NIUE ISLAND

NATIONAL INTEGRATED WASTE MANAGEMENT STRATEGY

2010 – 2015

ACKNOWLEDGEMENTS

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FOREWORD

To be written by the Department of Environment

CONTENTS

ACRNOYMS

EU	European Union
GDP	Gross Domestic Product
HRD	Human Resources Development
IBC	Industrial Bulk Containers
IWP	International Waters Project
IWRM	Integrated Water Resources Management
JICA	Japan International Cooperation Agency
NEC	National Environment Council
NIOFA	Niue Island Organic Farmers Association
NIP	National Implementation Plan
NIUANGO	Niue Association of Non-governmental Organizations
NIWMS	National Integrated Waste Management Strategy
NPC	Niue Power Corporation
NZ	New Zealand
NZAID	New Zealand Agency for International Development
PET	Polyethylene Terephthalate
PIC	Pacific Island Country
PIFACC	Pacific Islands Framework for Action on Climate Change
POPs	Persistent Organic Pollutants
PVC	Polyvinyl chloride
PWD	Public Works Department
RS2010	Pacific Regional Solid Waste Management Strategy 2010-2015
SC	Stockholm Convention
SOPAC	Pacific Islands Applied Geoscience Commission
SPC	Secretariat of the Pacific Community
SPREP	Secretariat of the Pacific Regional Environment Programme
TVET	Technical and Vocational Education and Training
USP	University of the South Pacific

EXECUTIVE SUMMARY

Niue is a coral island atop an extinct volcano, with a beautiful array of caves, and chasms, and a breathtaking coastline fringed with vibrant coral reefs. Most of its goods are imported from New Zealand, but the resulting waste has to be managed on the island. There are several positive waste management activities such as a can recycling program, and a regular household waste collection system. Unfortunately, due to lack of appropriate infrastructure, and shortage of human and financial resources, most of the waste is poorly managed. This is of concern to the people of Niue, since poor waste management above ground can pollute the fresh water lens, which is the source of drinking water for the entire island.

A Niue Waste Management Plan was developed in 2000, to provide guidance for waste management; however, due to insufficient resources, the Plan was not fully implemented. As a result, there are still serious waste management issues which need to be resolved. This Integrated Waste Management Strategy and the accompanying Action Plan were developed in consultation with stakeholders in Niue during March and May 2010, and take into account progress in waste management, and changes in priorities and practices since 2000.

The overall goal of the strategy is for Niue to be recognized as a clean and healthy nation in the Pacific. It covers solid, liquid, hazardous, medical, and quarantine wastes and identifies 9 objectives targeting waste reduction, reuse and recycling, systems for waste collection and disposal, and legislation development. These objectives are to be achieved by 2015 with a mid-term review and evaluation in the first half of 2013.

The Action Plan to Implement the Niue Integrated Waste Management Strategy should be read in conjunction with this Strategy. It is a very prescriptive action plan, which takes into account the current limited human and financial capacity for waste management in Niue.

The implementation of the Strategy and Action Plan will be coordinated by the Department of Environment, with the assistance and participation of other stakeholders as appropriate. Measuring the implementation progress of this National Integrated 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.

NIUE WASTE MANAGEMENT STRATEGY

Context

Niue is a coral island whose geological origin creates a beautiful array of caves, chasms, natural pools, and a breathtaking coastline fringed with vibrant coral reefs, which are all tourist attractions. It has a small resident population, spread over a relatively large land mass, and is directly connected by air and shipping services to only 1 country – New Zealand. The small population, rocky terrain, and lack of local industries mean that most food and other goods are imported from New Zealand. This one way flow of goods ultimately gives rise to solid and hazardous wastes, which must be managed along with liquid and medical wastes. Unfortunately, the lack of appropriate infrastructure, and shortage of resources means that most of this waste is poorly managed. If the situation continues unchecked, then this poor waste management will increase the risk of polluting the water lens, on which Niueans rely for drinking water. Moreover, the economic costs from the resulting environmental pollution could include loss of tourism revenue, public health-related costs, and loss of biodiversity and natural habitats. Niue therefore needs to implement a functional waste management programme to reduce the threats from pollution.

Overall Goal[1]

Niue is recognised as a CLEAN and HEALTHY nation in the Pacific

Purpose[2]

All Niueans participate in managing waste in an environmentally safe manner with minimum impact to public health.

Objectives

This National Integrated Waste Management Strategy (NIWMS) has 9 specific objectives:

- To increase recycling of cans, bottles, plastic, paper, etc, by 25% by 2013
- To reduce waste (household and commercial) by 25% by 2013
- To provide environmentally sound systems for collection & disposal of solid wastes by 2015
- To provide environmentally sound systems for collection & disposal of liquid wastes by 2015
- To provide environmentally sound systems for collection & disposal of hazardous wastes by 2015
- To eliminate asbestos stockpile on the island by 50% by 2013
- To increase the reuse of human and farm animal waste by 25% by 2013
- To develop practical and enforceable regulations for waste management by 2015

[1] The Overall Goal refers to the expected long-term development impact of this Strategy

[2] The Purpose refers to the immediate impact that will be achieved when the Strategy is implemented

Scope

This integrated strategy covers the management of solid, liquid, hazardous, medical, and quarantine wastes.

Time Frame

This strategy and action plan covers the five year period from 2010-2015. A mid-term review and evaluation of the action plan should be conducted in the first half of 2013.

Coordination

The implementation of this Strategy and Action Plan will be coordinated by the Department of Environment, with the assistance and participation of other stakeholders as appropriate.

Strategy Development Process

This Waste Management Strategy and the accompanying Action Plan were developed in consultation with stakeholders in Niue during consultations in March and May 2010 (see Appendix 1). Consultation was based on the Niue Waste Management Plan developed in 2000, and the resulting Strategy and Action Plan takes into account progress in waste management, and changes in priorities and practices.

BACKGROUND

Country Information

Niue is a coral island formed atop the remnants of an extinct volcano located approximately 2400 kilometres northeast of New Zealand (NZ) at latitude 19° south and longitude 169° west. The island has a land area of 269 km² and an Exclusive Economic Zone (EEZ) of 390,000 square kilometres [SOPAC, 2009].

Niue has been a self-governing state in close association with NZ since gaining independence from NZ in 1974. Niue makes its own laws, and for all practical purposes it conducts its own external relations, including establishing formal diplomatic relations with other states. It participates as a full member of the Pacific Islands Forum, SPREP, and other regional bodies in the Pacific. The political system is a parliamentary democracy, with the Head of State being HM Queen Elizabeth II, represented by the Governor General of New Zealand.

The population is estimated at 1,549 distributed throughout the 14 villages with the lowest population density of 6 persons per square kilometre [SPC, 2008]. There are more Niueans living abroad than in Niue; in the 2006 New Zealand census 22,500 people in New Zealand identified themselves as of Niuean descent [NZMFAT, 2009], while just under 500 Niueans are said to be living in Australia [DFAT, 2010]. Niueans are New Zealand citizens with the right of free access to New Zealand.

Economy

Niue has a small economy with a GDP of NZ$17.2 million in 2003 [NZMFAT, 2009]. Government spending accounts for 40% of the GDP. Most families on Niue are involved in subsistence farming; however there is a small export market for fish, taro, noni, honey and vanilla. Tourism also contributes to the economy with a steady increase in visitor arrivals recorded since 2004. In 2008, visitor (non-resident) arrivals were reported to be 4,748 [Government of Niue, 2009a].

Overseas Development Assistance

New Zealand is the largest bilateral donor to Niue. Other donors include Australia, China, France and various multilateral organisations. The indicative total bilateral New Zealand Official Development Assistance to Niue for 2008/09 was $9.2 million, of which $7.6 million is to assist the Government of Niue in meeting the demands of its current budget. Assistance remains at the same levels in 2009/10. A further $20 million over 5 years for infrastructure and economic development was allocated as part of the Halavaka ke he Monuina Arrangement in 2004 after cyclone Heta. It was recently decided that the remainder of this funding would continue to be available until 2010. Also in 2004 $10 million was allocated over 5 years for developing partnership relationships with New Zealand government agencies [NZMFAT, 2009].

Air and Shipping Services

Niue is served by air and sea links. Air New Zealand operates a once weekly flight to and from Auckland, while Reef Shipping provides a cargo service to and from New Zealand every 3 to 4 weeks supplying essential goods and fuel to the island.

Weather

Niue has a tropical climate with two distinct seasons. The hot, wet season from November to April is also the cyclone season, with an average temperature of 27° Celsius, and an average rainfall of 240 millimetres. In contrast, the cool, dry season runs from May to October with a mean temperature of 24° Celsius and average rainfall of 100 millimetres. For Niue, the average annual rainfall is 2000 millimetres, and the average annual temperature is 26° Celsius [Government of Niue, 2009b].

In 2004, the island was devastated by Cyclone Heta, a category 5 cyclone which caused the most damage to the capital city of Alofi and was responsible for the death of two people. The storm caused over $89 million in damage on the island, or over 5 times the 2003 GDP of $17 million [Government of Niue, 2004]. As many of the buildings in Niue were constructed with asbestos roof sheets, cyclone Heta also caused a lot of asbestos waste to be generated, the disposal of which is now a major concern for Niue.

Land Ownership

Land in Niue in inalienable and cannot be sold or deeded permanently to non-Niueans. It is owned largely by individual families and to a lesser extent by Government.

Strategic Context for Solid Waste Management

National Context

Niue National Strategic Plan

Niue National Strategic Plan 2009-2013, sets out a strategic vision for the development of Niue intended to make the country 'prosperous' in 5-years time. The plan promotes the development of the fishing, vanilla and noni farming, and eco-tourism industries, which rely on a clean and pristine environment. The strategic plan also addresses waste management and calls for the implementation of the Niue Waste Management Plan 2000.

Niue Waste Management Plan 2000

The first Niue Waste Management Plan was endorsed by Cabinet on 21 December 2000. It makes over 80 recommendations for improving waste management, which have been summarized in Appendix 2. The progress towards implementing those recommendations as at March 2010, have also been summarized in Appendix 2. It should be noted that there has been limited implementation

of the Waste Management Plan due to a shortage of resources, particularly funding and manpower to coordinate activities. This Integrated Waste Management Strategy and Action Plan is the result of the first formal review of the 2000 Waste Management Plan.

Regional Context

The Waigani Convention

On 22 July 2003, Niue ratified the Waigani Convention, which bans the importation into Forum Island Countries of hazardous and radioactive wastes and controls the trans-boundary movement and management of hazardous wastes within the South Pacific region. This convention enables countries such as New Zealand and Australia to receive hazardous wastes exported from South Pacific Forum Island countries such as Niue.

The Waigani Convention is implemented under the auspices of the Niue Health Department and is the instrument that enables the safe removal and disposal of Persistent Organic Pollutants (POPs) and other hazardous wastes from Niue.

The Pacific Regional Solid Waste Management Strategy

The Pacific Regional Solid Waste Management Strategy 2010-2015 (RS2010) is the region's guiding document for solid waste management. The implementation of the regional strategy is coordinated by SPREP, and it prescribes actions for SPREP as well as SPREP member countries and territories. In particular it addresses nine priority areas: sustainable financing; integrated solid waste management; legislation; awareness, communication and education; capacity building; environmental monitoring; policy, planning and performance; solid waste industry; and medical waste

As a member of SPREP, Niue was consulted during the development of RS2010, and committed itself to the implementation of the strategy. Niue also identified three high priority issues as being (1) integrated solid waste management, (2) legislation, and (3) capacity building. The actions identified in the Regional Strategy should be closely aligned with the actions for solid waste management identified in this Niue Integrated Waste Management Strategy.

Pacific Islands Framework for Action on Climate Change 2006-2015

In 2005, the Pacific Islands Forum Leaders endorsed the Pacific Islands Framework for Action on Climate Change (PIFACC) whose goal is to ensure that Pacific island peoples and communities build their capacity to be resilient to the risks and impacts of climate change (CC). Two of the key expected outcomes of the PIFACC are to implement adaptation measures to the adverse effects of climate change and to contribute to global greenhouse gas reduction.

Implementation of the Niue Integrated Waste Management Strategy and Action Plan should lead to better waste management which in turn can contribute to adaptation to CC, since it can lead to reduced discharge of leachate and the lower levels of pollution from litter, poorly managed

dumpsites, etc. These positive effects reduce the manmade stresses on the ecosystems such as reefs, thus allowing them to better cope with CC impacts. In terms of mitigation of greenhouse gases such as methane, better waste disposal methods such as semi-aerobic landfills and home composting can reduce the production of methane.

International Context

Stockholm Convention

The Stockholm Convention on POPs (SC) is a global treaty "to protect human health and the environment from chemicals that remain intact in the environment for long periods, become widely distributed geographically, and accumulate in the fatty tissue of humans and wildlife" [Stockholm Convention Secretariat, 2009]. This convention was ratified by Niue in March 2002 and requires Parties to take measures to eliminate or reduce the release of 12 different POPs into the environment.

Under Article 5 of the SC, Niue is required to implement measures to reduce and eliminate releases of dioxins and furans from unintentional sources (uPOPs), which are generally from the open burning of organic waste (kitchen and yard waste) and other materials containing chlorine (e.g. PVC plastic). Niue is also required to promote the use of best available techniques (BAT) and best environmental practices (BEP), for sources of uPOPs, specifically open burning of waste on landfills and dumpsites, and waste incinerators. BAT and BEP include using low-waste technology, promoting recovery and recycling of waste, and considering alternatives to incineration.

CURRENT WASTE MANAGEMENT SITUATION IN NIUE

Institutional Arrangements for Waste Management

The Department of Environment is responsible for regulating solid, liquid, and hazardous waste management in Niue and also for providing waste management services such as waste collection, recycling and disposal in partnership with other stakeholders. Currently, a private contractor is hired to provide solid waste collection services, while septic tank sludge and lead-acid batteries are collected by staff of the Department. From time to time, the Environment Department also contracts Niue Timber Products and the Public Works Department to push the rubbish in the dump. The institutional arrangements for different waste types are shown in Table 1.

Table 1: Institutional arrangements for waste management in Niue

Area of Responsibility	Responsible Department				
	Solid	Liquid (incl. sludge)	Quarantine	Hazardous	Medical
Regulation & Policy development	Environment	Environment	Dept. of Agriculture, Forestry & Fisheries (DAFF)	Environment/ DAFF	Health
Monitoring & enforcement	Environment	Environment	DAFF	Environment	Environment
Operation (collection & disposal)	Environment (collection contracted to Makani Contractors)	Environment	DAFF	Environment	Niue Foou Hospital
Recycling	Environment in partnership with Niue Catholic Mission	-	-	-	-

Legislation

Niue Environment Act 2003, is the most recent and relevant legislation enacted, however many provisions of the Act are yet to be implemented. The Act establishes the Environment Department and empowers it to design and implement programmes for waste management and pollution control, nature conservation and protection of historic areas. Cabinet is also given powers to make regulations on a wide range of environment issues including prescribing waste management and

pollution control measures, regulation of hazardous wastes, and rehabilitation of contaminated and polluted land.

The Act also requires the establishment of a National Environment Council (NEC) to advise the Minister on matters relating to environmental, planning, developmental, and resource management policies, and to review the work of the Department. The Environment Department is to serve as the Secretariat of the NEC with a membership comprising of representatives from Health, Planning, Police, Public Works, Community Affairs, Tourism, Agriculture, Forests and Fisheries, Chamber of Commerce, and interest groups or general community. To date, the NEC has not been formed.

In 2007, Niue undertook a review of environment-related legislation, which concluded that it was difficult to find effective provisions in Niue's laws that deal with controls over littering and dumping of wastes on land. The review recommends several priority areas for legislative reform including the prevention of marine pollution, the regulation of transboundary movements of hazardous wastes through Niue's waters, regulating the dumping and incineration of wastes at sea, and anti-littering and disposal of wastes on land. The recommendations from this review in relation to pollution prevention and waste management have not yet been implemented.

The 14 Village Councils have the authority under the Village Councils Act 1967 to formulate their own bylaws which allow them to exercise powers, functions and duties in relation to any other law in force in Niue.

The Public Health Act 1965 specifies a reasonable state of cleanliness for all buildings and land with the requirement that all refuse and rubbish be disposed of 'from time to time as circumstances require'. The Act also empowers health inspectors to issue notices to improve sanitation and waste management practices.

There are also references to various waste-related offences in other legislation:

- The Transport Act 1965, Clause 83, and the Mosquito Control Act 1965, prohibit littering and dumping of rubbish
- The Agriculture Quarantine (Prevention of Animal Disease) Regulations 1991 – Clause 14, requires the management of rubbish dumps to prevent pigs, poultry or dogs from gaining access to rubbish which may contain meat or animal products or animal carcases.
- The Water Resources Act 1996 regulates the underground disposal of 'any matter'.

Solid Waste Management

Household Solid Waste Generation and Composition

Data for household waste generation and composition in Niue is available from 2000, and more recently from a training workshop conducted in May 2010. The data from these two studies are compared in Table 2.

It can be seen that the composition of the waste changed slightly from 2000 to 2010, with the percentage of metals, plastics, and diapers increasing. The waste generation rate of 0.36 kg/person/day used in 2000 was found to be similar in the 2010 study at 0.31 kg/person/day. These waste generation rates were used along with the population in 2000 and 2010, to estimate the weight of waste generated per year for each category. Comparison of the weights from 2000 and 2010, show a decrease in the amount of organics and paper. Meanwhile, the amount of diapers has increased, and the amount of plastics (bags, bottles & others) has more than doubled from 16.91 tonnes to 36.18 tonnes.

This household solid waste characterization will be extremely useful in identifying appropriate solid waste management strategies, however, a more complete picture of the waste situation can be obtained by also analysing the commercial and institutional waste stream. It is therefore important to conduct a landfill-based waste characterization study in order to get a complete picture of the type and quantity of waste being generated nationally by all sectors in Niue.

Table 2: Household waste composition in Niue from studies in 2000 and 2010

Category	Household Waste Composition			
	2000		2010	
	%	tonnes/year	%	tonnes/year
Organics	54.3	133.07	27.7	48.62
Metals	8.1	19.85	13.2	23.07
Paper	14.7	36.02	9.4	16.51
Diapers	6.5	15.92	16.3	28.49
Plastics - bags	6.9	16.91	8.0	14.02
Plastics - bottles			4.9	8.59
Plastics - other			7.7	13.57
Textiles	-	0	0.4	0.68
Others	8.0	19.60	9.3	16.28
Glass	1.6	3.92	3.1	5.43
Total	**100.0%**	**245.31 tonnes/year**	**100.0%**	**175.27 tonnes/year**

Notes:

1. Waste Generation Rate in 2000 = 0.36 kg/person/day
2. Waste Generation Rate in 2010 = 0.31 kg/person/day
3. Population in 2000 = 1,865
4. Population in 2010 = 1,549

Solid Waste Storage and Collection

All residents on Niue receive a collection service, and the country is divided into three zones for collection purposes. Alofi is collected on Mondays and Fridays, Niue North (from Lakepa to Makefu) is

collected on Thursdays, while Niue South (from Liku to Tamakautoga) is collected on Tuesdays. The waste collection service is currently contracted to Makani Contractors.

During the development of this Strategy and Action Plan, the rubbish truck was not working, and the waste management contractor was using a truck leased from the Environment Department (see Picture 1).

A time and motion study was conducted as part of a traning exercise during May 2010 for the Niue South collection route. The results show that there is no standard waste bin being used. Instead waste is put out for collection in coconut baskets, cardboard boxes, wheelie bins of various sizes, rubbish stands, and 45 gallon drums cut in half. Another observation during the study was that the workers had to physically lift heavy bags and bins of garbage over their heads in order to get it over the side of the truck (see Picture 1). This creates a potential occupational hazard.

Different coloured bins were provided by Health Department and Community Affairs in previous years as part of the implementation of the original Waste Management Plan. Red bins were provided for dry-cell batteries, blue bins for public areas, and green bins for household waste. However, the system has broken down, and all bins irrespective of colour are used for general waste.

Picture 1: Rubbish collection truck

Solid Waste Recycling

There is a recycling program for aluminium cans operated by the Catholic Church Mission located in Alofi North. A deposit of 8.33¢ is collected by the government on each imported can, 5¢ is refunded when the can is returned to the Catholic Church depot, and the operator is paid a handling fee of 2.5¢ per can and is allowed to keep the proceeds from the sale of the cans in New Zealand. Despite the recycling program, it is still common to find aluminium cans in the waste stream and dumpsite.

A new can crusher with a capacity of 500 cans per bale was installed sometime in 2008. Recently, there was also an interruption to the recycling program due to a break down in communication between the operator and the Environment Department. As a result, residents were turned away when returning their cans.

In the last year, a Niue-based small business – Vili Franchise - has expressed interest in recycling other types of wastes such as plastics, and glass, and the business owners have approached the Environment Department to discuss options and opportunities.

Draft Recycling Regulations under the Environment Act 2003 have been proposed to Cabinet to apply a system of deposits and refunds to PET pellets and PET beverage and cooking oil containers, lead-acid batteries and white goods. The amount of the deposit and refund for each item is provided in Table 3 .

Table 3: Proposed Recycling Regulations - Schedule of deposits and refunds

Item	Deposit	Refund
Any PET beverage container	8.333¢ per container	50¢ per 10 containers
Any PET pellet used to make beverage containers	8.333¢ per container	-
PET cooking oil container	8.333¢ per container	50¢ per 10 containers
Aluminium beverage container	8.333¢ per container	50¢ per 10 containers
Lead-acid battery	$5 per battery	$3 per battery
White goods using electricity or gas	$30 per item	$ 30 per item

Composting

Composting is not widely practiced in Niue, and there are no specific awareness programs to promote its benefits. The Niue Island Organic Farmers Association (NIOFA) promotes the principles of organic farming with 106 farmers, more than 40 of whom have been fully certified according to NIOFA procedures. However, not much composting is practiced by these farmers mainly because of the small quantities of organic waste generated. In the future NIOFA plans to revive cluster farms (5-20 farmers), which may be a good opportunity to promote 'cluster' composting.

Three shredders are available from DAFF, which farmers can borrow and transport to their properties at their own cost to produce mulch or to aid in the composting process.

The Education Department also plans to launch technical vocational education and training (TVET) for Niue High School, which will include modules on horticulture and agriculture. This may also be a good opportunity for practical demonstrations of the benefits of composting and to encourage the practice at household level.

Solid Waste Disposal

Solid waste is dumped in the Makato dump which is an uncontrolled, unrestricted dumpsite located on land leased by the Government. Occasionally, equipment from the Public Works Department or Niue Timber Products is hired by the Environment Department to push the rubbish to the edges and create more room for the dumping. The dump is smelly, unsightly, and a breeding ground for flies, rats, and other pests (see Picture 2). The lack of engineering controls such as leachate collection and

treatment also increases the risks of pollution of the water lens, which is Niue's only source of potable water.

There is a second dumpsite located at Mutalau, which is used mainly by the surrounding residents. The waste is scattered over a wide area, and sometimes set on fire to control the flies (see Picture 3). This site is located inland on the second terrace, and poses a higher pollution risk to the water lens

A third dumpsite is located at Vaiea and has been abandoned since 2005. The site is currently inaccessible.

Picture 2: Makato open dumpsite

Picture 3: Mutalau dumpsite

Bulky solid wastes

Bulky solid waste as defined in this Strategy refers to items, such as derelict vehicles, gas stoves, construction and demolition waste, etc, which are large, and non-hazardous. There are a number of derelict vehicles throughout the island, particularly at a site in Tuaki-Hakupu.

The Clean-up Niue Campaign, funded by NZAID ($400,000) was being undertaken from March to June 2010, with a focus on removing abandoned vehicles from communities.

Liquid Waste Management

There are several types of systems used for management of sewage: septic tank systems (sealed and unsealed tanks) and water seal latrines. Sealed Septic tank systems are accepted as the environmentally sound option. Water seal latrines, and unsealed septic tanks release raw sewage directly into the ground which could directly contaminate the water lens. There are also reported cases of raw sewage being piped directly from flush toilets into caverns.

There is a general lack of awareness on the maintenance of septic tank systems. Therefore, a septic tank is only emptied when it becomes a problem. The Environment Department has a 6000 litre sludge pump truck which can be hired to empty household septic tanks at a charge of $56 per load. No proper records are kept on the quantities of septic tank sludge collected and dumped.

A sanitation survey of Alofi North and South is being conducted by the Justice Department subcontracted by the Integrated Water Resources Management project. There is scope for this survey to be expanded to cover the entire island.

The current building code requires a dual septic tank system. To address improvements to houses with water seal latrines, the Public Works Department in conjunction with the Health Department will be submitting a proposal to EU under the EDF-10 programme to address sanitation, hygiene and water issues, under the Water Safety Plan Improvement Schedule.

Medical Waste Management

There is only one hospital on Niue, the Niue Foou Hospital, which was rebuilt in 2006 after the previous hospital was destroyed by Cyclone Heta. The hospital recently adopted a clinical waste management policy in 2009 which makes several recommendations for waste segregation, storage, and training and public awareness.

The hospital has 9 beds and generates waste which includes sharps, chemical waste, pathological waste, dressings and other wastes contaminated with bodily fluids. The chemical waste, which includes developer and fixers for x-rays, are dumped down the drain at the rate of 20 litres per month. Other waste is burnt in a wood-fired medical waste gasifier (or incinerator), which can burn up to 3 bags of medical waste in 2 hours, with 10 buckets of wood as fuel. After incineration, the ash is removed and dumped at the Makato dumpsite. Prior to incineration, the waste is stored in wheelie bins and bags, and a 20-foot container as shown in Picture 4.

An imprest ordering system has been implemented at the hospital. This system specifies a maximum stock level for each item which significantly reduces the amount of expired and obsolete chemicals generated.

Picture 4: Medical waste storage and incineration at Niue Foou Hospital

Hazardous Waste Management

Hazardous waste found in Niue includes asbestos, POPs, electrical and electronic waste (e-waste), waste oil, and lead acid batteries.

Asbestos

Asbestos in the form of cement roof sheets was introduced to Niue following a devastating cyclone in 1959 and 1960, when many of the homes were destroyed and had to be rebuilt. In 2004, cyclone Heta caused significant damage to many homes on the island and resulted in a lot of asbestos waste being generated. In response, the Niue Government with the assistance of the New Zealand Government implemented a project in 2004/2005 to clean-up the asbestos waste and as a result asbestos wastes were collected from the villages and stockpiled in Huihui, awaiting final disposal for the last 5 or 6 years. It is estimated that 3,650 square metres of asbestos from Niue High School were removed and buried.

It is also estimated that there are still 347 houses on the island that still contain asbestos roofing materials. Most of these houses are abandoned and in a dilapidated state which means that the asbestos is deteriorating and the health risks are increasing daily.

Recent estimates indicate that the amount of asbestos waste to be disposed of ranges from 45 to 73 full container loads (20-foot containers)[3].

The Clean-up Niue Campaign is also trying to address the collection of asbestos waste from communities.

[3] Estimate obtained from a 2010 Cabinet Paper by William Peet – Infrastructure Coordinator

Picture 5: Typical abandoned house with asbestos roof sheets

POPS

The management strategy for POPs should be covered by the Stockholm Convention National Implementation Plan (NIP) which each Party to the Convention is required to develop. Niue developed its NIP in 2005.

From 1997-2006 Niue was a beneficiary of the "POPs in PICs" project, which was an AusAID-funded initiative to remove and destroy stockpiles of POPs in 13 Pacific Island Countries (PICs). Under this project a total of 3,971 kilograms of chemicals and chemical containers were removed from Niue and transported to Australia for incineration. There are still some chemicals in Niue, which could not be collected under the POPs in PICs project. These include acids, copper fungicide, lime sulfur spray, laboratory chemicals, and methyl bromide.

Throughout the villages, there are signs (see pictures below) which promote awareness on the prevention of POPs.

A comprehensive strategy for preventing the generation of POPs is already detailed in the Niue NIP, and it addresses cross-cutting issues such as waste incineration (quarantine, medical & solid waste), and public awareness on better solid waste disposal.

Picture 6: Village signs promoting awareness of POPs

E-Wastes

E-waste is defined simply as any unwanted device that has an electrical plug or runs on batteries. E-wastes contain both non-hazardous such as glass, wood, non-ferrous and ferrous metals, and hazardous components such as lead, mercury, arsenic, cadmium, and flame retardants. The e-waste problem will generally increase with increasing affluence of the population, as more people gain access to technology.

In the absence of a formal e-waste survey in Niue, the importation statistics for electrical and electronic products, which eventually become e-waste, was collected and is shown in Table 4. It is easily seen that most items are increasing or at least maintaining the same levels. This means that there are increasing amounts of e-wastes being generated, and these need to be managed appropriately to minimize any negative environmental impact.

Some e-wastes such as computers, televisions, and office equipment are currently stockpiled at Huihui, however, others such as refrigerators, and stoves are usually taken to the Makato dumpsite or dumped illegally, even though residents can contact the Environment Department to have their e-waste collected.

There is a small reuse sector in Niue, which includes Vili Franchise Limited who dismantles and reuses some e-waste parts from refrigerators, stoves, and washing machines. The company also stores the waste oil generated from these activities.

The NZAID funded Clean-up Niue Campaign will also be collecting and disposing of whiteware ande-waste.

Table 4: Importation statistics for electrical goods in Niue

Item	Number of units imported in specific years		
	1997	2001	2006
Air Condition	n/a	8	17
Automatic Telephone	223	218	n/a
Automatic Washing Machine	106	200	308
Bread Maker	8	40	57
Camera	206	219	76
CD Player	161	379	n/a
Ceiling Fan	n/a	43	112
Cellular Unit Telephone	212	225	n/a
Computer	25	77	n/a
Cooler	85	117	110
Cordless Phone	13	42	n/a
Crockpot (Electric Pot)	61	56	56
Deep Freezer	321	337	315
Deep Fryer	42	50	54
Digital Camera	n/a	n/a	175
DVD player	n/a	38	407
Electric Cooktop	51	34	70
Electric Frying Pan	325	371	360
Electric Iron	537	538	511
Electric Jug	562	518	489
Electric Sewing Machine	178	175	161
Electric Stove	210	146	228
Electric Toaster	331	369	388
Electric Water Pump	57	38	26
Fax Machine	16	29	n/a
Hoover Washing Machine	18	18	141
Laptop	n/a	15	n/a
Microwave	127	192	290
Mobile Telephone	16	49	n/a
Portable Fan	n/a	444	668
Printer	20	78	n/a
Radio/Tape Recorder	626	605	n/a
Refrigerator	405	394	415
Sandwich Maker	179	246	258
Television Set	395	451	519
Video Camera	18	30	46
Video Recorder	222	295	228
Wringer Washing Machine	302	283	117

Waste Oil

Waste oil is produced mainly from the Niue Power Corporation (NPC), and also from the Public Works Department, and to a lesser extent from private garages and the communities. A central site for waste collection was established at Amanau but this was destroyed by Cyclone Heta in 2004.

In March 2010, the stockpiled quantity of waste oil at NPC was estimated at 12,000 litres. This oil was stored in metal drums which had deteriorated over the years and began leaking oil into the ground as shown in the pictures. In recent times, 10 industrial bulk containers (IBC) with 1000 litre capacity each were purchased to provide more secure storage of the waste oil at Amanau. Public Works Department also plans to purchase IBCs to be placed at Public Works compound for waste oil. Other tanks are also expected to be placed at suitable locations for waste oil from private sector and communities.

Enquiries by the Niue Power Company in 2010 reveal that Caterpillars Gough and Hammer located in Auckland, would be willing to purchase any waste oil delivered to their facility at a small fee of 23¢ per litre.

The location of Niue Power Corporation on the upper terrace of Niue, and any direct disposal of waste oil to the ground increases the risk of pollution of the water lens.

Picture 7: Waste oil storage at Niue Power Corporation (March 2010)

Picture 8: Waste oil storage at Niue Power Corporation (May 2010)

Batteries

The main source of waste lead acid batteries is from motor vehicles registered in Niue. These batteries are collected by the Environment Department on an as-needed basis and stockpiled at Huihui. As of March 2010, there are about 300 batteries at Huihui.

Dry cell batteries are also generated and are thrown out with the household waste.

Quarantine Waste

Quarantine waste is produced from the weekly Air New Zealand flight and from vessels docking in Alofi. Bins are provided at the Alofi wharf for collection of this waste, which is then transported to Huihui and burn in a crude incinerator. When the incinerator is not working, the waste is burnt in a hole with diesel. The ash is then dumped at Makato dumpsite.

The temperature required to minimize the production of dioxins, furans and other toxic gases from waste containing plastics, is over 800 degrees Celsius. It is believed that these high temperatures are not reached in the crude incinerator shown in the picture.

Picture 9: Quarantine waste incinerator

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.

Financing

The Environment Department's waste management budget for Niue is currently NZ$70,000 per year (including collection contract). This is supplemented with revenue from septic tank pumping service. However, the majority of the waste management costs are fully funded by government.

Stakeholders

There are several stakeholders involved in the management of solid, liquid, hazardous, quarantine, and medical wastes in Niue, as shown in Table 5. This list is 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 5: Major waste management stakeholders in Niue

Major Stakeholders	Level of Participation	Comments/Waste type
Department of Environment	High	H, L, M, Q, S
Department of Public Works	High	
Department of Agriculture, Forestry & Fisheries	High	H, Q
Department of Tourism	High	
Department of Health	High	M
Department of Education	High	H, L, M, S
Planning and Statistics Office	High	Data collection & analysis
Niue Power Corporation	High	H
Department of Community Affairs	High	H, L, M, S
Niue Island Organic Farmers Association	High	S
Makani Contractors	High	H, S
Niue Can Recycling Joint Venture Project	High	S
Vili Franchise Ltd	High	H, S
Niue Training Development Council	High	H,L,S
Bulk Fuel	High	H
Village Councils	High	H, L, M, S
NIUANGO	High	Implementing projects
USP	High	Research, studies, etc

* LEGEND:

H = Hazardous Waste
L = Liquid Waste (including septic sludge)
M = Medical Waste
Q = Quarantine Waste
S = Solid Waste

THE WAY FORWARD

Guiding Principles

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

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 Niue 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.***

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. ***Niue relies heavily on its water lens as a source of drinking water, but this is at threat from above-ground pollution. Application of this principle is critical to preserve the purity of Niue's drinking water.***

Consultation Principle

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

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 four 'R's - **R**efuse, **R**educe, **R**euse, and **R**ecycle. This model prioritizes waste avoidance and reduction methods, before reuse, recycling, and final disposal.

Strategic Objectives

As noted earlier, the Niue Waste Management Plan 2000 has not been actively implemented since its endorsement due to a shortage of resources, particularly funding and manpower to coordinate activities. Consequently, there has not been much improvement in the waste management situation, and as a result the original objectives are still very relevant. However, the more recent Niue National Strategic Plan 2009-2013, has specified a number of specific targets for solid and hazardous waste

and pollution, and these will be included as objectives of this National Integrated Waste Management Strategy (NIWMS). Implementation of the NIWMS will therefore contribute to the implementation of the National Strategic Plan.

Consequently, the objectives of the NIWMS are:

- To increase recycling of cans, bottles, plastic, paper, etc, by 25% by 2013
- To reduce waste (household and commercial) by 25% by 2013
- To provide environmentally sound systems for collection & disposal of solid wastes by 2015
- To provide environmentally sound systems for collection & disposal of liquid wastes by 2015
- To provide environmentally sound systems for collection & disposal of hazardous wastes by 2015
- To eliminate [reduce] asbestos stockpile on the island by 50% by 2013
- To increase the reuse of human and farm animal waste by 25% by 2013
- To develop practical and enforceable regulations for waste management by 2015

These objectives will be achieved by focusing on 9 thematic areas, which are outlined in the following chapters: (1) National Coordination, (2) Legislation, (3) Data Collection and Analysis, (5) Education and Awareness, (6) Waste Reduction, Reuse & Recycling, (7) Waste Collection, (8) Waste Disposal, and (9) Environmental Monitoring.

Within each thematic area, the current issues are examined, targets are set, and the strategies for achieving those targets are explained. The strategies are numbered continuously from one thematic area to the next.

Action Plan

The Action Plan which accompanies this Strategy provides concrete actions for each of the strategies discussed in the following 9 chapters. For each action, a lead agency and timeframe for completion is identified. Further, an indicative budget is provided with possible sources of funding, technical assistance and partnerships. Measures are also included to monitor the progress of each action with performance indicators and means of verifying those indicators. Finally, any assumptions made are explained.

NATIONAL COORDINATION

The issues

The Environment Department has responsibility for the operational and regulatory aspects of solid, liquid and hazardous waste management. However, there is no single staff member who is solely responsible for the multitude of issues involved in waste management. Instead, the responsible staff member is also tasked with responsibilities for EIA, education, and a range of other responsibilities. As a result, the waste management area may not always be a priority. This situation should not be allowed to continue because of the current poor disposal practices for solid, liquid, and hazardous wastes, which could potentially be negatively impacting the water lens.

The Environment Act 2003 requires the establishment of a National Environment Council (NEC) to advise the Minister on matters relating to environmental, planning, developmental, and resource management policies, and to review the work of the Environment Department. To date this Council has not been established, however, there are other project committees such as the Niue Water Steering Committee which contribute to the implementation of waste management priorities, and which could possibly be expanded to include waste management in view of the linkages between water and waste management.

What we want to achieve

- By December 2010, a Waste Management Officer/Adviser employed by the Environment Department to manage solid, liquid, and hazardous waste, and to manage the implementation of components of this Integrated Waste Management Strategy and Action Plan.
- By December 2010, a body will be established to oversee the implementation of this Strategy.

How we will achieve the targets

1. The Environment Department will create and fill the position of Waste Management Officer/Adviser in consultation with the Niue Public Service Commission and make the necessary provisions for the ongoing funding of this position.

2. The Environment Department will take the lead role in establishing the body to oversee implementation of the NIWMS

LEGISLATION

The Issues

A review of Niue's environment-related legislation was conducted in 2007, with several recommendations made for legislative reform in several areas including prevention of marine pollution, the regulation of transboundary movements of hazardous wastes through Niue's waters, regulating the dumping and incineration of wastes at sea, and anti-littering and disposal of wastes on land. To date these recommendations have not been implemented.

Niue is a very small and tight-knit community, with strong local governance in the form of village councils. These village councils have the ability to create and enforce by-laws for waste management including littering, however, there are no such by-laws in place.

What we want to achieve

- To develop practical and enforceable regulations for waste management by August 2013 in line with recommendations made in the report on the "Analysis of environment-related legislation in Niue"

How we will achieve the targets

3. Consult with the Crown Law Office to identify a way forward in developing the necessary regulations as identified in the report: *Analysis of environment-related legislation in Niue*.

DATA COLLECTION AND ANALYSIS

The Issues

Reliable information is an important foundation for proper waste management planning and operation; however there are currently no systems for regular collection, storage and analysis of information that can be readily retrieved, such as waste generation and composition, recycling rates, importation of certain products which become hazardous waste (e.g. e-waste), community awareness levels, etc. Other data which should be collected and stored include hazardous waste disposal locations (for example asbestos waste has been buried on the island, but this is not currently recorded in any national database), environmental quality, water quality, etc.

Collecting and analysing solid waste data is also critical in order to establish baseline conditions and to evaluate the future progress towards achieving the objectives set in this strategy.

What we want to achieve

- By June 2011, a database framework will be established and hosted at the Environment Department and which will hold critical information on the waste management system and environmental quality in Niue.
- By December 2011, a regular schedule for conducting waste management surveys will be developed and implemented, and the database will be updated with a complete set of baseline data.

How we will achieve the targets

4. The Environment Department will work with the IT Department, Community Affairs, Niue Power Corporation, Public Works Department, Statistics Department, and the Health Department to design a database for collecting, storing, and analysing key waste management information.

5. The Waste Management Officer/Adviser will develop a 5-year schedule for waste management surveys and will undertake the necessary studies and surveys to obtain the required baseline data to enter into the database. Further, the Environment Department will interpret these data into useful information and use it as the basis for the mid-term review of this Strategy and Action Plan.

EDUCATION AND AWARENESS

The Issues

Some awareness activities, such as radio programs, are done for different aspects of waste management. However, there is a need for more capacity building and awareness in communities emphasizing the link between waste management practices and the water lens. Community and individual involvement in waste management is critical for all areas covered by this Integrated Waste Management Plan.

Village inspections are currently done once per year for each village, by a group comprising representatives from Health, Community Affairs, PWD, Water Division, NPC, and Environment. These inspections include a component for awareness which could be used as the vehicle for broader awareness programs on waste management.

Waste management is not a formal component of the school learning programmes; however, some aspects of waste management may be covered in various subjects.

There is a need for stronger working partnerships between the Education Department and the Environment Department for good waste management promotion

What we want to achieve

- By June 2011, a framework will be in place for better cooperation and collaboration between the Environment Department and stakeholders in education.
- By December 2011, a program for waste management awareness will be developed, which takes advantage of existing activities such as the village inspections.
- By January 2014, waste management will be integrated into the primary and secondary school learning programmes, with the teachers up-skilled to deliver the learning programmes.

How we will achieve the targets

6. The Environment Department will work closely with stakeholders in education to develop the appropriate framework for future cooperation. Areas for collaboration will be identified including the development of a waste management learning programme for primary and secondary schools.

7. The Environment Department will work together with the stakeholders to develop a program for waste management awareness in the communities focusing on the priority areas in this strategy and action plan (solid, liquid, hazardous waste).

WASTE REDUCTION, REUSE AND RECYCLING

The Issues

As shown in Table 2, household waste includes relatively large amounts of organics (27.7%), diapers (16.3%), metals (13.2%), paper (9.4%), and plastic bags (8%). However only the aluminium can is targeted by a recycling program. There are still opportunities to reduce household waste by composting of organic waste, by increasing the recycling of metals and paper, and by reducing plastic bag consumption through awareness or legal measures. The proposed Recycling Regulations will boost recycling programs.

There may also be opportunities to reduce liquid waste by reusing human waste through co-composting with organic waste and also farm animal waste. The resulting compost would be rich in nutrients and would be a useful soil additive for farming.

One of the activities under the IWRM project is to purchase a sludge de-watering machine to remove water from sludge, dry sludge, and reuse in oriental gardens (beautification).

What we want to achieve

- To increase recycling of cans, bottles, plastic, paper, etc, by 25% by December 2013
- To reduce waste (household and commercial) by 25% by December 2013
- To increase the reuse of human and farm animal waste by 25% by December 2013

How we will achieve the targets

8. The Environment Department will solicit support from other agencies and lobby for the enactment of the Recycling Regulations, which will reduce the amount of waste ending up in the dumpsite, while generating much needed revenue to support waste management programmes.

9. The Environment Department will consider and explore ways of enhancing and expanding the existing recycling program in conjunction with the key stakeholders and the private sector, in order to export as much of the recyclable wastes as possible and achieve higher recycling rates.

10. Apart from the Recycling Regulations, the Environment Department will identify and develop additional opportunities for waste reduction and will consider ways of stimulating and supporting private sector initiatives for waste reduction, reuse and recycling.

WASTE COLLECTION

The Issues

From an occupational health perspective, the temporary solid waste collection truck is not well designed, since the worker on the ground has to lift heavy garbage bins above head level. There are also other issues identified by a time and motion study in May 2010, such as collecting garbage on the side of oncoming traffic, lack of standardized waste bins, and need for appropriate safety gear.

There is no separate collection service for bulky waste and e-waste. Instead, this material is put out and collected with the regular waste, which reduces overall collection efficiency.

The current waste collection contract with the private contractor is renewed on a yearly basis. It is often difficult for the contractor to secure loans on the basis of such a short-term contract, which in turn affects the contractor's ability to invest in the appropriate equipment and can lead to a costly collection system. It also does not encourage other private sector operators to consider waste management as a viable business opportunity.

What we want to achieve

- To provide environmentally sound, occupationally safe, and cost effective systems for storage and collection of solid, liquid, and hazardous wastes by August 2011.

How we will achieve the targets

11. The Environment Department will review its solid and liquid waste collection programs in order to identify areas for improvement, including contractual arrangements with the private sector. In doing this, the Department will as far as possible use the polluter pays principle as the foundation for any improvements.

12. The Environment Department will work with interested stakeholders to develop and implement a safe and cost-effective collection program for hazardous wastes, such as e-waste, lead-acid batteries, and waste oil. The Department will as far as possible employ the polluter pays principle in developing this collection program.

WASTE DISPOSAL

The Issues

Solid wastes are disposed of in an uncontrolled, unrestricted open dump at Makato, with the rubbish being pushed about once a month, to create more room, using equipment rented from the Public Works Department or Niue Timber Products at $100 per hour. There are no Environment Department staff on site, and no records of incoming waste quantities. The dumpsite at Mutalau is still being used and an old dumpsite in Vaiea has never been properly closed.

There is no proper disposal facility for liquid waste (septic tank sludge), consequently this is dumped directly to the ground on an overgrown patch of land.

Medical wastes and quarantine wastes are disposed of in separate incinerators which most likely do not meet the high temperature (greater than 800 degrees Celsius), and gas combustion time (2 seconds) required to minimize the generation of toxic gases. Furthermore, very little segregation of the wastes occurs before incineration, and in the case of quarantine wastes, aluminium cans and other recyclables are burnt unnecessarily.

Hazardous wastes such as e-waste, lead-acid batteries, and waste oil are poorly managed and could potentially pollute the water lens.

In general, there are several sites for waste management and there is no central waste disposal facility.

What we want to achieve

- To provide environmentally sound, cost-effective and integrated systems for disposal of solid, liquid, hazardous, quarantine, and medical wastes by June 2015.
- To eliminate asbestos stockpile on the island by 50% by December 2013
- To increase the reuse of human and farm animal waste by 25% by July 2013

How we will achieve the targets

13. The Environment Department will proactively seek out technical and financial resources to develop environmentally sound, cost effective, and integrated waste disposal facilities for all solid, liquid, hazardous, quarantine and medical wastes which cannot be avoided, reused, or recycled, while making incremental improvements using domestic resources. The operation of disposal facilities should be based on the polluter pays principle to ensure that financing is always available.

14. The Environment Department will be proactive in obtaining a consensus for the disposal of asbestos waste based on the three available options (disposal in NZ, disposal at sea, or disposal in sealed landfill on Niue), and will be proactive in seeking out financing from domestic and non-domestic sources to carry out the preferred option.

15. The beneficial reuse of human and farm animal waste will be evaluated and developed further if appropriate by the Environment Department in consultation with the Health Department, DAFF, NIOFA, and other key stakeholders.

ENVIRONMENTAL MONITORING

The Issues

There are many waste management and disposal sites throughout the island. Huihui is used for hazardous waste storage and quarantine waste incineration, while medical waste incineration and disposal of chemicals is done on the hospital grounds. Makato, Mutalau, are current dumpsites, and Vaiea is a disused dumpsites. There is a separate site for disposal of septic tank sludge, while waste oil is left to spill out on the ground at the site of Niue Power Corporation. There is also a site where asbestos roof sheets from Niue High School were buried.

Despite these multiple disposal sites, and the potential impact of the above-ground pollution on the water lens, there is no environmental monitoring or reporting program in place. Further, the appropriate environmental testing equipment is not available on the island.

What we want to achieve

- By March 2015 a comprehensive environmental monitoring program will be in place, which includes water quality monitoring.

How we will achieve the targets

16. The Environment Department will develop and implement an appropriate environmental monitoring program, which includes water quality monitoring, in partnership with the key stakeholders.

CAPACITY BUILDING

The Issues

There is a shortage of appropriately trained people in waste management in Niue.

Environmental law capacity within the country is also limited. This is an issue broader than just waste management, but it is addressed within this NIWMS.

What we want to achieve

- By May 2015, adequate numbers of trained staff are implementing waste management activities under the NIWMS and its Action Plan, with a plan in place for continuous staff development
- By May 2015, at least one person trained in Environmental Law in Niue.

How we will achieve the targets

17. Review Environment's HRD plan to match activities in this Strategy and Action Plan.

18. Develop local capacity for drafting of environmental law through training and attachment, (e.g., at SPREP and USP).

MONITORING AND MEASURING PROGRESS

Measuring the implementation progress of this National Integrated 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. Measuring the success of the Strategy should be based on national key performance indicators such as the amount of waste generated, amount of waste diverted from landfill (reused, recycled, or composted), amount of illegal dumping and littering, etc. Unfortunately, there is a lack of baseline data for many of these indicators, and there are also very few methods to allow the collection of this data.

One of the activities in this Integrated Waste Management Strategy is to develop a database and acquire appropriate baseline information on waste management in Niue. Until the database is established and a regular program of data collection implemented, it is recommended to monitor the progress of the strategy by simple tracking of initiatives taken towards achieving the targets using the template provided in Appendix 3. This should be completed during the mid-term review and evaluation of the Strategy. The Action Plan that accompanies this Strategy also has performance indicators attached to each action. These indicators should also be measured and reported during the mid-term review and evaluation.

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APPENDIX 1: STAKEHOLDERS CONSULTED

Name	Affiliation

APPENDIX 2: PROGRESS OF 2000 NIUE WASTE MANAGEMENT PLAN

Recommendations from the 2000 Niue Waste Management Plan	**Action taken to implement recommendation**
Waste Stream Results	
1. That discussions occur between the operators of the aluminium recycling scheme and relevant government departments to consider operational and administrative improvements	- A new can compactor with a capacity of 500 cans per bale is installed and operational - The operator was concerned that there is a delay in making funds available for the refunds which leads to lack of collection of the cans. Environment Department has a different view which indicates possible communication issues
2. That the existence and benefits of the aluminium recycling scheme be promoted	Residents are aware of the recycling scheme as there is very little aluminium cans to be found at the Makato dumpsite. However, visitors and tourists may be unaware of the scheme.
3. That the use of disposable nappies be further analysed and awareness campaign undertaken promoting the correct disposal of disposable nappies.	Nil
4. The potential for recycling metal (tin) cans should be investigated	Nil
5. That beneficial use of cardboard and paper for mulch and compost be investigated and trialled	No investigations conducted, however, some cardboard is used by DAFF as fuel for incineration of quarantine wastes
6. The potential for recycling plastics be investigated	Nil
7. The potential for recycling glass be investigated	No investigation conducted, however, there is an individual who has demonstrated interest in collecting glass and other recyclables on the landfill and has sought assistance from Department of Environment to export this material
8. That the beneficial use of food scraps for inclusion in composting or provision of pig food be promoted.	Nil
9. That the beneficial use of green waste for mulch and in composting be promoted	Nil
10. That a regular mulching service to village households be investigated	Nil
11. That shredding and use of green waste as mulch or in compost be investigated and trialled	Nil
12. That twice yearly community clean up collection be undertaken aimed at reducing waste especially items which may pose a danger during hurricane season and also reducing vermin harbourage and mosquito breeding sites.	Regular village inspections conducted with advice given to residents. Clean-up Niue Campaign funded by NZAID being conducted in first half of 2010. (Village inspection team comprises representatives from key departments)
13. That the potential for the establishment of a recycling program for plastic, tin cans and glass be investigated	Recycling Regulations have been proposed to Cabinet to apply deposits and refunds to PET pellets and containers (beverage, & cooking oil), lead-acid batteries and white goods.
14. That a waste reduction program be initiated throughout all government operations	Nil
Waste Collection Service	
15. That discussion occurs between the Waste Management Advisory Committee and the contractor to consider modification or changes to the waste collection service to improve effectiveness and efficiency.	The Waste Management Advisory Committee is no longer functional, however the Department of Environment who is the lead agency for waste management, now manages the contractor
16. That in consideration of the above discussions the terms and conditions of the collection contract be reviewed	The collection contract value was increased in 2010 after many years of remaining unchanged.
17. That the provision of appropriate waste containers for the community be pursued	Colour-coded bins were provided: green for households, red for batteries, and blue for public areas, but the system has broken down
18. That a community education and awareness program be established promoting waste reduction and responsible waste management	This is undertaken as part of village inspections.
Commercial Waste	
19. That an awareness program be established aimed at educating the owners of commercial premises of responsible waste management and the use of the rubbish dumps	Nil

Recommendations from the 2000 Niue Waste Management Plan	Action taken to implement recommendation
Industrial Waste	
20. That Codes of Practice be produced for existing and future industrial businesses	Nil
21. That an awareness, education, and enforcement program be initiated to support the Codes of Practice	Nil
Used Tyres	
22. That disposal of used tyres to the waste disposal facilities be encouraged to prevent mosquito breeding from inappropriately dumped or stored tyres	Nil
23. That progress in practical and cost effective recycling, reuse and disposal strategies be monitored	Nil
Abandoned Vehicles	
24. That an abandoned vehicle and large appliance collection and disposal program be developed	Clean-up Niue Campaign is being undertaken in the first half of 2010. There is no ongoing program in place.
25. That an approval system be developed in respect to the use of vehicle wrecks and other machinery as fill for land reclamation in consideration of land use, environmental and engineering criteria.	Nil
Litter	
26. That a community awareness and education campaign be undertaken aimed at significantly reducing the incidence of littering on Niue	Awareness is done during village inspections
27. That litter bins be supplied to all areas on the island which are popular with tourists and locals	Blue bins were provided and these are emptied by the collection contractor
28. That appropriate legislation be developed prohibiting littering.	Nil
Electronic hardware	
29. That existing stocks of computer hardware and electrical equipment be disposed to landfill	Electronic wastes (e-wastes) are currently stockpiled at the Huihui storage site
30. That future initiatives for the disposal or recycling of electronic hardware be monitored	Nil
Waste Disposal Facilities	
31. That options for future waste disposal strategies be investigated including: • Potential of Makato waste tip to act as the major waste disposal facility in the short to medium term • Assessment of proposed Vaiea and Mutalau sites in consideration of environmental and land use principles as indicated in the Sustainable Development Guidelines (Planning for Solid Waste Management) • Consideration of options utilizing transfer stations	Nil
32. That a Memorandum of Understanding between the Department of Works and the Health Department be produced aimed at providing improved waste management practice and departmental cooperation	The Department of Environment is now the lead agency for waste management
33. That a clean up of the Makato waste disposal site continue and an operation and maintenance plan be developed and implemented	Nil, the Makato site is an open dump
34. That a community awareness and education campaign be undertaken promoting environmental and public health protection and the responsible use of waste disposal sites	Partly undertaken through village inspections
35. That the formal process in relation to the lease agreement for the Makato waste disposal site be completed	Nil
36. That maintenance be undertaken on the village waste disposal tips to consolidate and cover existing waste	Mutalau dumpsite is still uncontrolled, and Vaiea has been abandoned without being properly closed and is inaccessible due to overgrowth.
37. That operational and maintenance plans be established for the waste disposal sites	Nil
38. That the status of agreement for the use of the waste disposal sites be investigated and formalized where necessary	Nil
Quarantine Waste	
39. That the replacement of the incinerator be pursued [incinerator at public works depot]	Due to a fire incident with the diesel-powered incinerator in 2004, a new wood/cardboard fired incinerator was donated by SPC and installed at Huihui
40. That awareness and enforcement of Niue's quarantine requirements be strengthened to ensure waste management in relation to vessels visiting Niue meets appropriate standards	Nil

Recommendations from the 2000 Niue Waste Management Plan	Action taken to implement recommendation
Liquid Waste	
41. That amendment be made to the building code to provide for the dual septic system to be designated as the minimum standard for sewage treatment for households	Unable to verify
42. That the Public Health Division provides advice in relation to septic applications and installations	The Department of Environment now has responsibility for septic waste management
43. That a program for the replacement of water seal and longdrop sewage treatment systems with the dual tank septic system be pursued	
44. That a community awareness campaign be undertaken promoting the benefits of regular maintenance of septic systems	Nil
45. That the Government of Niue provide a regular septic tank de-sludging service and consider payment for this service and other waste management activities by establishment of a waste management/ environment levy.	Nil. Septic tanks are emptied on request – when they are filled.
Septic sludge disposal	
46. That a sludge drying bed and effluent treatment system be designed and funding pursued for its construction.	Nil. The Integrated Water Resources Management Project may be looking at a sludge treatment process.
47. That composting and vermiculture trials be undertaken	Nil
Hazardous waste	
48. That a waste oil collection facility be established at the Niue Power Corporation and at a suitable central site for receipt of waste oil from commercial premises and the community	Nil
49. That a community education and awareness program be established promoting environmental protection and the appropriate disposal of waste oil to the waste oil collection facility	Nil
50. That removal of waste oil offshore for recycling be pursued	Nil
51. That alternative methods of sports field line marking be encouraged	Marking of sport fields with used oil as stopped
52. That a Codes of Practice be developed for the various industries to specific requirements in relation to waste management and environmental protection	Nil
53. That a collection service for oil filters be established	Nil
54. That a community education and awareness program be established promoting environmental protection and the disposal service for oil filters	Nil
55. That a contract for the export of spent vehicle batteries to New Zealand for recycling be established	Vehicle batteries are currently stockpiled at the storage area in Huihui
56. That subsidized freight costs be pursued	Nil
57. That a collection and processing facility be established.	Nil
58. That a collection program be undertaken	Used batteries are currently collected by the Environment Department
59. That a community education and awareness program be undertaken promoting environmental protection and the correct disposal of spent vehicle batteries	Partly undertaken during village inspections
60. That dedicated waste bins be provided at village halls and commercial outlets for the collection of spent dry cell batteries	Red-coloured bins were provided in communities, but they are no-longer exclusively for batteries
61. That a community education and awareness program be established promoting environmental protection, the advantages of rechargeable torches and batteries and the correct disposal of spent dry cell batteries	Nil
Agricultural Chemicals	
62. That the department of Agriculture, Forestry and Fisheries, the Health Department and the Environment Unit (Pesticide Committee) undertake research into the use of pesticides in agriculture and consider the potential for less toxic products and integrated management techniques aimed at protecting public health, the environment of Niue and promoting the benefits of organic agriculture.	Nil
63. That the Department of Agriculture, Forestry and Fisheries, the Health Department and the Environment Unit (Pesticide Committee) undertake an awareness and education program aimed at correct and safe use of agricultural pesticides and the requirements for disposal of unused chemicals and chemical containers	POPs in PICs Project included an extensive awareness campaign as evidenced by the numerous village signs promoting prevention of POPs.
64. That the secure packaging and storage of obsolete chemicals be undertaken in preparation for removal by SPREP	3,971 kilograms of obsolete chemicals (agricultural and others) were removed under the POPs in PICs project

Recommendations from the 2000 Niue Waste Management Plan	Action taken to implement recommendation
Other Chemicals	
65. That the secure packaging and storage of the chemicals be undertaken in preparation for removal by SPREP	3,971 kilograms of obsolete chemicals (agricultural and others) were removed under the POPs in PICs project
66. That the public health pest control program be reviewed	Unable to verify
Hospital Waste	
67. That the materials contained in the basement storage area [of the hospital] be separated and packaged	The hospital was destroyed during Cyclone Heta in 2004 and waste materials could not be located in the aftermath.
68. That materials considered safe for incineration be incinerated and remaining materials be securely packaged and stored in readiness for disposal under the SPREP program	The hospital was destroyed during Cyclone Heta in 2004 and waste materials could not be located in the aftermath.
69. That future expired or obsolete materials be appropriately stored and periodically incinerated or otherwise disposed by Environmental Health	An imprest ordering system was implemented at the hospital. It's based on specifying a maximum stock level for each item which significantly reduces the amount of expired and obsolete chemicals generated.
Asbestos Waste	
70. That a community awareness program be established promoting safe practice in the removal, transport and disposal of asbestos building products	Undertaken as part of village inspections
71. That a Code of Practice be produced requiring the safe handling, transport and disposal of asbestos products	Nil
72. That appropriate records be kept of the disposal of asbestos products	Approximately 3.650 square meters of asbestos roofing was removed from the High School and buried on island. Unable to verify if proper records are kept.
Hazardous Substances Management	
73. That an effective and sustainable management framework for the control of risk associated with hazardous substances importation and use be developed	Nil
Water Quality Monitoring	
74. That an appropriate chemical and bacteriological water monitoring program be implemented [health dept]	Bacteriological water quality testing done by Health Department. Nothing for chemical quality
75. That funding be pursued for the supply of a portable chemical analysis laboratory	Nil
Awareness and Education	
76. That an integrated education and awareness program be established linking the significance of responsible waste management to protection of public health and the environment of Niue and promoting the aim of the Waste Management Plan that Niue is recognized as the cleanest and healthiest Nation in the Pacific	Nil
Waste Management Legislation	
77. That existing and draft legislation relating to waste management be compiled and further developed if necessary to provide waste management legislation relevant to the present and future needs of Niue	Review of environment related legislation in Niue completed in 2007, however, no recommendations implemented with respect to waste management legislation
Resources	
78. That the financial, human and physical resources required to undertake a sustainable waste management program for Niue be determined and recommended to the Government of Niue for allocation as an ongoing commitment for budgetary considerations	Nil
79. That Cabinet considers the application of funding mechanisms to provide for the financing of environmental/waste management programs for the protection of public health and the environment of Niue	A container deposit scheme applied to aluminium cans which sustains the operation of the recycling/export program. No other mechanisms in place.
Future Development	
80. That consideration of development proposals has regard for the principals of Ecological Sustainable Development	Unable to verify
81. That new proposals be considered within a social, environmental and economical planning framework to ensure detrimental impacts are not imposed on the nation if developments are approved	Unable to verify
Review	
82. That formal review of the Waste Management Plan is undertaken every two years	No formal review undertaken. Partial review started in 2007, but never completed, and no documentation available.

APPENDIX 3: NIWMS MONITORING/REPORTING TEMPLATE

TARGETS (as listed in the Strategy)	DESCRIBE PROGRESS, BARRIERS, DELAYS, ETC	DATE
To increase recycling of cans, bottles, plastic, paper, etc, by 25% by 2013		
To reduce waste (household and commercial) by 25% by 2013		
To provide environmentally sound systems for collection & disposal of solid wastes by 2015		
To provide environmentally sound systems for collection & disposal of liquid wastes by 2015		
To provide environmentally sound systems for collection & disposal of hazardous wastes by 2015		
To eliminate [reduce] asbestos stockpile on the island by 50% by 2013		
To increase the reuse of human and farm animal waste by 25% by 2013		
To develop practical and enforceable regulations for waste management by 2015		
By December 2010, a Waste Management Officer/Adviser will be hired by the Environment Department to manage solid, liquid, and hazardous waste, and to manage the implementation of components of this Integrated Waste Management Strategy and Action Plan.		
By December 2010, a body will be established to oversee the implementation of this Strategy.		
To develop practical and enforceable regulations for waste management by August 2013 in line with recommendations made in the report on the "Analysis of environment-related legislation in Niue"		
By June 2011, a database framework will be established and hosted at the Environment Department and which will hold critical information on the waste management system and environmental quality in Niue.		
By December 2011, a regular schedule for conducting waste management surveys will be developed and implemented, and the database will be updated with a complete set of baseline data.		

TARGETS (as listed in the Strategy)	DESCRIBE PROGRESS, BARRIERS, DELAYS, ETC	DATE
By June 2011, a framework will be in place for better cooperation and collaboration between the Environment Department and stakeholders in education.		
By December 2011, a program for waste management awareness will be developed, which takes advantage of existing activities such as the village inspections.		
By January 2014, waste management will be integrated into the primary and secondary school learning programmes, with the teachers up-skilled to deliver the learning programmes.		
To increase recycling of cans, bottles, plastic, paper, etc, by 25% by December 2013		
To reduce waste (household and commercial) by 25% by December 2013		
To increase the reuse of human and farm animal waste by 25% by December 2013		
To provide environmentally sound, occupationally safe, and cost effective systems for storage and collection of solid, liquid, and hazardous wastes by August 2011.		
To provide environmentally sound, cost-effective and integrated systems for disposal of solid, liquid, hazardous, quarantine, and medical wastes by June 2015.		
To eliminate asbestos stockpile on the island by 50% by December 2013		
To increase the reuse of human and farm animal waste by 25% by July 2013		
By March 2015 a comprehensive environmental monitoring program will be in place, which includes water quality monitoring.		
By May 2015, adequate numbers of trained staff are implementing waste management activities under the NIWMS and its Action Plan, with a plan in place for continuous staff development		
By May 2015, at least one person trained in Environmental Law in Niue.		