

SAMOA TSUNAMI

Preliminary Survey

Report on Bulky

Wastes & Sewage Conditions



At the Affected Villages of Aleipata & Lepa Districts

Lepa

Saleapaga

Lalomanu

Vailoa

Ulutogia

Satitoo

Malaela

Lotopue

Mutiatele

Saleaamua

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1.0. INTRODUCTION.

1.0. Background Information

This report presents the findings of a preliminary survey initiated and conducted by the Japan International Cooperation Agency (JICA) to assess the situation of the generated solid waste and the sewage conditions at the Aleipata and Lepa Districts following the tsunami which hit Samoa on Tuesday, 29th September 2009. The occurrence of the Tsunami event has resulted with the generation of large quantities of solid wastes deposited at 10 villages of the Aleipata and Lepa Districts. Wastes from fallen trees, damaged buildings and furniture as well as other destroyed properties were deposited along the coast towards 200m inland. The toilet facilities at these villages were all destroyed with the contents of most septic tanks being swept away by the waves leaving open ditches, while some partly damaged septic tanks still have active and unstable sludge. Samoa like most of the Pacific Islands does not have any special policy and strategy in place to provide a management framework to respond to such a situation. The findings of this preliminary survey are therefore very important in providing some baseline information and data to assist JICA in its post tsunami relief waste management works.

1.1. Scope of the Survey.

The survey covers the generated solid wastes and bulky waste such as damaged vehicles, boats and others of the same magnitude. It also assessed the conditions of septic tanks.

The study shall provide some countermeasures and recommendations of actions to be taken to safely store, collect and dispose of the generated wastes, bulky waste, sludge and sewage.

This study shall also come up with some information on the necessary equipments, facilities, manpower and funding required to support the planned countermeasures to manage the situation at the time.

2.0. OBJECTIVES.

- To conduct a preliminary assessment to estimate the quantities of the generated solid wastes with special focus on recyclable and reusable waste materials and bulky wastes.
- To observe the conditions of sewage and sludge at the affected villages.
- To ascertain and estimate the necessary resources required to implement appropriate countermeasures and activities.

3.0. SURVEY CONTENTS

- Discussion and interviews conducted at the targeted villages in the Aleipata and Lepa Districts.
- Field visits at the affected sites to conduct assessment and make observations.
- Information and Data Recording and Photo Taking at the affected sites.
- Data Analysis and Presentation
- Survey Report Writing and Presentation.

4.0. SURVEY SCHEDULE

Schedule	Activities	Time	Information Type / Output
Friday, 3 rd Oct 2009	Interviewing of Affected Residences at Lepa, Saleapaga, Lalomanu and Ulutogia Villages	4pm - 9pm	Properties lost (Cars, TVs, Houses and etc)
Saturday, 4 th Oct 2009	Interviewing of Affected Residences at Satitua and Malaela Villages Field survey at Lepa, Saleapaga, Vailoa, Ulutogia	10am - 12.00n 2pm - 7pm	Properties lost (Cars, TVs, Houses and etc) Damaged Cars, TVs, Houses and etc recorded Photos Taken
Sunday, 5 th Oct 2009	Interviewing of Affected Residences at Mutiatele and Saleaaumua	1pm - 7pm	Properties lost (Cars, TVs, Houses and etc)
Monday, 6 th Oct 2009	Field survey at Satitua, Malaela, Lotopue, Mutiatele & Saleaaumua Information and Data Analysis & Report Writing	10am - 3pm 6.00pm - 2am	Damaged Properties Photo taken Draft Report Produced

5.0. GATHERED INFORMATION AND DATA

5.1. Bulky Waste Generation

The information collected from both the interviews and field visits conducted at the affected villages indicated the following estimates summarized under table 1 and 2. Please refer to Annex 1 for detailed information.

Table 1: Estimates of the Generated Bulky Wastes

Item	Quantities
Mattresses	594
E-wastes	427
Car Bodies	33
Plastic Tanks	24
Boats	11

Refrigerators and Televisions constitute about 50% of the expected e-wastes generated at the affected areas. The smaller electrical appliances were difficult to sight as they were mostly buried by sands and mud or deposited in inland swampy areas of the affected villages especially at Ulutogia, Satitua, Malaela, Lotopue, Mutiatele and Saleaamua. The above figures were based on the damaged units being observed during field surveys but not including the ones being buried at villages' backyards. It requires the assistance of excavators' to bring to surface these buried items.

Table 2: Estimate of the Generated Iron Roofing Materials

Village	Estimated Volume of Damaged Iron Roofing (cubic-meter)
Lepa	150
Saleapaga	300
Lalomanu	300
Vailoa	30
Ulutogia	130
Satitua	300
Malaela	170

Lotopue	30
Mutiatele	20
Saleaamua	50
TOTAL	1,580 cubicmeters

5.2. Reusable and Recyclable Wastes

There are large quantities of reusable and recyclable waste materials generated from damaged buildings such as timbers, iron roofing materials, damaged steel furniture and electrical and electronic equipment. The timbers will all be reused for construction of temporary houses, kitchens, toilets and other forms of shelters. The remaining will all be used as firewood to support traditional cooking methods in these affected villages. The partly damaged iron roofing materials will be mostly used for building and fencing materials. People will try their best to reuse the damaged iron materials while the badly torn ones will need to be disposed off. Because of limited time for this survey, a detailed assessment to quantify by category the amount of recyclable waste materials generated could not be done.

While all timbers, partly damaged iron roofing materials, vehicles, tanks, mattresses and some furniture can be reused, electronics like refrigerators and televisions have to be collected and disposed of. The survey findings indicated about 427 medium to large electronics such as refrigerators, televisions and others indicated above as well as 24 plastic water tanks have to be collected and disposed. The 33 car bodies recorded are likely to become waste while the others have not been considered as they were in good conditions and will possibly remove by their owners for repair works.



Some Damaged Vehicles have been removed from the sites by their owners and rental businesses

The iron roofing materials were the main bulky waste item observed and noticeable throughout the affected areas. The study estimated about 1,580 cubic-meters of damaged and torn iron roofing materials, with more believed to be buried underground at villages' backyards. These are preliminary findings only due to the amount of wastes which the survey could not identify unless some excavation works conducted on site to dig up the rest of the buried materials.



General conditions of Iron Roofing Materials at the affected areas

5.3. General Waste

There are high quantities of green waste generated from fallen trees as well as other general solid wastes of plastic, textile, metal and glass nature observed in the affected areas. Because of limited time, this survey could not properly quantify these categories in details as most are buried by sand and mud. The survey team also noticed large quantities of plastics being deposited at Lalomanu (Tuialamu area). Detailed assessments of the wastes indicated that these could come from the Lalomanu Beach Resorts but not the rubbish collection contractors as per earlier suspicion. These wastes were disposed of along the coasts and such illegal practice has been carried on for some time.



Plastic items being deposited along the road at Lalomanu Village (Tuialamu area)



The generated general solid waste mixed with iron metals and timber

5.4. Sewage and Sanitation Status

The toilets and septic tank facilities at Lepa (Vaigalu area), Saleapaga, Lalomanu (Resort Area), Ulutogia, Satitoo and Malaela have been completely destroyed. There is high concern for the affected residences in these areas because of possible disease outbreak caused by hygienic conditions as result of poor to no toilet facilities in place. Some villages living in camps at villages schools are using the new toilets recently constructed by the Ministry of Education under the European Union Funding Assistance. However, these toilets will be overloaded soon because of more people using these facilities at present. This requires regular septic tanks servicing by sewage disposal trucks. Other villages camps set up inland are using the bush or some inland families' toilets. The water supply to some of the inland areas where the affected residences are concentrating is mostly not good and thus requires some water storage containers and tanks, as well as regular water supply servicing.



The general conditions of toilets and septic tanks at the affected villages

Most septic tanks have been damaged and their contents have been swept away by waves living open ditches. The partly damaged septic tanks have some sludge contents containing mixed active and stable sludge. This could pose health risks to the affected residences living in the areas if no appropriate actions are taken accordingly.

5.5. Collection Services.

There has been no collection service for the affected areas since the tsunami on Tuesday, 29th September 2009 based on the responses from the affected villages. The government current rubbish collection program provides two collection services for the general waste but not including organic waste (green waste and food scraps). With the large quantities of mixed wastes at the affected areas, it would be difficult for this service to implement given the absence of rubbish shelves which made it easier for the contractors to collect the waste from these areas. The contract between MNRE and the contractor responsible for the collection of waste from Aleipata and Lepa Districts does not cover disaster wastes. There is a special bulky waste collection service to be provided every four months period every year. It is not confirmed whether this special service provision under the government rubbish collection program has any remaining services to be utilized at this time. The collection of sludge and sewages from septic tanks is only provided by private companies and thus there is no free service for collection of sludge and sewage from damaged septic tanks.

5.6. Disposal Services.

All the wastes collected under the current government rubbish collection program have to be transported and disposed of at the Tafaigata Waste Disposal Site. This includes the collected sewages and sludge from septic tanks. Some villages are planning to use the generated waste to reclaim some eroded lands during the tsunami. There are high quantities of waste deposited in swampy areas and the possibility of these wastes being left there is high given the costs and difficulties involved in removing them. At the time of this assessment, a number of residences were observed burning their piles of garbage because of the bad odour generated.



5.7. Pollution Sources

The burning of piles of garbage as observed in many villages would be a major air pollution given the suspected burning of plastic items and electronics. While there are other suspected major pollution to the marine environment as result of the tsunami, this assessment was not able to carry out a detailed assessment on the possible sources and the extent of those sources. This requires a full detailed post tsunami pollution assessment to be initiated and coordinated by the Ministry of Natural Resources and Environment bringing in the available expertises from relevant organizations, individuals and others who are willing to assist in this area.

6.0. CONCLUSION

The findings of this survey indicates that the generated reusable and recyclable waste materials at the affected villages and areas at Aleipata and Lepa Districts are high, but their details by waste composition could not be determined due to limited time for this preliminary assessment.

These wastes pose risks to the affected residences and the travelling public during sudden strong winds because of flying objects such as iron roofing being lying everywhere in the affected areas. The sharp materials being buried at most villages from broken glasses and steel metals of furniture are also dangerous to the people living in these areas.

A clear image of the actual quantities of waste will be known once people begin cleaning and clearing their villages to recover and reuse some of their damaged properties leaving the unwanted things aside. This can be known in three to four weeks time.

The estimated cost of managing the generated wastes is more than \$145,000 covering all the affected areas at the Aleipata and Lepa Districts. About \$130,000 is transportation costs to deliver the waste to Tafaigata.

There is pollution involved as result of the tsunami but proper follow up assessments need to be made in order to provide in depth information on this for appropriate actions in the future.

7.0. Countermeasures

In light of the above presented survey findings, the following measures are highly recommended for implementation in order to provide some quick actions on the ground to manage the waste and sewage situations in the affected areas.

7.1. Provision of Advices and Information to the Affected Areas

There is an urgent need to advise the residences at the affected villages through radios, televisions and government-villages representatives (pulenuus and sui o tamaitai) on some important information relating to:

- The arrangements the government has in place to handle the generated solid waste (general waste, bulky waste and etc).
- Waste Management Advices for the safe storage, collection and disposal of the generated wastes to prevent public health and the environment
- What the villages need to do to assist with the implementation of any planned government special waste collection services at these affected areas such as:
 - i). Placing of their general solid waste along the roadsides for the usual weekly collection service. This is important as all the villages rubbish shelves have been damaged.
 - ii). Do not burn waste.
 - iii).Dispose of the green waste at backyards or garden areas.
 - iv).Schedule of collection services in case it changes at this time.
 - v). Bulky waste collection information.
- Any other important supporting services, initiatives and projects to be provided by other organizations, companies and individuals.

7.2. Segregation at Source

- There is a need to implement waste segregation at source to reduce the quantities of waste to be collected and transported to Tafaigata for proper disposal. Most of the generated waste is recyclable and reusable such as timbers, iron roofing materials, furniture and others that were partly damaged during the tsunami. The affected villages must be sufficiently advised on this for easier implementation of collection services and reduction of costs involved.

- The green waste (trees leaves, branches and trunks) have to be collected and disposed of at the villages backyards. The people must be advised that burning is not the appropriate way to dispose of the green waste.

7.3. Provision of Collection Service

- There is an urgent need to continue the collection of the general solid waste from the affected villages at Aleipata and Lepa villages.
- There is a need for collection of the bulky waste generated as indicated above.
- The incorporation of the services provided by Private Recycling Companies will be important in effectively providing separate collection services for large recyclable waste materials such as car bodies, iron roofing materials and others.
- The contribution from projects and voluntary initiatives to be implemented by other organizations, religious groups, businesses and individuals will be important in providing the much needed assistances at these affected areas.
- The collection of sewage and sludge from damaged toilets and septic tanks shall be the responsibility of the residences with some assistance from the government to reduce the services costs involved. Arrangements can be made with Sewage Disposal Trucks Operators for cheaper rates affordable to the residences. The damaged septic tanks should be considered in future relief reconstruction works.

7.4. Disposal Services

All the collected wastes must be transported and disposed of at Tafaigata with the exception of the green wastes to be disposed of at the villages' backyards. These can be used to reclaim some eroded lands during the tsunami. While the creation of small villages inland dumpsites to dispose of their generated wastes is much cheaper and quicker, there is concern for the safety of such development to the people and the environment.

7.5. Pollution Management

Given the lack of information on pollution, there is a need for a follow up assessment to assess the pollution conditions at these surveyed areas and other areas affected in Samoa.

Annex 1: ESTIMATE OF TRUCK LOADS OF THE GENERATED RUBBISH

A). GENERATED BULKY WASTE

Village	Truck Loads (10 C.M)
Lepa	5
Saleapaga	10
Lalomanu	15
Vailoa	2
Ulutogia	7
Satitua	12
Malaela	6
Lotopue	3
Mutiatele	4
Saleaamua	5
TOTAL	69 truck loads

B). GENERATED TRUCK LOADS OF TORN AND DAMAGED IRON ROOFING

Village	Estimated Volume of Damaged Iron Roofing (cubic-meter)
Lepa	15
Saleapaga	30
Lalomanu	30
Vailoa	3
Ulutogia	13
Satitua	30
Malaela	17
Lotopue	3
Mutiatele	2
Saleaamua	5
TOTAL	158 Truckloads

ANNEX 11: ESTIMATES FOR COLLECTION & TRANSPORTATION

Equipment	Average Cost per Unit / Hour	Estimate Sub Total Cost	Estimate Budget
Rubbish Trucks (10tonnes) to transport Waste to Tafaigata	\$600	217 Truck loads x \$600 = \$130,200	\$130,200
Excavators to remove heavy wastes deposited at villages backyards / coastline	\$120	\$120 x 7 Villages x 8hrs \$120 x 3 Villages x 4 hrs	\$6,720 \$1,440
Iron Roof Cutters (For the villages to cut into smaller sizes the iron roofs for easier transportation)	\$50	\$50 x 100	\$500
Trucks to transport Green Waste and Logs for disposal at villages backyards	\$120	\$120 x 7 villages x 4hrs	\$3,360
		TOTAL	\$142,220

ANNEX 111: PHOTOS OF FIELD SURVEY CONDUCTED



Survey Team at Lepa Village



Survey Team at Saleapaga Village



Survey Team at Lalomanu

ANNEX IV: DETAILS OF THE GENERATED WASTE

WASTE STREAM		VILLAGES										
ITEM	DETAILS	Lepa	Saleapaga	Lalomanu	Vailoa	Ulutogia	Satitoo	Malaela	Lotopue	Mutiatele	Saleaamua	Sub Total
1.0. Electronics	Refrigerators	15	25	31	3	12	16	12	3	6	12	135
	TV Sets	17	14	20	5	14	18	10	4	8	14	124
	Computer	2		4		4						10
	Washing Machines	4	5	8	2	5	3	6	2		2	37
	Stereo	13	7	5	2	3	7	5	3		4	49
	Rice Cooker	2	2	7		2	3	7	2		2	27
	Microwave	4		5			4	5	3		2	23
	Sewing machines		9				6	4	2		1	22
	Sub-Total (Units)	57	62	80	12	40	57	49	19	14	37	427 e-wastes
2.0. Car Bodies	Pickup	2	1	3		2	1	1	1	1	2	14
	Van		1					2				3
	Taxi		2			2						4
	Jeep											
	Others		2	3			2	3		1	1	12
	Sub-Total (Units)	2	6	4		4	3	6	1	2	3	33 car bodies
3.0. Boats	Fishing Boat						3			1		4
	Small boat	1			1	1	2			2		7
	Sub-Total Units	1			1	1	5			3		11 boats
4.0. Plastic Tanks	Plastic Waster Tanks	2	4	7		4	3	2			2	24
	Sub-Total Units	2	4	7		4	3	2			2	24 boats
5.0. Mattresses	Mattresses	20	125	190	10	33	52	29	14	9	12	594
	Sub-Total (Units)	20	125	190	10	33	52	29	14	9	12	594 mattresses
ESTIMATED VOLUME (C.M)		50	100	150	20	70	120	60	30	40	50	690 c.m
EST NO OF 10 C.M COLLECTION TRUCK LOAD		5	10	15	2	7	12	6	3	4	5	69 truckloads

ESTIMATED VOLUME OF THE GENERATED IRON ROOFING WASTE MATERIALS

IRON ROOFING MATERIALS	VILLAGES										Sub Total
	Lepa	Saleapaga	Lalomanu	Vailoa	Ulutogia	Satitoo	Malaela	Lotopue	Mutiatele	Saleaamua	
Estimated Volume	150	300	300	30	130	300	170	30	20	50	1,580 cu.meter
Est No of Collection Trucks (10 c.m)	15	30	30	3	13	30	17	3	2	5	158 truck loads
GRAND TOTAL TRUCK LOADS (10 C.M)	20	40	45	5	20	42	23	6	6	10	217 trucks