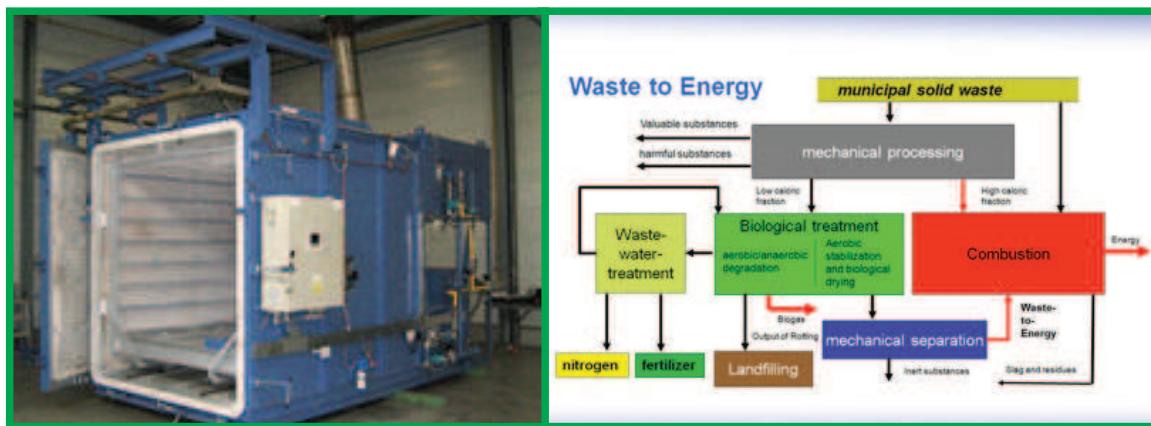
There are a number of alternative technologies that might be considered which can provide energy from waste, these include the following:

1. Mass Burn Incineration
2. Pyrolysis, Gasification and Plasma
3. Anaerobic Digestion
4. Mechanical Biological Treatment

However it is important to recognise that some of these technologies complement our existing strategies and policies, whilst others contradict these strategies and policies.

Some of the alternative technologies require a feedstock of high calorific value materials such as plastics, and would discourage recycling of this material.

Whilst it is always worthwhile to consider alternative technologies it is considered that it is premature to consider these ahead of having an established waste collection system in place nationally. There is insufficient data at this time to determine the quantities of waste generated and the type of waste. There is some recycling of plastic and cans but this is sporadic and not established across the whole of Fiji.



13.1.9 Medical Wastes

Medical wastes from the main hospitals and quarantine wastes from airports and ports are incinerated. The ash from the hospital in Suva is disposed of in the Naboro Sanitary Landfill. The Ministry of Health are in the process of sourcing a new medical waste incinerator for Suva and other locations as required. Waste incinerated at airports and ports may not be incinerated in incinerators that are up to standard. However, infectious medical wastes from smaller clinics needs to be collected as required from each clinic for incineration. The Ministry of Health are proposing to establish a divisional medical waste incinerator probably site at Naboro, the intention then is to have regular collection using a designated vehicle to collect infectious waste for incineration.



13.1.10 Difficult Wastes

The Naboro Sanitary Landfill is operated in such a way to have separate cells for receiving, difficult and hazardous wastes such as odorous fish loads. WEEE-waste, and contaminated soils, this waste is segregated from general waste being delivered and directed to specifically prepared locations by the contractor.

In terms of agricultural (animal) waste, the concern here is that animal waste is simply dumped within the farm property boundary and then any effluent is allowed to discharge uncontrolled into waterways causing contamination and pollution. It was proposed that this animal waste be either used in Biogas Digesters on the larger farms and to establish sedimentation ponds on smaller farms.



13.2 What we want to achieve

- 25 percent reduction in the amount of waste that requires final disposal (in a landfill)
- Everyone provided with access to cost-effective, reliable, and environmentally sound waste collection and transportation services
- Every area has access to cost-effective and environmentally sound solid waste disposal services (for all types of waste covered in this Strategy)
- Policies that guide the development of new waste management facilities on a National basis

13.3 How we will achieve the targets

24. Develop and implement a replication action plan for the JICA-funded Waste Minimization and Recycling Promotion Project, in order to expand the programme to other areas in Fiji. This plan will require data to be available (as specified in this Strategy).
25. Implement the recommendations of the evaluation study of options to reduce plastic bag consumption
26. Provide continuing support for the implementation of the UNDP-funded Container Deposit Legislation project.
27. Undertake a nation-wide time and motion study in order to identify the issues with the current waste collection and disposal systems and identify the optimum combination of waste disposal site locations (e.g. regional landfills) and transportation services (e.g. transfer stations) to provide the most cost-effective waste collection and transportation services to all.
28. Develop and implement a WEEE-waste management policy in consultation with key stakeholders. As far as possible, the WEEE-waste management policy must:

- a. be based on polluter pays principle, and take into account the costs of whole-life management of the electrical or electronic product which becomes WEEE-waste.
 - b. also consider methods for managing charitable donations of used electrical or electronic products which eventually become WEEE-waste.
29. Develop and disseminate minimum guidelines for the public and for facilities which cover the storage (containment), collection, and disposal of bulky waste and hazardous wastes.
30. Prepare development policy proposals and agree regulatory guidelines with all stakeholders.

13.4 How will we know that we have achieved the targets?

- Increase in the amount of waste collected
- Reduction in the amount of waste that requires final disposal
- Increased proportion of the population with access to regular solid waste collection services
- Reduction in unit waste collection costs (\$/tonne) (if more waste is collected this will also result in reducing the unit cost of collection)
- Reduction in number of dumpsites and increase in number of Sanitary Landfills



14 IMPLEMENTATION PLAN

TABLE 12: IMPLEMENTATION PLAN

	STRATEGY (PLEASE REFER TO MAIN DOCUMENT FOR COMPLETE TEXT)	RESPONSIBLE AGENCY	PRIORITY
Sustainable Financing	1. Undertake an evaluation of the costs of delivering waste management services Fiji-wide, and a cost benefit analysis of possible cost-recovery measures	MOF & DOE	HIGH
	2. Encourage investment in new vehicles and additional equipment for waste disposal services the Government to introduce a reduced or zero import levy on equipment either purchased by councils, private operators or provided through funding agencies.		HIGH
Legislation and Enforcement	3. Step-up enforcement efforts by engaging and empowering other agencies to assist the Department of Environment	Solicitor General and DOE	HIGH
	4. Review Penalties and ensure that they are large enough that they deter offenders from repeating offences		HIGH
	5. Effective fixed penalties/spot fines		HIGH
	6. Extend waste permitting system to include Scrap metal dealers and Scrap yards		HIGH
	7. Enact a Recycling Decree		HIGH
Awareness and Education	8. Finalize and implement the draft Integrated Communications Plan for the NSWMS 2011 - 2014	Ministry for Education, DOE	MEDIUM
	9. Engage and assist relevant agencies, NGOs, public and private sector organizations, and other interested parties to adopt or incorporate the Integrated Communications Plan into their normal activities and annual corporate plans.		MEDIUM
	10. Assemble a team to work with the Curriculum Development Unit to incorporate aspects of waste management into the formal curriculum.		MEDIUM
Capacity Building	11. Undertake a capacity gap assessment with respect to implementation of this NSWMS 2011 - 2014	DOE, FIT, FSM, USP	MEDIUM
	12. Collaborate with FIT, FSM and USP to develop or consolidate course offerings in waste management		MEDIUM
	13. Train and empower Council Health Inspectors to enforce the provisions of the EMA		HIGH
Environmental Monitoring	14. Develop and implement an environmental monitoring program, which includes water quality monitoring, and appropriate response and mitigation measures.	DOE,	HIGH
	15. Increase laboratory capacity for environmental testing		HIGH
	16. Increased waste returns from all holders of permits regarding the waste they generate		HIGH
	17. Secure funding for Biogas Digester		HIGH
Policy and Planning	18. Undertake an institutional review for solid waste management	MOF, National Planning, DOE, DOLG	HIGH
	19. Develop a data collection and analysis protocol for the waste types covered in this Strategy		HIGH
	20. Introduce a system of returns for all waste recycled such as lead acid batteries, this should be part of the existing permit system.		HIGH

Solid Waste Industry	21. Implement economic incentives and subsidies for the solid waste management industry	MOF, DOE	LOW
	22. Regulate the informal sector to ensure protection of human health, and to recognize and record the contribution (in terms of waste diversion) of the sector.		LOW
	23. Encourage industry to establish an Industry Waste Management Association		MEDIUM
Integrated Solid Waste Management	24. Develop and implement a replication action plan for the JICA-funded Waste Minimization and Recycling Promotion Project	DOE, DOLG, National Planning	MEDIUM
	25. Implement the recommendations of the evaluation study of options to reduce plastic bag consumption		HIGH
	26. Provide continuing support for the implementation of the UNDP-funded Container Deposit Legislation project.		HIGH
	27. Undertake a nation-wide time and motion study		HIGH
	28. Develop and implement a WEEE management policy in consultation with key stakeholders.		MEDIUM
	29. Develop and disseminate minimum guidelines for the public and for facilities which cover the storage (containment), collection, and disposal of bulky waste and hazardous wastes		HIGH
	30. Prepare development policy proposals and agree regulatory guidelines with all stakeholders.		HIGH

15 MONITORING AND MEASURING PROGRESS

15.1 Key Performance Indicators

Measuring the implementation progress of this National Solid Waste Management Strategy will be critical to ensuring that any challenges to implementation that may have been missed during the initial development are identified and addressed. During the discussion of each priority thematic area, individual performance indicators were provided. However, measuring the overall success of the Strategy will be based on the following key performance indicators:

- Amount of waste generated per capita,
- Percentage of total waste landfilled,
- Percentage of total waste diverted (includes reuse and recycle),
- Percentage of waste not collected, either dumped or burnt,
- Unit cost of waste management (per capita or per tonne of waste),
- Percentage of waste management budget subsidized by government sources.

15.2 Baseline

It is necessary to establish the baseline conditions for the above key performance indicators against which to evaluate future progress. However, much of this information was not available at the time of writing the Strategy. It is anticipated that this information will be gathered as the Strategy is implemented.

The total tonnage of waste generated is considered based upon the overall population of Fiji of 837,271 inhabitants. Different waste generation figures are used per capita because the collection across Fiji varies from town to town.

The percentage of waste landfilled is based upon data from Naboro and Lautoka weighbridge returns and from the returns received from the survey in January 2011 and showed the tonnages to landfill or dump as shown in Table 13.

TABLE 13: QUANTITIES OF WASTE DISPOSED TO LANDFILL OR DUMPS IN 2010

DISPOSAL LOCATION	TONNES RECEIVED	BASIS OF ASSESSMENT
Naboro Landfill	58,500	Based upon Weighbridge returns includes all waste
Sigatoka Dump	7,300	Based upon Conversation with Sigatoka CEO
Lautoka Dump	24,203	Based upon Weighbridge returns includes all waste
Ba Dump	2,900	Based upon January survey – includes Tavua
Rakiraki Dump	1,442	Based upon Population assessment - Urban waste only
Savusavu Dump	956	Based upon January survey - Urban waste only
Labasa Dump	2,243	Based upon Population assessment - Urban waste only
Levuka Dump	1,280	Based upon Population assessment – Urban waste only
Total to Disposal	98,824	

Table 14 below uses different waste generation figure to show how variable the total tonnage of waste generated in Fiji and highlights the need for more data collection. The 1.0kg/person/day and the 0.78kg/person/day are over estimations of the total waste across Fiji as they are biased towards the Urban areas. The 0.78kg/person/day could be applied for the urban population and a lower waste generation rate of say 0.4kg/person/day for the rural population

In 2007 census the Urban population was 424,337 and the rural population was 412,933. Applying the figures above give a Total tonnes of waste generated of 184,194 tonnes of waste annually or 505 tonnes per day, even if we apply a waste generation figure of 1.0kg/person/day to the Urban community this still only gives a total of 215,171 Tonnes of waste annually or 590 tonnes per day. A very small quantity of rural waste goes to the dumps identified in Table 13 above, we can almost assume zero percent.

TABLE 14: KEY PERFORMANCE INDICATORS FOR TOTAL TONNAGE OF WASTE GENERATED

KEY PERFORMANCE INDICATOR	RURAL	URBAN	RURAL	URBAN
Amount of waste generated per capita	0.4kg/pers/day	0.80kg/pers/day	0.5kg/pers/day	1.0kg/pers/day
Population	412,933	424,337	412,933	424,337
Total Tonnage of waste generated	60,288	123,906	73,360	154.883
Percentage of total waste landfilled/dump	N/A	80%	N/A	64%
Percentage of total waste recycled	Unknown	Unknown	Unknown	Unknown
Percentage of waste not collected, either dumped or burnt	Unknown	Unknown	Unknown	Unknown
Unit cost of waste management, collection and disposal/tonne	Unknown	Unknown	Unknown	Unknown
Percentage of waste management budget subsidized by government	Unknown	Unknown	Unknown	Unknown

15.3 Monitoring

It is recommended that the key performance indicators be monitored and reported against on a yearly basis.

REFERENCES

1. A Practical Guide to Landfill Management in Pacific Island Countries and Territories - Volume 1; Inland Based Waste Disposal SPREP JICA March 2010
2. National Solid Waste Management Strategy and Action Plan 2008 – 2010.
3. Pacific Regional Solid Waste Management Strategy 2010 – 2015 - Prepared by SPREP and JICA.
4. National Policy Proposals and Operational Waste Management Strategy – Report by HYDEA March 2011
5. Stockholm Convention Secretariat (2009). The Stockholm Convention Retrieved 7 October 2009 from <http://chm.pops.int/Convention/tabid/54/language/en-US/Default.aspx>
6. Draft Health-Care Waste Management Policy 2011
7. Capacity building for Environmental Law in the South Pacific – Report by Pepe Clarke, Ilona Millar and Kaspar Sollberger
8. Economics of rural waste management in the Rewa Province and development of a rural solid waste management policy for Fiji By Padma Lal, Margaret Tabunakawai and Sandeep K. Singh

APPENDIX 1: PROGRESS OF 2008-2010 FIJI WASTE MANAGEMENT PLAN

ACTIONS AS PER THE NSWMS&AP 2008-2010	UPDATE
DIRECT MEASURES	
1. Collate and consolidate current available national data on all waste streams and identify gaps and means to collect required data by June 2008.	<ul style="list-style-type: none"> i. This was undertaken to some extent, through the JICA Waste Minimization Project, the Feasibility Study on Plastic Bags, the Container Deposit Legislation project (Beverage/PET survey). ii. There are plans to beef up on the Economic Incentive to Rural Waste Management Document, which needs additional survey for data to be representative. iii. Waste data has been collated by DOE through HYDEA and volunteer on the central division waste data reaching Naboro which has been the basis for developing actions. iv. The mechanism for database setup/national reporting system is currently under discussion and is part of the ACP 2011.
2. Identify appropriate waste minimization options for solid waste by June 2009	<ul style="list-style-type: none"> i. Since the strategy, the only waste streams undertaken were the baseline under the JICA waste minimization project, and the Container Deposit system project. Ministry of Health (Local authorities) have undertaken waste streams – under the advice of Central Board of Health. ii. Reduction Targets still need to be drawn up
3. Strengthen and add-value to efforts by individuals and the private sector to recycle and reprocess recyclables for overseas markets by December 2008	<ul style="list-style-type: none"> i. Promotion of recycling has so far been undertaken with the assistance of JICA – recent advertisement. There have been media articles on promotion of the concept of recycling which indirectly links to recycling companies. There have also been promotion at regional meetings – especially on car battery recycling, etc. ii. The permit system requires the submission of data, however, proper database still needs to be developed to this effect. iii. Upcoming policy of Container Deposit legislation does contribute to this (PET/Cans) iv. Interest have been shown by recycling companies for support in organising for this, hence, this still needs to be explored and organised.
4. Assist municipal councils and local rural authorities and to enhance their solid waste management (e.g. collection) systems by 2009.	<ul style="list-style-type: none"> i. Health Inspectors of councils and local authorities have been sent for trainings (overseas) for solid waste management – training involves “time and motion study”, 3R promotion, etc which should help contribute to improving system. The DOE/JICA have also been involved in local trainings on this issue – improving dump operations, 3Rs (recent training), Litter Awareness, etc. ii. No works undertaken so far in squatter settlements.

ACTIONS AS PER THE NSWMS&AP 2008-2010	UPDATE
5. Explore the means to better manage solid waste in rural areas by June 2008.	<ul style="list-style-type: none"> i. The development of funding proposal had been highlighted in the last 3R training – for councils/local authorities to submit budget proposals relating to 3R promotion in the 2012 budget submission. ii. Trainings/Presentations have been made, where possible at Tikina/village level, In collaboration with other stakeholders (local authorities, etc). Outreach to rural areas has been included in 2011 ACP. iii. No further piloting undertaken by DOE. However, NGOs have been working closely with a few communities and schools throughout Fiji. iv. This is still to be undertaken. The Draft Rural Waste Management Policy calls for assistance by government in terms of collection, etc. However, data needs to be representative, hence there's a need to work on this to obtain concrete support.
6. Upgrade current dumpsites in urban centres by 2009.	<ul style="list-style-type: none"> i. Naboro Landfill has an endorsed operational guideline, however, for other dumps, permit conditions have been drawn up in line with NIP and environmental concerns. ii. Training has also been done on dump operational improvements for dump operators in the northern and western division iii. Regional landfill is still being explored - iv. Resourcing mechanism is part of this new strategy - E-TAX.
POLICY DEVELOPMENT AND ADVOCACY	
7. To identify all major gaps and recommendations from legislative reviews on waste legislation carried out so far in Fiji by June 2008 and develop effective policies and hence identify any new gaps and overlaps in and between legislations related to	<ul style="list-style-type: none"> i. The EMA (together with the regulations) is currently undergoing review (internal). ii. Litter Decree was reviewed in 2008 – Litter Promulgation 2008, and reviewed in 2010 (Litter Amendments 2010) iii. Health officials and DOE have been working closely on the enforcement the EMA, Litter Promulgation and Public Health Act. There have been continuous iv. Other government department administering other ACTs have been working closely with DOE in harmonizing their legislation with EMA (FIMSA, Mineral Resources, etc) v. An operational working party is yet to be established.
8. Clarify the roles of Government ministries and departments with respect to the NSWMS &AP 2008 – 2010 by the end of 2008	<ul style="list-style-type: none"> i. This is yet to be officially made

CAPACITY BUILDING AND AWARENESS RAISING	
9. To enhance the coverage of aspects pertaining to waste management practices/issues in current primary and secondary school curricular; and courses offered by tertiary institutions by June 2009	<ul style="list-style-type: none"> i. The incorporation of solid waste management / environmental management has been highlighted with USP during yearly review of courses. ii. EIA has now been offered (postgraduate – which does include solid waste management to some extent). iii. FSM and FNU offers environmental courses, with the incorporation of solid waste management. iv. For schools (primary/secondary), this is yet to be an established curriculum, and is still exercised as an extracurricular activity. v. Team is yet to be assembled to work with CDU on the incorporation of solid waste management in the school curricular
10. To provide a series of short training for communities on better solid waste management practices in at least 5 villages and settlements per Province by June 2008 (to be implemented with pilots)	<ul style="list-style-type: none"> i. More than 10villages have been trained in solid waste management (coastal, islands, northern division, etc) ii. Guide is yet to be developed.
11. To implement targeted research as part of pilot projects on waste minimization, extended producer responsibility (EPR) and the recommended areas identified in Direct Measures (objective 1) by December 2009.	<ul style="list-style-type: none"> i. Yet to be undertaken. ii. DOE/HYDEA is currently working on an e-tax submission - as a means to assist with financing solid waste management.
12. To raise Public awareness about the NSWMS &AP 2008 – 2010 and solid waste management issues in general throughout the lifetime of this strategy (2008-2009)	<ul style="list-style-type: none"> i. A launch was undertaken in 2008, and there has been a promotion to some extent since – but at a minimum ii. Draft Communication Strategy drawn up in 2009, however this needs to be reviewed and adopted for 2011 – 2014. DOE has also developed an internal “Integrated Communications Strategy” which is in line with key issues highlighted in the NSWMS&AP 2008 – 2010 . iii. There has awareness undertaken to some extent, including Naboro Landfill – however, this needs to be taken to another level. iv. Reduction targets are yet to be determined to assist with gauging level of commitments from general public.
13. To learn lessons from similar waste management works carried out in other communities and apply the principles of work done to other communities in Fiji and identify and possibly involve community/National champions in this work (2008-2009)	<ul style="list-style-type: none"> i. Yet to be thoroughly looked into.
14. To carry out research and identify appropriate technology in waste minimization for the country.	<ul style="list-style-type: none"> i. Various technological options have been looked into – depending on waste type. ii. Through JICA, EU,CDL and plastic bag feasibility study

EFFICIENT PRICING AND ECONOMIC INSTRUMENTS	
15. To put in place economic incentives and disincentive mechanisms that support recycling activities	<ul style="list-style-type: none"> i. The Container Deposit Legislation is one that will be adopted soon – PET / Aluminium cans ii. The plastic bag control system also includes highlighting the cost of plastics at the counter – shoppers choosing to buy or bring your own...take to save – there is also a permit system for all bags to be imported (biodegradables).
16. To put in place economic incentives and disincentive mechanisms that will encourage industries, Government and large institutions to minimize their solid waste output by December 2009	<ul style="list-style-type: none"> i. This is already underway, but not in time with this strategy. ii. The EMA calls for relevant government departments to set up environment management units - role is to establish an environmental management plan, etc. Trainings have been undertaken to this effect, however, this need to be taken to another level.

APPENDIX 2: INTERNATIONAL AND REGIONAL OBLIGATIONS

CONVENTION	OBLIGATIONS	HOW INCORPORATED INTO THIS STRATEGY
Waigani Convention	The 1995 Waigani Convention is a treaty that bans the exporting of hazardous or radioactive waste to <u>Pacific Islands Forum</u> countries, and prohibits Forum island countries from importing such waste. The convention has been ratified by Britain, France, Japan and Ten Pacific region countries (including Australia and New Zealand).	DoE currently require exporters of hazardous waste to advise them by pre-notification of any movement or shipment stating the origin and destination. This complies with Duty of Care within this Strategy
<i>Vienna Convention for the Protection of the Ozone Layer & Montreal Protocol</i>	The Montreal Protocol on Substances That Deplete the Ozone Layer (a protocol to the <u>Vienna Convention for the Protection of the Ozone Layer</u>) is an international <u>treaty</u> designed to protect the <u>ozone layer</u> by phasing out the production of numerous substances believed to be responsible for <u>ozone depletion</u> .	Fiji is banning the import of substances banned under the Montreal Protocol on Substances That Deplete the Ozone Layer
UNFCCC	The objective of the UNFCCC is “to achieve ... the stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure food production is not threatened and to enable economic development to proceed in a sustainable manner.”	Industrial facilities that emit substantial amounts of GHG's are required by the department to have an air pollution permit that meets air pollution standards in the waste regulations 2007
Kyoto	The Kyoto Protocol to the UNFCCC shares the objective, principles and institutions of the Convention. However, it seeks to strengthen the Convention by committing Annex 1 countries to individual, legally binding targets to limit or reduce their greenhouse gas emissions.	The CDM mechanisms can assist the Government by trading carbon pools with respect to respect

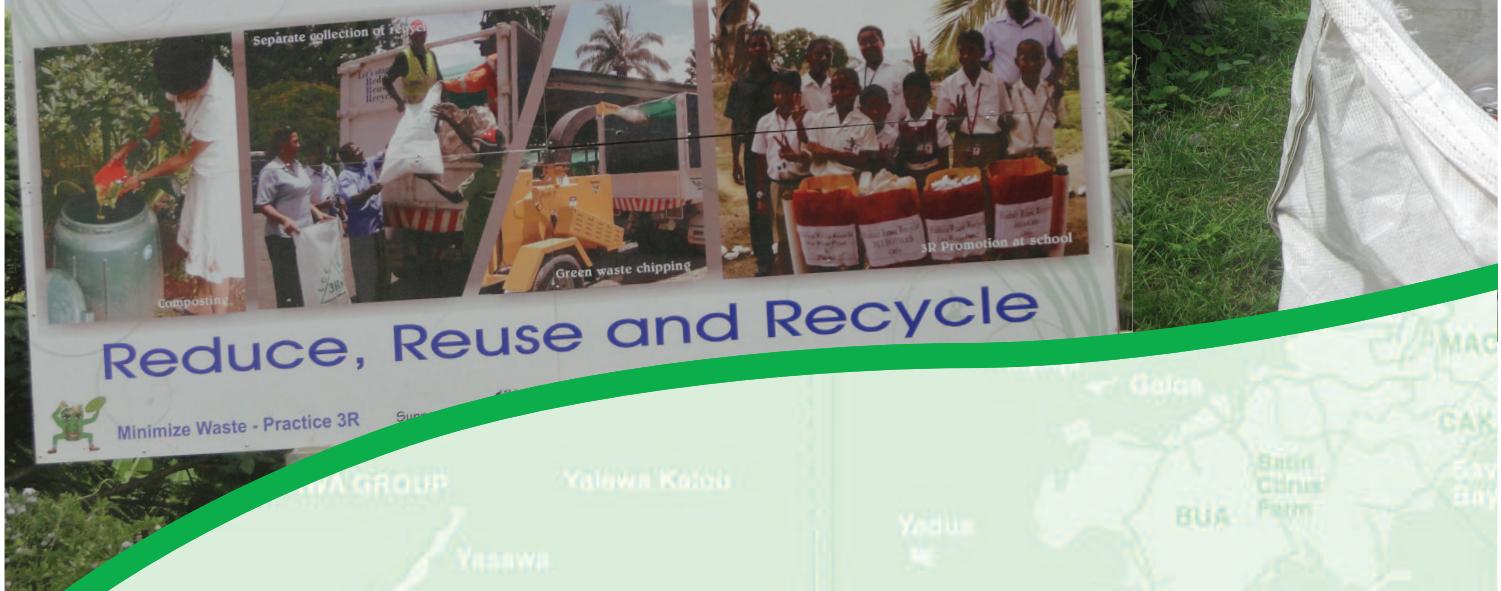
APPENDIX 3: STAKEHOLDERS CONSULTED

NAME	AFFILIATION
Seini Raiko	Rakiraki Town Council
Esther Richards	SPREP
David Hynes	
Azam Khan Sandhya Singh	Nausori Town Council
Dip Chand Elia Lawena	Ministry of Health – Lautoka
Gyneshwar Rao Shalend Singh	Lautoka City Council
Aisea Tuidraki Eseta Leawere	Sigatoka Town council
Pranit Kapoor Rakesh Kumar	Ministry of Health Labasa
Alipate Bolalevu	Provincial Council - Northern
Jovesa Vocea	Provincial Development - Nadi
Tevita Bosewaqa	Provincial Development – Director
Parmod Kumar	Ministry of Health – Eastern Divisional Inspector
Josese Rakuita	Director Local Government
Timoci Vakabua	Savusavu Town Council
Vijay Chand	Labasa Town council
Nacani Dreu	FIRCA
Romit Prakash	Department of Environment – CDL
Kavita Prasad	Ministry of Industry, Trade & Commerce
Selaima Maitoga	Lami Town Council
Thompson Yuen	Ministry of National Planning
Nimilote Fifita	Department of Lands
Naresh Narayan	Suva City Council
Irfan Hussain	Fiji Commerce Commission
Eroni Valili Priscilla Govind	Ministry of Information
Eduace Navukiboro	Ministry of Agriculture
Seini	Consumer council
Nanise Vosayaco	MSPNDES
Tomasi Digitakimata Jiuta Waqavonovono	Commissioner Western Office
Rajiv Prasad	Pacific Batteries
Hamza Hussein	Carpenters Shipping
Mark Hirst	H G Leach (Fiji) Ltd
Mere Cakaunitabua Alipate Mataivilia	Ministry of Finance
Apimeleki Qio	Ministry of Education
Ponipate Cagi	FIMSA
Yurie Kawabata	JICA
Mosese Kama	Nasinu Town Council
Arun Prasad Apimeleki Leka	Ba Town Council
Maria Vulavou	Tavua Town Council
Waisea Vosa	Ministry of Labour
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Lusiana Ralogaivau	Department of Environment

Senimili Nakora	Department of Environment North
Senivasa Waqairamasi	Department of Environment – West
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Sainimili Bulai	Department of Environment
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Notes

Notes



Reduce, Reuse and Recycle



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