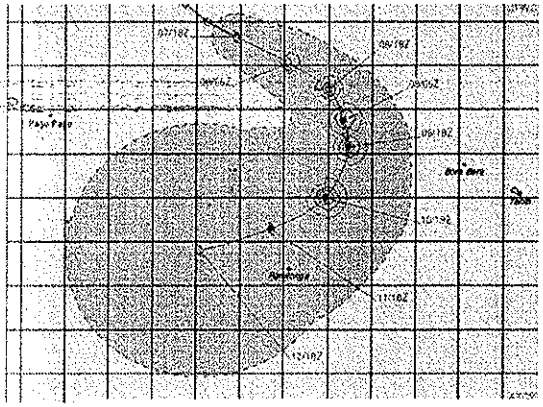
CYCLONE PAT INITIAL ASSESSMENT REPORT

AITUTAKI BUILDING DAMAGES



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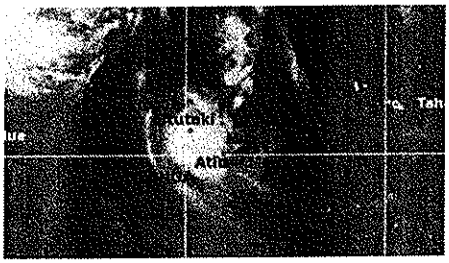
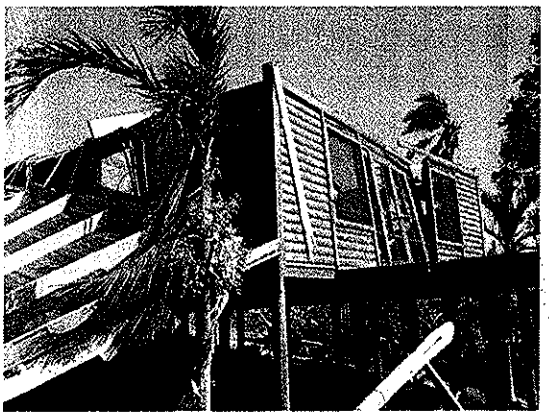


Cyclone Pat at 11am 10 Feb 2010



Assessments By:
Ministry Of Infrastructure & Planning
Rarotonga

14 February 2010

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CYCLONE PAT INITIAL ASSESSMENT REPORT
AITUTAKI BUILDING DAMAGES

Executive Summary

Severe Tropical cyclone Pat hit Aitutaki Island around 2 am on 10 February 2010 with category 3 wind force in the range of 176 km/hr to 208 km/hr. The cyclone left behind very devastating damages to the overall island of Aitutaki.

A Team of assessors from Ministry of Infrastructure & Planning (MOIP) with the Red Cross (Rarotonga), Telecom (Rarotonga) and Public Health (Rarotonga), was mobilized to Aitutaki to begin a program of assessing damages caused by the cyclone Pat

This initial assessment reports is broad in scope and focuses on a general overview of the type of building damage that have occurred, to assist in determining the relief and immediate response requirements.

Electricity transmission was cut to the entire island, except at the Emergency Operation Centre (EOC) based at the Island Administration Yard. Severe damage to poles (approximately 100 no.) and pole –mounted electrical distribution and communication networks was widespread. Power distribution affected other essential utilities such as the hospital, water supply.

The water supply relying on electricity to power the water pumps were also damaged. The village of Tautu would be greatly affected by the electricity being taking longer than anticipated and the water supply would require much needed emergency generators to power the water pumps at the water gallery.

There may be a need to review the design wind speed forces, of the Cook Islands Building Code with the likelihood of newer buildings to be designed to higher wind speeds as experienced by Cyclone Pat.

The initial assessment of all buildings surveyed showed a very high average of 57% damage of all the populated buildings on the island of Aitutaki. The 387 damaged buildings out of 762 total buildings, received at varying degree from minor building roof damage to entire building being demolished was assessed This figure is very overwhelming, considering that in 2005 cyclones that hit Rarotonga, only 5% of roof damages was afflicted, during the 4 cyclones that came close to Rarotonga.

The worse cyclone impacted area was the villages of Nikaupara and Tautu, with 79% and 86% respectively of buildings severely damaged. Tautu and Vaipae villages had 6 of each buildings being totally destroyed. In the village of Amuri, although 40% of the all buildings in the area were damaged, a considerable large amount of 12 buildings was totally destroyed.

The majority of cyclone building damages were the domestic buildings with 73% damaged compared to all buildings surveyed. The cost estimate to replace or rehabilitate their homes would be around $4.5 millions. For the community building such as Churches, community halls etc. would require at least $1.0 million as a replacement cost to rehabilitate these buildings.

The least of the rehabilitation cost was unexpectedly come from the tourism sector with the cost damages of $128, 000.00. These facilities seem to be operating with minimum disruptions observed during the assessment.

The overall total destroyed buildings as a result of the cyclone was assessed at 34 buildings. This would be the first prioritized households that would require urgent assistance in regards to the provision of sheltered tents so the families can be relocated back onto their properties to start cleaning. Most of the occupants are staying in the community halls or with relatives. The Red Cross would have more details about the occupants being affected.

The second priority will be the assistance provided to an approximately 160 households from acquiring sheltered tents to several tarpaulins to protect household goods and provide shelters for the occupants.

The third priority will require mostly tarpaulins to cover the affected roof areas and the forth priority will need a tarpaulin or the owner to temporary repair the damaged roofs until assistance do arrive.

The total replacement cost to rehabilitate to the building damages only, as a result of Cyclone Pat, is estimated at a cost of NZ$12.0 million. This includes basic electrical rewiring of the buildings with an estimated cost of NZ$2.9 millions, as a result of not only to damages to roof structures but the whole buildings as well.

The electrical elements and wiring of all buildings whether damaged or undamaged prior to the power being restated should be checked thoroughly to avoid risks of short circuits due to water (and saline) ingress especially through the socket and light points.

The damaged roofing sheets should be collected or dismantled from purlin timbers and stored securely away or be collected and delivered to the landfill site for safe keeping.

The burning of organic waste in their green state should be strongly discouraged due to excessive smoke which is hazardous to the health and the environment. The green waste should be either be buried on residential own properties or stored away on available land site to naturally breakdown and rot away as compost.

The burning of debris and rubbish waste should also be discourage as the whole island is currently experiencing the drying of vegetations and scrubs which may ignite a fire hazard on the island.

Introduction

Severe Tropical cyclone Pat hit Aitutaki Island around 2 am on 10 February 2010. The Cyclone was upgraded from a category 2 to a category 3 when it struck the Island with wind speeds in the range of 176 km/hr to 208 km/hr. Fortunately no serious injuries or death was reported, however, the cyclone left behind very devastating damages to the overall island.

A Team of assessors from Ministry of Infrastructure & Planning (MOIP) consisting of Ata Herman, Loius Teiti, Joseph Akaruru and Charlie Tamangaro, and other Teams from the Red Cross (Rarotonga), Telecom (Rarotonga) and Public Health (Rarotonga), was mobilized to Aitutaki within 30 hrs to begin a program of assessing damages caused by the cyclone Pat on the island of Aitutaki.

The Teams could not be mobilized sooner, as the Island of Rarotonga was also on standby alert awaiting the arrival of Cyclone Pat at 2pm in the afternoon. Fortunately this did not occur as the path of the Cyclone Pat veered to Southwest direction bypassing Rarotonga.

This initial assessment reports is broad in scope and focuses on a general overview of the type of building damage that have occurred, to assist in determining the relief and immediate response requirements.

On Saturday morning, 13th February 2010, a preliminary building damage assessment in electronic format database copy was provided to the Emergency Coordinator Mr. Charlie Carlson via Patrict Arioka to be entered into the overall assessment database including those collected by the Red Cross and others.

Site visit

Upon arrival on Aitutaki Island at 9 am, 11 February, the teams could not believe the impact of the severity of the damages, especially as we drove through the villages towards the Aitutaki Emergency Operating Centre (EOC) – Aitutaki Island Administration Base.

A meeting chaired by the Mayor, Tai Herman, was held with all stakeholders. The stakeholders consist of the assessment teams from Rarotonga, Aitutaki Infrastructure staff, Island Councils, and member of Parliaments, local contractors, and others. The purpose of the meeting was to coordinate and conduct urgent tasks to clean the islands of debris and other activities required to be carried out during that day.

The EOC was ideally located, as this was the only area where power and telecommunication was operating on the island. The rest of the island was blacked out in regards to the power supply and the telecommunication tower was also damaged.

Assessment Teams

Soon after, a briefing meeting of the assessments team only (MOIP, Red Cross, Health, Island designated council members), chaired by Charlie Carlson with the assistant of the Mayor was kicked started by splitting the assessment team into four lots each allocated to specific village areas around the island. With the transports being arranged and ready, the four teams were on the road just after midday to undertake the survey and assessments. Each assessment teams was accompanied by the designated council members to guide and assist each team.

The assessment continued from 11th Thursday after midday to 12th Friday evening. The Initial assessments and analysis (in electronic form) was provided to the Emergency Coordinator Mr. Charlie Carlson via Patrict Arioka to be entered into the master database.

Impacts on Critical Infrastructures

Electricity transmission was cut to the entire island, except at the EOC base.
Severe damage to poles (approximately 100 no.) and pole –mounted electrical distribution and communication networks was widespread. Power distribution affected other essential utilities such as the hospital, water supply.

The water supply relying on electricity to power the water pumps were also damaged. The village of Tautu would be greatly affected by the electricity being taking longer than anticipated and the water supply would require much needed emergency generators to power the water pumps at the water gallery.

Initially the access by roads was limited in some areas due to trees falling directly across the roads. However, this was cleared by Friday afternoon. However, the overall road infrastructure is unaffected by the cyclone.

The Te Uira Aponga (TAU) in Rarotonga has been keeping in touch with the Aitutaki power supply via the Rarotonga Emergency Operation Centre on Wednesday morning to what can urgently be supply to assist with the power supply.

Cyclone Wind Forces

Cyclone wind forces on a building acts predominantly upwards and horizontal. A building must have structural systems, which will remain intact under these loads and transmit the wind forces to the ground through its structural members, connections and claddings without failure of these elements.

According to the Cook Island Building Code, the equivalent basic wind speed for permissible stress methods of design is 49 m/s. (approx. 180 km/hr) this corresponds to category 2 Terrain and the value of the factor B1 is 1.5 and an upwind slope of 1:10 for escarpments.

As the cyclone was upgraded from a category 2 to a category 3 when it struck the Island, with expected wind speeds in the range of 176 km/hr (49m/s) to 208 km/hr (57 m/s). This would be just beyond the Building Code design wind speed of 49m/s.
The severity of the wind force intensity, say at 190km/hr or 53m/s, beyond the Code design wind speed would definitely maximized the potential for fatigue failure of building structure fixings, including the undamaged buildings not assessed on the islands.

Therefore with the severity of the wind force greater than the Building Code wind force and as most buildings is not well maintained, it would not be a surprise to expect such devastating damages all throughout the villages – as indicated by the average 57% of the building populations being damaged to various degrees.

Damage to newer homes was also not immune to damages from the Cyclone Pat wind forces. It was very surprising to see a fair amount of newer buildings sustaining damages, particularly at the roof structures.

There may be a need to review the design wind speed forces, of the building Code with the likelihood of newer buildings to be designed to higher wind speeds.

Assessment Damage Criteria

The building damage assessment was based primarily on three damage criteria's such as; Building roof damage, building roof demolished and total building being demolished. Each criterion has assigned replacement rates of $200/m2, $400/m2 and $800/m2 respectively with various degree of damage expressed in percentage. The replacement cost is based on a value of rebuilding a damaged building structure. **Refer to Appendix A:** Building Damage Criteria Assessment

Impacts on Buildings

The majority of structural damages assessed was as expected, associated with older constructions (>25 years). The older structures were primarily build of lower standard and are more likely to have deteriorated components (corrosions, rot, insect attack) leading to a reduction in strength at critical fixings (roofing/purlin, purlin/rafter and rafter/wall top plate etc).

With roof damages, the lost of flashings, basic guttering was also damaged, thus the delivering of rain water to water tanks (majority of the buildings have water tanks of varying sizes from 2000 litres to 10,000 litres) as a substitute for drinking water will be a major concern.

Some of the damages incur on buildings were caused by detached and flying building material debris from other damage buildings. The majority of homes with out-building such as make shift cooking/storage sheds were all destroyed.

There has been witness by home owners seeing their roof structure partially being uplifted/heaving motions during the intense period of the cyclone. Therefore there is also a need during the recovery phase of the rehabilitation of buildings to inspect all buildings for structural soundness.
Not only older constructions incurred damages but some newer home also received damage more particularly at the roofing. There is concern that the building standards has not improve greatly, even with the appointment in 2008 of a building inspector on the island.

Initial Assessment Results

In regards to the replacement cost to rehabilitate the damages as a result of Cyclone Pat, a tentative cost estimate is NZ$12.0 million. This includes basic electrical rewiring of the buildings with an estimated cost of NZ$2.9 millions, as a result of damages to roof structures.

Table 1

AITUTAKI INITIAL BUILDING ASSESSMENT - BUILDING DAMAGES

A. BUILDING ASESSMENT

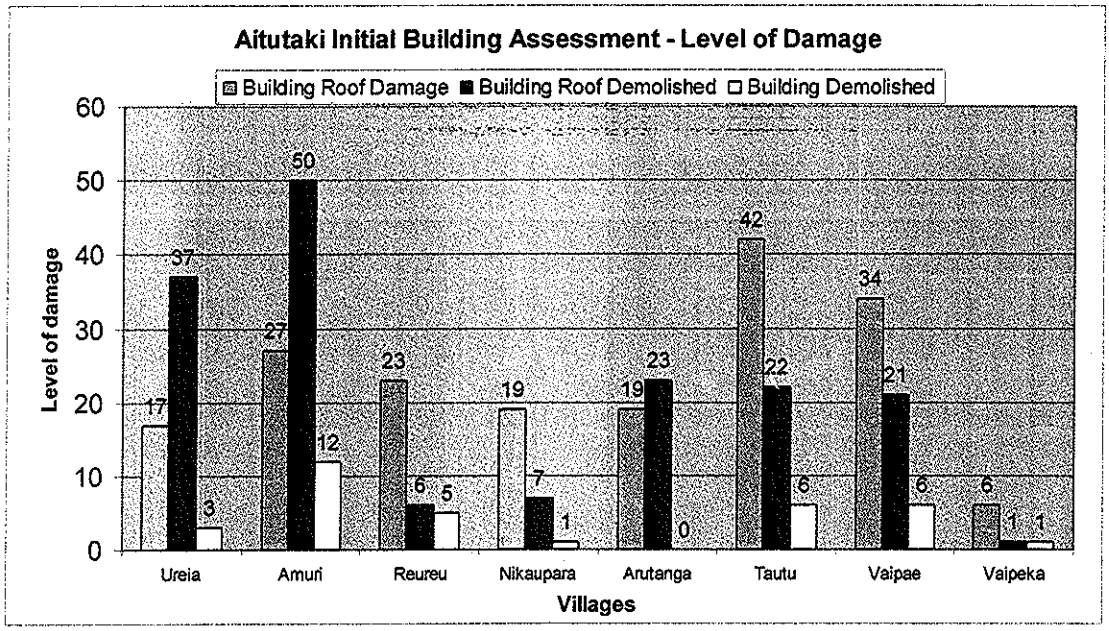
Villages	No. of Buildings (Survey Data 2007)	Building Roof Damage	Building Roof Demolished	Building Demolished	Affected Building No.	Percentage Damaged	Total Replacement Cost
Ureia	86	17	37	3	57	66%	$ 1,814,760.00
Amuri	224	27	50	12	89	40%	$ 2,148,010.00
Reureu	71	23	6	5	34	48%	$ 370,460.00
Nikaupara	34	19	7	1	27	79%	$ 268,310.00
Arutanga	123	19	23	0	42	34%	$ 1,744,388.00
Tautu	81	42	22	6	70	86%	$ 1,101,200.00
Vaipae	129	34	21	6	61	47%	$ 1,206,700.00
Vaipeka	14	6	1	1	8	57%	$ 157,800.00
subtotal	762	187	167	34	388	57%	$ 8,811,628.00

B. ELECTRICAL COSTS - rewiring of buildings

Subtotal	$ 2,910,000.00
TOTAL REPLACEMENT COST	$ 11,721,628.00
Say	$ 12,000,000.00

The above Table 1 illustrates from the assessments of the extensive damage showing a very high percentage in average of 57% of the populated buildings on the island of Aitutaki. The 388 damaged buildings received at varying degree from minor building roof damage to the entire building being destroyed or demolished. This figure is very disturbing, taking in consideration that in 2005 cyclone that hit Rarotonga, only 5% of roof damages was afflicted, after 4 cyclones.

The worse cyclone impacted areas was the villages of Nikaupara and Tautu, with 79% and 86% respectively of buildings severely damaged. Tautu and Vaipae villages had 6 of each buildings being totally destroyed. In the village of Amuri, although 40% of the all buildings in the area were damaged, a considerable large amount of 12 buildings was totally destroyed. The overall total destroyed buildings as a result of the cyclone was 34 buildings.



Tabulated Graph 1.

The tabulation Graph 1 above illustrates further the level of damages of buildings in each of the villages.

From the assessments it was clear indication that the majority of building failures was the roof structure. The failures seem to occur at the purlin and rafter connection, whereby the roofing sheeting's were still attached to the purlin. Common indication also was that the purlin is usually fixed to the rafter by a single nail driven vertically through the rafter. A two nail-skewed driven on an angle would have been adequate.

The majority of older constructed building failures were occurring at the rafter to top plate connection. The fixings were typically two or one nail skewed driven to the side of the rafter into the top plate. The cyclone-ties or No.8 wires used in the older days did not exist.

There were concerns, that the high risk of faulty electrical wiring may induce short circuits/shocks due to water (and saline) ingress especially through the socket and light

points caused by the brunt of severe wind force driving through and around the exposed damaged sections of the buildings.

The electrical elements and wiring of all buildings whether damaged or undamaged prior to the power being restated should be checked thoroughly to avoid risks of short circuits or causing fire hazard to the building.

Refer to APPENDIX B for further detail of the assessment results.

Table 2

Aitutaki Intial Building Damage Assessments - Building Types

Building Type	Urela	Amuri	Reureu	Nikaupara	Arutanga	Tautu	Vaipae	Vaipeka	Total	Cost damages ($)	%
Government (G)	2	4	2	0	1	0	4	0	13	$ 387,360.00	4%
Domestic (D)	41	63	29	26	36	68	51	8	322	$ 6,459,688.00	73%
Commercial (Cm)	6	8	1	1	0	0	1	0	17	$ 370,650.00	4%
	0	12	0	0	0	0	0	0	12	$ 127,880.00	1%
Community (C)	3	2	2	0	5	2	5	0	19	$ 1,003,100.00	11%
Institution (In)	5	0	0	0	0	0	0	0	5	$ 462,950.00	5%
subtotal	57	89	34	27	42	70	61	8	388	$ 8,811,628.00	100%

Table 2 indicates that the majority of cyclone building damages were the domestic buildings with 73% damaged compared to all buildings surveyed. The cost estimate to replace or rehabilitate their homes would be around $4.5 millions. For the community building such as Churches, community halls etc. would require at least $1.0 million as a replacement cost to rehabilitate these buildings.

The least of the rehabilitation cost was unexpectedly come from the tourism sector with the cost damages of $128, 000.00. These facilities seem to be operating with minimum disruptions observed during the assessment.

Priority needs and requirements

The initial assessed buildings have been priorities according to severity scale of the damages imposed on such buildings as follows:

Priority 1: All building that have totally being demolished and unlivable
(Yellow colour highlighted
Priority 2: All buildings that have 50% to 100% roof and wall structure destroyed.
(Green colour Highlighted -) but repairable
Priority 3: All buildings that have 25% to 50% roofing damage but livable
(Light blue colour highlighted)
Priority 4: All buildings that have minor damages – less that 25% roof damage, and easily repaired

Table 3.

Priority Criteria Assessment

Priority Criteria assessmet		Ureia	Amuri	Reureu	Nikapara	Arutanga	Tautu	Vaipae	Vaipeka	Total
Priority 1.	All building that have totally	3	12	5	1	1	7	6	1	36
	being demolished and unlivable									
	(yellow colour highlighted .)									
Priority 2.	All buildings that have 50% to 100% roof a	35	44	6	7	21	23	23	5	164
	nd wall structure destroyed but can be reapaired									
	(Green colour Highlighted -)									
Priority 3.	All buildings that have 25% to 50% roofing damage	7	8	5	10	10	7	4		51
	but livable									
	(Light colour Highlighted -)									
Priority 4.	All buildings that have minor damages - less	12	25	18	9	10	33	28	2	137
	than 25% roof damages and easily repaired									
	(White colour Highlighted -)									
	total	57	89	34	27	42	70	61	8	388

The above Table 3 illustrates the priorities needs and requirement to reinstate the damage buildings. The detailed prioritised tabulation can be referred to the attachment in the **Appendix A.**

The priority 1 has indicated a 33 to 34 building totally demolished and would require urgent assistance in regards to the provision of sheltered tents so the families can be relocated back onto their properties to start cleaning.

The priority 2 has indicated by the criteria assessment above, an approximately 160 households would require assistance from sheltered tents to several tarpaulins to protect house hold goods and provide shelters for the occupants.

The Priority 3 will require mostly tarpaulins to cover the roofs.

The priority 4 will require owners to temporary repair the damaged roofs until assistance do arrive.

Preliminary Recommendations

For the rebuilding or upgrade of all damage buildings, the fixings from the roofing sheeting/purlin/rafter/wall/foundations, and not just from roofing sheets to purlin or purlin to rafter, needs to be addressed.

Inspection of structural element to all buildings especially in the tie down systems will need to be checked that they are structurally sound and will continue to perform in future cyclone.

There may be a need to review the design wind speed forces, of the Cook Islands Building Code with the likelihood of newer buildings to be designed to higher wind speeds as experienced by Cyclone Pat.

The electrical elements and wiring of all buildings whether damaged or undamaged prior to the power being restated should be checked thoroughly to avoid risks of short circuits due to water (and saline) ingress especially through the socket and light points.

The damaged roofing sheets should be collected or dismantled from purlin timbers and stored securely away or be collected and delivered to the landfill site for safe keeping.

A scrap metal crusher is available on Rarotonga, and should be made available to be freighted to Aitutaki ASAP on the next available shipping.

The burning of organic waste in their green state should be strongly discouraged due to excessive smoke which is hazardous to the health and the environment. The green waste should be either be buried on residential own properties or stored away on available land site to naturally breakdown and rot away as compost.

The burning of debris and rubbish waste should also be discourage as the whole island is currently experiencing the drying of vegetations and scrubs which may ignite a fire hazard on the island.

Acknowledgements

In concluding the initial assessment report we acknowledge the support and assistance of the Island Mayor, Island Administration Office, Island Councils and a special appreciation to the people of Aitutaki who have generously assisted with the information required.

Meitaki maata

APPENDICES:

Ureia Village Cyclone Damage Assessment

(Ureia Area)		Building Description			Damage Assessment	%	Rate ($/m^2)	Estimated Cost	Class	Priority
No	Name	Wall Type	Roof Type	Floor Area (m^2)						
1	Ureia Hall	Concrete	Gable	210	Building roof damaged	40%	200	$16,800.00	C	
2	Maina Traders	Timber	Gable	90	Building roof demolished	100%	400	$36,000.00	Cm	2
3	Catholic Hall	Concrete	Hip	150	Building roof damaged	40%	200	$12,000.00	C	
4	Drollet Hosea	Concrete	Gable	125	Building roof damaged	50%	200	$12,500.00	D	
5	Arama Tera	Concrete	Gable	105	Building roof damaged	45%	200	$9,450.00	D	
6	Rino George (Accomodation)	Timber	Gable	115	Building roof demolished	100%	400	$46,000.00	Cm	2
7	Rino George (Rentals)	Timber	Lean-to	65	Building roof damaged	35%	200	$4,550.00	Cm	
8	Rino George Residence	Concrete	Gable	120	Building roof damaged	35%	200	$8,400.00	D	
9	Ureia Community Water Tank shed	Concrete	Gable	120	Building roof demolished	100%	400	$48,000.00	C	2
10	Teremoana Nooroa	Limestone	Gable	156	Building roof demolished	90%	400	$56,160.00	D	2
11	Josie Sadaraka	Timber	Gable	189	Building roof demolished	100%	400	$75,600.00	D	2
12	Daniel Ioane	Timber	Gable	223	Building roof demolished	50%	400	$44,600.00	D	2
13	Teina George	Concrete	Gable	118	Building roof demolished	30%	400	$14,160.00	D	
14	Tanoi Noaro	Concrete	Gable	100	Building roof demolished	30%	400	$12,000.00	D	
15	Tara Ngataua	Timber	Lean-to	68	Building roof demolished	25%	400	$6,800.00	D	
16	Ashin Ashin	Timber	Lean-to	126	Building roof demolished	85%	400	$42,840.00	D	2
17	Junior Manuela	Timber	Lean-to	105	Building roof demolished	100%	400	$42,000.00	D	2
18	Takake Ngatuakana	Timber	Gable	112	Building roof demolished	75%	400	$33,600.00	D	2
19	Aioto Oariki	Timber	Lean-to	20	Building roof demolished	100%	400	$8,000.00	D	2
20	Airangi Paora	Timber	Lean-to	96	Building wall/ roof damaged	85%	200	$16,320.00	D	
21	Enua Manavakai	Limestone	Gable	112	Building roof damaged	65%	200	$14,560.00	D	
22	Tinanga Bishop	Timber	Lean-to	94	Building roof demolished	100%	400	$37,600.00	D	2
23	Papa Rua	Concrete	Lean-to	70	Building roof damaged	50%	200	$7,000.00	D	
24	AOG Church	Concrete	Gable	220	Building roof damaged	50%	200	$22,000.00	C	
25	Tumutoa Nichols	Timber	Gable	40	Building demolished	100%	800	$32,000.00	D	1
26	Anna Nichols	Limestone	Gable	86	Building roof damaged	15%	200	$2,580.00	D	
27	Clinic Child Welfare	Timber	Lean-to	65	Building demolished	100%	800	$52,000.00	C	1
28	Maina Traders Shed	Timber	Lean-to	70	Building roof demolished	70%	400	$19,600.00	Cm	
29	Bob Maoate	Concrete	Gable	165	Building roof damaged	10%	200	$3,300.00	D	
30	Ngatuakana Ngatuakana	Timber	Gable	96	Building roof demolished	100%	400	$38,400.00	D	2
31	Poa Tunui Tereau	Timber	Lean-to	84	Building walls/ roof demolished	75%	400	$25,200.00	D	2
32	Katapu Natua	Timber	Lean-to	82	Building roof demolished	50%	400	$16,400.00	D	2
33	Bani Ngapoe	Timber	Lean-to	112	Building demolished	100%	800	$89,600.00	D	1
34	Kaitai Tutai	Timber	Lean-to	56	Building roof demolished	50%	400	$11,200.00	D	2
35	Allan Tikaka Henry	Timber	Lean-to	86	Building roof demolished	85%	400	$29,240.00	D	2
36	Simona Naku	Concrete	Gable	106	Building roof demolished	100%	400	$42,400.00	D	2
37	Ngataua Puapii	Concrete	Gable	100	Building roof demolished	15%	400	$6,000.00	D	

38	George Titi	Timber	Lean-to	65	Building roof demolished	100%	400	$26,000.00	D	2
39	Fred Charlie	Timber	Lean-to	70	Building roof demolished	100%	400	$28,000.00	D	2
40	SDA School	Timber	Conc/ Timber	850	Building walls/ roof demolished	100%	400	$340,000.00	In	2
41	Tukua Upokomanu	Concrete	Gable	125	Building roof demolished	100%	400	$50,000.00	D	2
42	Tua Doherty	Concrete	Gable	115	Building roof damaged	15%	200	$3,450.00	D	
43	Steve Doherty	Timber	Hip	126	Building roof damaged	15%	200	$3,780.00	D	
44	Matakeu Teteva	Concrete	Gable	86	Building roof damaged	10%	200	$1,720.00	D	
45	Araura College	Timber	Gable	275	Building roof damaged	50%	200	$27,500.00	In	
46	Araura Primary School	Timber	Gable	415	Building roof damaged	35%	200	$29,050.00	In	2
47	Araura College (Cont'd)	Timber	Gable	200	Building walls/ roof damaged	35%	400	$28,000.00	In	2
48	Araura College (Cont'd)	Timber	Gable	320	Building roof demolished	30%	400	$38,400.00	In	2
49	Tere Raea	Concrete	Gable	135	Building roof demolished	100%	400	$54,000.00	D	2
50	Arona Tinirau	Timber	Gable	104	Building roof demolished	40%	400	$16,640.00	D	
51	Jesse Jesse	Timber	Gable	146	Building walls/ roof demolished	40%	400	$23,360.00	D	2
52	Bolton Paiti	Timber	Gable	96	Building roof demolished	50%	400	$19,200.00	D	2
53	Maea Maea	Conc/Timber	Gable	120	Building roof demolished	100%	400	$48,000.00	D	2
54	Solomona Solomona	Concrete	Gable	136	Building roof demolished	50%	400	$27,200.00	D	2
55	Foursquare Shop	Timber	Gable	115	Building roof demolished	100%	400	$46,000.00	Cm	2
56	Tourism Office	Timber	Lean-to	15	Building roof demolished	100%	400	$6,000.00	G	2
57	Maina Traders Warehouse	Timber	Gable	225	Building roof demolished	4%	400	$3,600.00	Cm	

Replacement Cost Estimate	$1,814,760.00

Building Damage	Damage Description	Rate ($)
Building Roof Damage	roofing iron damage but purlin/rafter/ceiling mostly	200
Building Roof Demolished	roofing iron/purlin/rafter/ceiling/wiring demolished	400
Building Demolished	total wall/roofing iron/purlin/rafter/ceiling/wiring de	800

Table Key	
D	Domestic Building
G	Government Building
Cm	Commercial Building
T	Tourism Accomodation
C	Community Building
In	Institution Building

Villages	Total Buildings No.	Building Roof	Building Roo	Building demolish	Affected Building No.
Ureia	86	17	37	3	57

Building Type	Ureia	
Government (G)	2	$54,000.00
Domestic (D)	41	$1,039,260.00
Commercial (Cm)	6	$155,750.00
	0	
Community (C)	3	$102,800.00
Institution (In)	5	$462,950.00
	57	$1,814,760.00

Prioritised Rehabilitation/upgrade			Ureia
Priority 1.	All building that have totally being demolished and unlivable		3
	(yellow colour highlighted – 33 buildings.)		
Priority 2.	All buildings that have 50% to 100% roof and wall structure destroyed.		35
	(Green colour Highlighted -)		
Priority 3.	All buildings that have 25% to 50% roofing damage		7
	(Light colour Highlighted -)		
Priority 4.	All buildings that have minor damages - less than 25% roof damages		12
	(White colour Highlighted -)		
	subtotal		57