



VANUATU

WATER SAFETY PLAN FOR MELE RURAL AREA



**MELE RURAL WATER SUPPLY
PORT VILA VANUATU**

Water Safety Plan Programme
A Project Funded by AusAID -2006-2007

SOPAC



NOTE

This report is one in a five series produced for the Vanuatu Water Safety Plan programme funded by AusAID and implemented by Pacific Applied Geoscience Commission (SOPAC) and World Health Organisation (WHO). For ease of reference and retrieval this report is available digitally in the SOPAC publications library system as **SOPAC Technical Report No.....**

SOPAC wish to acknowledge the kind cooperation of Geology Mines and Water Resources, Ministry of Health. Live and learn Environmental Education Vanuatu and the Water Safety Plans Steering Committee, Vanuatu to make this project a success.

List of Other Reports:

Water Supply System Description – Port Vila and Santo
Water Safety Plan –Mele Rural Supply, Port Vila
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Water Safety Plan for Mele Rural Area

I. Introduction:

Access to safe drinking water is a basic need and is one of the most important contributors to public health and to the economic health of communities. Pacific island countries have yet to overcome the challenge of providing a safe and adequate supply of drinking water to its populations. Infectious, waterborne diseases, such as Typhoid and Cholera and newly emerging pathogens are a major cause of morbidity and mortality within the Pacific region.

The World Health Organization (WHO) report that about 2 million people in the world die each year due to diarrhoeal diseases, most of them are children less than 5 years of age. The worst affected are the populations in developing countries. Lack of access to safe drinking water is one of the main contributors to this situation.

Traditional approaches that rely on sampling and testing water have failed to achieve extensive improvement in access to safe drinking water. Pacific island countries are committed to achieving targets specified in the Millennium Development Goals (2000), including halving the proportion of people without access to safe drinking water by 2015. A new strategy is now being promoted globally that is based on risk management principles – drinking water safety planning.

1.1. Tasks

The five day mission to Vanuatu from 29 October- 2 November 2007 was convened to review the Water Safety Plan and Improvement Schedules compiled by the Mele Water Safety Plan Steering Committee and Department of Geology Mines and Water Resources ,Port Vila.

The team reviewed the water safety plan, carried out field assessment and water analysis. The Rural Water Supply manager Mr. Erickson Sammy and engineer were

consulted and reference was made to the existing reports. At the end of the week draft reports were presented and discussed with Mele Water Safety Plan Steering Committee.

1.2 Administrative Support

Administrative support was given by Department of Geology Mines and Water Resources and the Ministry Of Health, for the availability of transport and office space. A good commitment was shown by both the Ministries and Live and Learn Environmental Education (LLEE) was also involved for the public awareness programs,

1.3 Key Personnel

Davendra Nath, Water Safety Plan Project Officer, (SOPAC)
Denise Tulley, Drinking Water Assessors, Ministry of Health, New Zealand
Christopher Edmonds, Drinking Water Assessor, Ministry Of Health, NZ
Erickson Sammy. Manager, Rural Water Supply, (DGMWR) Port Vila

2. Project Objectives: What is a Water Safety Plan?

The main objective of the Water Safety Plan Programme in the Pacific is to produce Water Safety Plans for urban and rural drinking water supply systems involving all in-country stakeholders.

A Water Safety Plan (WSP) is a comprehensive risk assessment and management tool that encompasses all stages in the drinking water supply from catchment to consumers. It draws on principles and concepts from other risk management approaches including Hazard Analysis Critical Control Point (HACCP) and the 'multi-barrier approach'.

The Improvement Schedules are part of the Water Safety Plans and are compiled after the risk assessment of the water supply system has been completed.

The key objectives of a Water Safety Plan are to:

- Prevent the contamination of source waters;
- Treat water to reduce or remove contaminants; and
- Prevent re-contamination during storage, distribution and handling

3. Mele Water Supply Description

Mele rural water supply system flow diagram and locality plan can be seen below. Since the water is from shallow well there is no filtration system in place and thus chlorination is the necessary process to eliminate pathogens from water prior to consumption.

Mele is one of the largest settlements in Vanuatu located close to Port Vila. The Department of Geology, Mines and Water resource has jurisdiction over this water supply and the Rural Water Committee of Mele maintains the supply. Since there is no water levy it is difficult to maintain the system. There are no plans for the improvement to the system by the Government. To supplement their water supply the households keep rainwater tanks for drinking purpose.

Most of the population in rural areas depends on the other sources of water supply such as river, creek or springs. The source is mainly contaminated due to human and animal activities. The water is collected by blocking the river or creek with a small concrete dam where water is collected and piped to storage tanks and then to the distribution pipes without treatment. The Mele rural water supply system was studied as a pilot project since there are about 5000 people who depend on this supply and continued operation was considered to be critical.

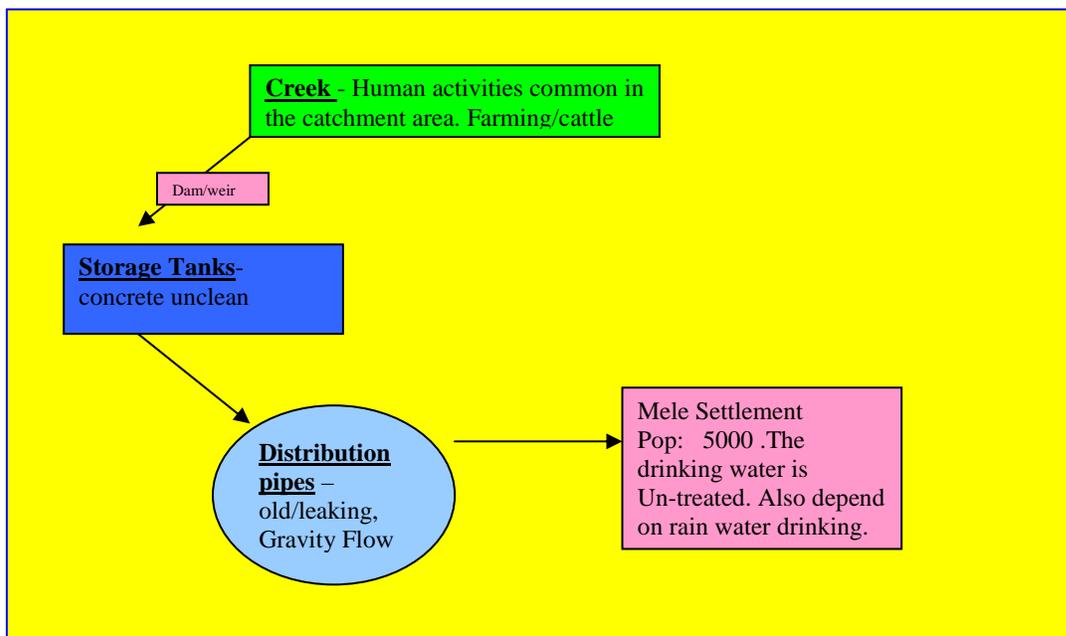


Figure: 3 Mele Rural Water Supply System (Illustration Davendra Nath, SOPAC)

MELE SETTLEMENT – RURAL WATER SUPPLY:

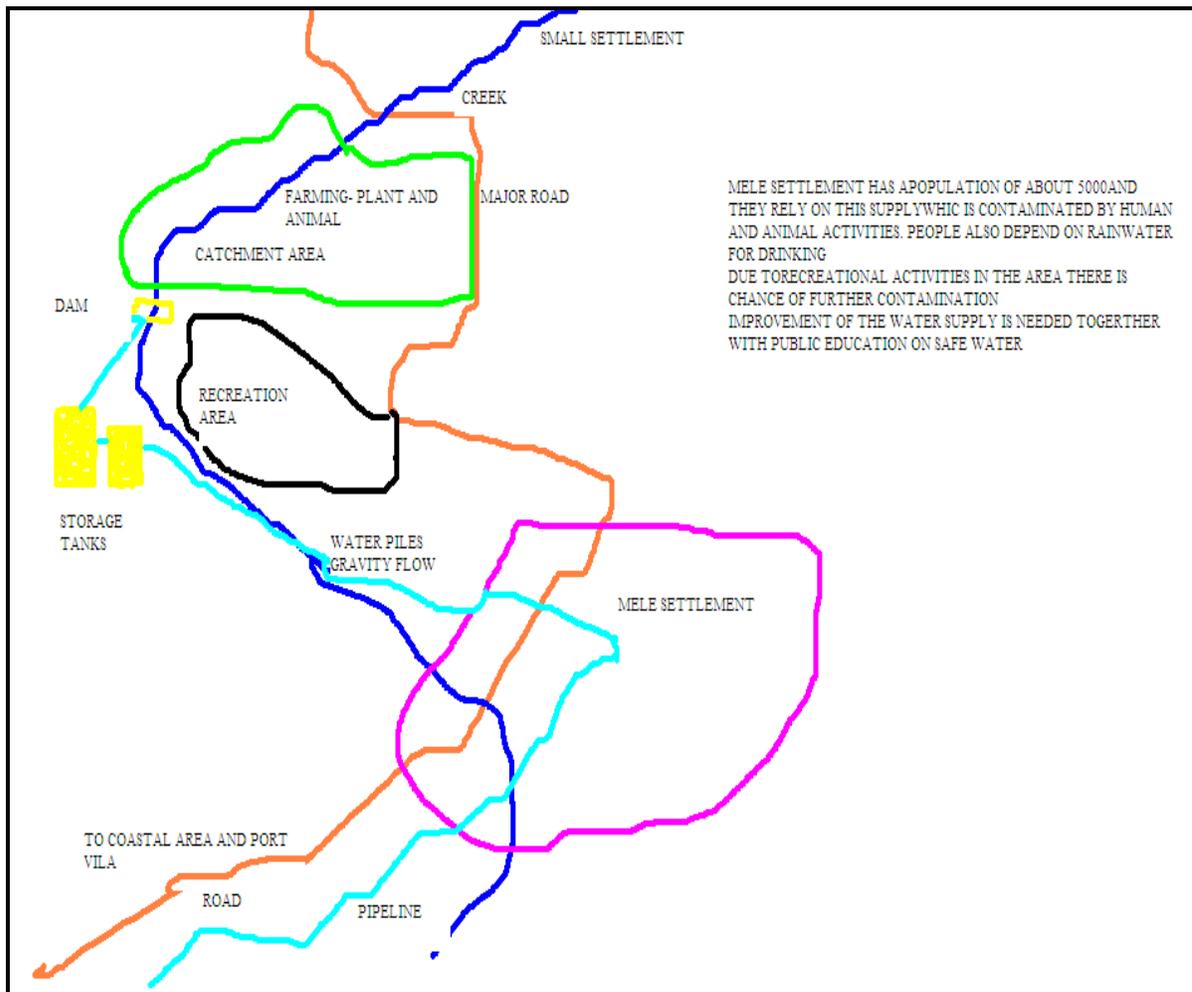


Figure: 4 Locality Plan of Mele Water Supply System (Davendra Nath, SOPAC)

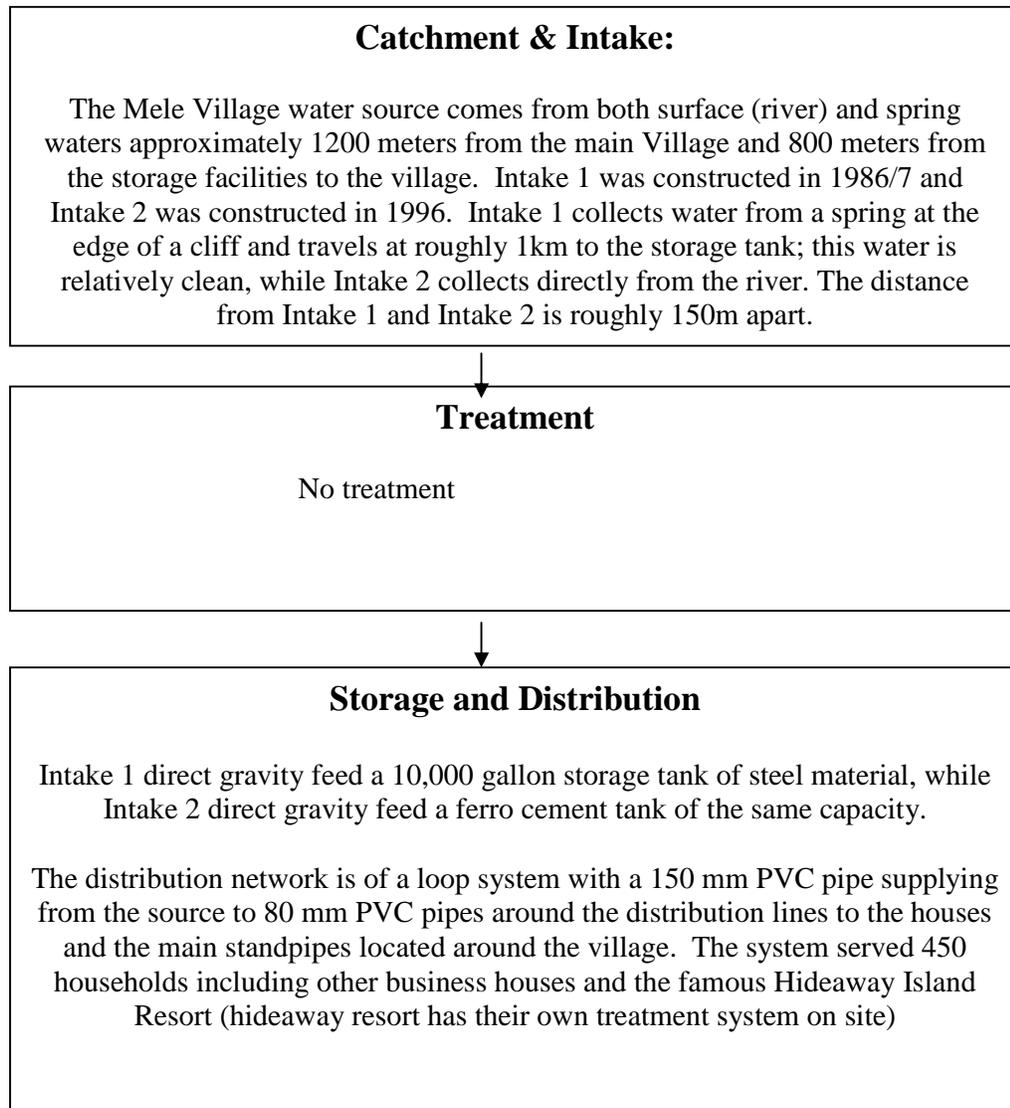
There is no treatment of the water prior to distribution except in disease out break and emergencies. The two holding tanks serve as storage and the location of the tank uphill makes it difficult to clean. The water can not be collected from the lower end of the creek as mechanical pumps will be required and secondly there are recreational activities in the area. The tanks are old and there is water loss which becomes a problem during dry spell. The storage tanks are highly vulnerable to natural disasters such as earthquakes which are common in Vanuatu.

The distribution of water is through old cast iron pipes and any new extension is in PVC pipe. There is a lot of pipe breakages and loss of water as the Water Committee are unable to maintain it due to financial constraints. Land use and ownership issues obstruct the maintenance work on the distribution lines as most of the pipelines pass through the private properties.

WATER SAFETY PLAN

Supply Name: Mele Village Water Supply

Step 1: Flow Chart



Catchments and Intake

List what could happen that may cause drinking water to become unsafe (Deterioration in water quality)	Is this under control?	If not, judge whether this needs urgent attention. Urgent attention is needed for something that happens a lot and/or could cause significant illness,
1. Contamination of Intake 2 source by grazing animals. Intensive livestock farming upstream from the intake and within the catchment area. Cattle directly have access to the river, no fencing or buffer zone provided along the river. Other small husbandry activities upstream from the source	NO	Yes, poses a real water quality risk and may cause serious health problems. Yes, poses a high chance of erosion along the river banks.
2. Contamination of Intake 2 source by settlers upstream from the intake and within the catchment area. Possible contamination from such activities: <ul style="list-style-type: none"> • Domestic activities ; washing of clothes and kitchen pots and pans and swimming in the river. • Small scale subsistence farming (gardening, irrigation to taro patches etc), felling and burning of trees. • Pit Latrines • Illegal Dumping of solid wastes along the river banks and directly into the river. • Proposed subdivision upstream, before the Bridge. 	NO	Yes, poses serious health risks. Yes, poses real water quality risks and may need a lot of awareness and encourage participatory approach to the settlers within the catchment area.
3. Contamination of Intake 2 source from surface run-off from a low lying bridge and from dust and particles caused by heavy use of the public road upstream from the source intake. A commercial agriculture farming upstream uses herbicides and pesticides may also contribute to the run-off during heavy rainfall.	NO	Yes, poses real water quality and health risks.
4. Contamination of Intake 2 source	NO	Yes, deteriorate water quality

during cyclones and heavy rainfall affecting causing soil erosion & sedimentation in the source and to an extend entering the storage facilities.		and poses health risks.
5. Possibility of water shortages during prolonged drought periods	NO	Yes, may cause serious water quality and quantity, available demand serving the high and growing population
6. No Treatment at the Intake nor at the Storage Facilities	NO	Yes, poses real water quality and health risks.

List what could happen that may cause drinking water to become unsafe (Deterioration in water quality)	Is this under control?	If not, judge whether this needs urgent attention. Urgent attention is needed for something that happens a lot and/or could cause significant illness,
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Storage and Distribution

1. Contamination of reservoir from sediment build-up (especially during heavy rainfall)	No- No regular cleaning of both storage tanks.	Yes, need a maintenance Schedule for regular cleaning.
2. No fencing around the storage facilities may cause possible contamination and damage of facilities from vandals	No	Yes, poses possible threat to the water quality.
3. Breaks, leaks or damages to pipes along the distribution lines and taps allowing contamination to enter the water.	Yes/No. There was a leakage detection programme a few years ago by SOPAC and RWS, but no report was produces on the findings.	Yes. Need urgent detection programme for the whole system.
4. Extensions and tapping into the system without consultation of the design and without proper supervision from the village plumber may cause contamination to enter the distribution network and also contributing to low pressure resulting in some houses being deprived of water.	No. There is a village water committee and a village plumber but unsure of their current status.	Yes. Poses risk to water quality.
5. Water and contaminants entering water during repairs to the distribution system.	No. Potential contamination during or after repairs of pipeline	Yes, poses water quality risk.
6. No treatment at the storage facilities	No	Yes, poses real water quality and health risks. Need to install and have standard

		operating procedures for the system.
List what could happen that may cause drinking water to become unsafe (Deterioration in water quality)	Is this under control?	If not, judge whether this needs urgent attention. Urgent attention is needed for something that happens a lot and/or could cause significant illness,

User's System and Others

1. Leakage inside buildings allowing contamination to enter the distribution network	No.	Yes, ongoing problem poses great potential risk of water quality.
2. Leakage in underground pipelines in between houses and properties allowing contamination to enter the distribution network.	No.	Yes.
3. Tapping by end users without knowledge and proper supervision of the village plumber.	No	Yes, ongoing problem posing risks to the water quality.
4. Inadequate monitoring of water quality by DGMWR staff and insufficient water quality data.	No, lack of consumables in the DGMWR laboratory resulted in no regular monitoring of the water quality.	Yes, ongoing monitoring utilising the communities to participate in the monitoring programme.
5. Insufficient information on the overall water consumptions and hence no information on the water demand for the village.	No.	Yes, need a new intervention to current ways or systems of operating semi-large water supply systems (metered system)
6. Inadequate Management skills from the Village Water Committee.	No.	Yes, to improve their management skills at all levels, finance, communication, maintenance and planning.

Catchments and Intake

<p>Copy the 'Needs Urgent Attention' from the worksheets. Expect no more than 3 – 5 in each worksheet.</p>	<p>IMPROVEMENT SCHEDULE: How can you remove or reduce or remedy the cause and by when? Indicate clearly where additional resources are required</p>	<p>Until remedied, how will you know when this is actually causing deterioration towards unsafe drinking water</p>	<p>What contingency management plan is in place until the cause is removed or reduced or remedied? Who needs to know and how quickly? Who can help?</p>
<p>1. Contamination of Intake source by grazing animals. Intensive Livestock Farming upstream from the intake and within the catchment area. Cattle directly have access to the river, no fencing or buffer zone establish along the river. Other small husbandry activities upstream from the source.</p>	<ol style="list-style-type: none"> 1. Establish and implement an ongoing water quality monitoring and analysis of source water to identify physical parameters and levels of microbial combination. 2. Fencing off livestock's access into the water way with proper consultations with cattle farmers. 3. Train Water Committee to implement water quality and share results with the DGMWR (Community based monitoring) 4. Consultation and awareness with land owners and/or Lease Holders and with the nearby communities 	<p>No documented Watershed Management Plans.</p> <p>No effective implementation of the Management Plan and therefore continuous human activities around and within the catchment and intake site.</p> <p>Uncontrolled Livestock farming within the watershed area will possible risks to water source contamination</p> <p>Public having no knowledge on the importance of protecting water sources may lead to continuous human activities that will have it's</p>	<p>The DGMWR and the NWAC with the help of the Village to establish a Watershed Management Plan.</p> <p>DGMWR to train the Village Water Committee on simple water testing kits (i.e. H2S) and establish a monitoring programme for water quality testing. Establish a communication strategy for the reporting and management of the data collected.</p> <p>DGMWR and NWAC to carry out public awareness within the catchment with the help of Live and Learn Environment,</p>

	<p>5. Promote alternative land use within the catchment area that can provide for subsistence needs</p> <p>6. Develop and implement policies and guidelines for the restriction of certain activities (i.e. Lessen the # of cattle in and around the intake area) and liaise with farmers and stakeholders on the restrictions.</p>	<p>consequences on the quality of the water source.</p> <p>High incidence of illness in those using water directly from the source.</p> <p>No awareness to cattle farmers on effect of intensive cattle farming on water source and encouraging alternative land use.</p> <p>No effective implementation and enforcement of established guidelines and policies.</p>	<p>stressing the importance of protecting the water source.</p> <p>DGMWR and Village Water Committee to seek funding for the erection of signage and notices at the intake site, storage facilities and around the catchment and produce awareness materials.</p> <p>DGMWR and NWAC to collaborate with the Department of Agriculture to establish guidelines and policies for farming practices and promote alternative land use. (Sustainable land management practices).</p>
<p>2. Contamination of Intake from surface activities by settlers upstream from the Intake and within the catchment area.</p> <p>Possible contamination from such activities:</p> <ul style="list-style-type: none"> • Domestic activities ;swimming, washing 	<p>1. Development and Implementation of a Watershed Management Plan, with key outputs such as:</p> <p>a. Developing Buffer Zones along the river with proper consultations with lease holders and land owners</p>	<p>Increase number of people residing within the catchment and increase domestic activities, clearing of bushes and felling of trees, more gardening.</p> <p>Increase number of Pit latrines</p>	<p>DGMWR and the Village Water Committee to put up public notices at the facilities</p> <p>DGMWR and Village Water Committee acquire funds to upgrade fencing and erect notice at the intake site.</p>

<p>of clothes and kitchen pots and utensils</p> <ul style="list-style-type: none"> • Small scale subsistence farming (gardening irrigation to taro patches etc), felling and burning of trees • Pit Latrines • Illegal Dumping of solid wasters along the river banks and directly into the river • Proposed subdivision upstream, before the bridge 	<ul style="list-style-type: none"> b. Tree/grass Planning along the buffer zones within the catchment c. Develop proper sanitation and waster management practices within the catchment d. Implement assessment on pit latrines and sanitary practices e. Assist to seek funds for the construction of proper sanitary systems. <p>Communities to actively contribute to the sustainability of the catchments ensuring the water quality do not deteriorate further.</p> <p>2. Liaise with Mele Chiefs and families an the Department of Lands on the Proposed Subdivision (Before Bridge)</p> <p>3. Promote alternative land use within the catchments area that can provide for subsistence needs</p>	<p>and improper solid waste disposal.</p> <p>Increased number of Coliforms, hence high incidence of illness in those using water directly from the source.</p> <p>No awareness to farmers on effect of intensive farming on water source and encouraging alternative land use.</p> <p>No effective implementation and enforcement of established guidelines and</p>	<p>DGMRW and NWAC to collaborate with Department of forestry in establishing and implementing a replanting programme within the catchment.</p> <p>Department to liaise with Live and Learn Environment on best method of communicating awareness programmes to the community.</p>
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	<p>4. Develop and implement policies and guidelines for the restriction of certain activities (i.e. Lessen the # of cattle in and around the intake area) and liaise with farmers and stakeholders on the restrictions.</p>	<p>policies.</p> <p>No Public awareness notice to stress the importance of keeping the catchments area free from possible contaminants.</p>	
<p>3. Contamination of Intake 2 source from surface run-offs from a low lying bridge and from dusts and particles caused by heavy use of the public road. A commercial agriculture farming uphill uses pesticides may also contribute to the run-offs during heavy rainfall.</p>	<p>1. With the proposed Tar Seal (Millennium Challenge Fund Project), the National Water Advisory Committee to seek and advice on the design and construct drainage so as not to further deteriorate the water quality.</p> <p>2. Relocate existing water supply intake (Intake 2) to before bridge. Need thorough feasibility study on possible sites</p> <p>3. Develop and implement policies and guidelines for the restriction of certain activities and liaise with farmers and</p>	<p>Tar sealing with enhance the access of storm water directly into the river if no proper drainage is build for diversion.</p> <p>Without the knowledge of the nearby communities, people will continue to create activities that will pose risks to the quality of water</p> <p>No effective implementation and enforcement of established guidelines and policies.</p>	<p>NWAC to liaise with PWD to acquire appropriate design plans and seek funding to implement design.</p> <p>NWAC to request Rural Water Supply section to carry out a feasibility study for a potential Intake (relocation) site before the bridge and survey on new proposed drilling site and provide report to the NWAC for consideration.</p> <p>DGMWR and Village Water Committee acquire funds to</p>

	<p>stakeholders on the restrictions. Provide advice to farmer on alternative farming practices and the control of the amount of chemicals used</p> <p>4. Signage and Public awareness stressing the importance of keeping the catchment free of all possible contaminants (protection) and management of the water source.</p>	<p>No Public awareness notice to stress the importance of keeping the catchments area free from possible contaminants</p>	<p>upgrade fencing and erect notice at the intake site.</p>
<p>4. Contamination of Intake 2 source during cyclones and heavy rainfall causing soil erosion & sedimentation in the source and to an extend sediment build up in the storage facilities.</p>	<p>1. Develop and implement best land use practices to mitigate effects of soil erosion and sedimentation.</p> <p>2. Install Screen at the intake to prevent large size particles entering the storage facilities.</p> <p>3. Develop and implement farming/gardening guidelines with farmers and landowners.</p> <p>4. Create a Buffer Zone and</p>	<p>Evidence of large amounts of soil erosion in the water e.g. increased visual turbidity.</p> <p>Water is murky after rain, and looks, smells, or tastes abnormal.</p>	<p>Maintenance schedule for the regular cleaning of the storage facilities.</p>

	<p>implement Tree/grass planting programme along the river with proper consultation with landowners/leaseholders.</p> <p>5. Awareness to nearby communities and putting up of sign boards/notices</p>		
5. Possibility of water shortages during long drought period	<p>1. Establish an alternative water source. Identify site and install borehole with electric pump installed, this will not only serve as standby source for drought period but also for extreme events such as heavy rainfall and cyclones.</p> <p>2. Weekly water level monitoring</p>	<p>Extreme shortage of water</p> <p>Reduction in water table</p>	<p>. Village Water Committee to look for possible borehole sites. DGMWR to do a feasible survey on the proposed sites and prepare quotations.</p> <p>DGMWR and the Village Water Committee to seek funding for a borehole and electrical pump</p> <p>DGMWR to implement ongoing programme of water level monitoring and provide results to the community.</p>
6. <i>No Treatment at the Intake</i>			

<p><i>or at the Storage Facilities.</i></p>	<ol style="list-style-type: none"> 1. Install a low cost, sustainable treatment system. (i.e. Sand filter or chlorination before distribution) 2. Develop a Standard Operating Procedure for the Treatment 	<p>No water treatment and hence contamination of water to the reservoirs and to the distribution networks.</p>	<p>DGMWR and the Department of Health to make sure that there is available stock of chlorine in place at all times</p> <p>DGMWR in collaboration with Health Department and UNELCO to establish a SOP for the treatment which will include what type of system to be use, consistency and adequate stock, daily checks, Microbiological monitoring etc.</p>
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Storage and Distribution and Proposed Treatment

<p>Copy the 'Needs Urgent Attention' from the worksheets. Expect no more than 3 – 5 in each worksheet.</p>	<p>IMPROVEMENT SCHEDULE: How can you remove or reduce or remedy the cause and by when? Indicate clearly where additional resources are required</p>	<p>Until remedied, how will you know when this is actually causing deterioration towards unsafe drinking water</p>	<p>What management plan is in place until the cause is removed or reduced or remedied? Who needs to know and how quickly? Who can help?</p>
<p>1. Contamination of reservoir from sediment build-up (especially during heavy rainfall)</p>	<p>1. Periodical tank cleaning (1 - 2 years)</p> <p>Maintain and repair tanks (replace loose bolts)</p>	<p>No regular cleaning of water tanks resulting in murky, smelly water</p> <p>Continuous leakage that may cause contamination to reservoirs</p> <p>No regular cleaning of water tanks resulting in murky, smelly water</p>	<p>The Mele water committee to draw up plans for regular tank cleaning</p> <p>Maintain ongoing maintenance monitoring of reservoirs and sustain spare parts by Mele Community</p>
<p>2. No fencing around the storage facilities may cause possible contamination and damage of facilities from</p>	<p>Construction of fences around storage tanks</p>	<p>Contamination to storage tanks from public access to the storage tank area</p>	<p>Public Notices for prohibition of entry to public into storage tanks area.</p>

vandals		Vandalism and unauthorized entry into water facilities	
3. Breaks, leaks or damages to pipes along the distribution lines and taps allowing contamination to enter the water.	<ol style="list-style-type: none"> 1. Leak detection program to be undertaken (Identification of leaks) 2. Maintain and repair broken pipes 3. The water committee to undertake community awareness on pipeline positions to reduce unintentional breaking of pipes through agricultural, construction, and other human activities 4. Encourage general public to report on any damage pipe/leakage 	<p>Deterioration of water quality causing the water unsafe to drink</p> <p>Continuous unintentional breaking of pipes causing contamination to the water supply</p>	<p>Water to be boiled before drinking or using rainwater for drinking</p> <p>Water committee to identify proposed activities and to see if the proposed activity be close to the pipeline</p> <p>Encourage comities to report on any damage pipe/leakage</p>
4. Extensions and tapping into the system without consultation of the design and without proper supervision from the village plumber may cause contamination to enter the distribution network and also contributing to low pressure resulting in some houses	<ol style="list-style-type: none"> 1. Consultation should be made with the water committee for approval for any extension to the existing water supply system 2. Water committee to consult with the Water Supply Engineer 	<p>Contamination of water supply during extension of the system and after the extension if the extension is installed by an unqualified plumber</p> <p>Inadequate water supply pressure</p>	<p>The water committee freeze any extension work or stop any proposed extension to the water supply system</p> <p>Advice community on the consequences of tapping water without proper supervision from</p>

being deprived of water.	within the DGMWR to see that any extension to the system won't have any impact to the water supply pressure and so on	resulting in some houses being deprived of water	village plumber.
5. Water and Contaminants entering water during repairs to the distribution system.	<ol style="list-style-type: none"> 1. Standardised pipeline materials & design by DGMWR 2. Unintentional damage of pipeline be reported as soon as possible to the water committee 3. Encourage community members to report on any damage pipe/leakage. 	<p>Pipes may not withstand the water pressure and may cause breakage on the pipes and therefore allows contamination</p> <p>Contamination into pipelines through breaks and also during repair</p> <p>Difficult to identify damage that will lead to water contamination and wastage</p> <p>No knowledge, should there be any contamination during or after repairs of pipeline</p> <p>Ongoing leakage on systems that will cause contamination into treated water</p> <p>Breakage in pipelines that may result in contamination of water in the network</p>	<p>Community awareness be done by DGMWR on water supply standard manual</p> <p>Community awareness on reporting of damages and leakages and educational awareness on contamination of water supply through leaks and breaks that can lead to diseases and infections.</p> <p>Awareness to community on importance of water quality test after major repairs of pipeline</p>

User's System and Others

<p>Copy the 'Needs Urgent Attention' from the worksheets. Expect no more than 3 – 5 in each worksheet.</p>	<p>IMPROVEMENT SCHEDULE: How can you remove or reduce or remedy the cause and by when? Indicate clearly where additional resources are required</p>	<p>Until remedied, how will you know when this is actually causing deterioration towards unsafe drinking water</p>	<p>What contingency management plan is in place until the cause is removed or reduced or remedied? Who needs to know and how quickly? Who can help?</p>
<p>1. Leakage inside buildings allowing contamination to enter the distribution network</p> <p>2. Leakage in underground pipelines in between houses and properties allowing contamination to enter the distribution network.</p>	<p>1. Awareness for conservation of water to all public servants. Acquaint householders with the side-effects of contaminated water usage.</p> <p>2. The Village Water Committee is responsible to repair and maintain leakages within the pipelines and the public standpipes.</p> <p>3. The water committee to establish water use and leakage policies for tap inside households (buildings).</p>	<p>Presence of water-borne diseases with the households</p> <p>Continuous leakage in houses result in reduce or low flow within the households</p> <p>Continuous leakages in households and in the yards.</p>	<p>Get householders know of side-effects of contaminated water usage</p> <p>Encourage householders to prevent leakage (through awareness raising)</p> <p>The Village Water Committee to establish water use and leakage rules or policies for tap and pipes into buildings, including issuing notices to households concern to cut water if no measures are taken to stop leakages- Village Water Committee.</p> <p>Encourage households to report on leakages.</p>

<p>2. Tapping by end users without knowledge and proper supervision of the village plumber</p>	<p>1. Village Water Committee to establish Water Rules or Policies to govern the water system including illegal tapping.</p>	<p>Reduced or low flow to some areas</p> <p>High incidence of disease in the area</p>	<p>Encourage households and individuals to report on unusual activities along the pipelines.</p> <p>Village Water Committee to establish Rules or Policies on illegal tapping at the end users.</p>
<p>3. Inadequate monitoring of water quality by DGMWR staff and insufficient water quality data.</p>	<p>1. Identify monitoring sites and conduct weekly water quality monitoring</p> <p>2. Draw up a weekly/monthly water quality monitoring programme</p>	<p>No continuous monitoring, meaning no clear indication of contamination and no data collection of quality of the water source.</p> <p>No interest and improvement of skills for the Village Water Committee on water quality monitoring.</p>	<p>DGMWR and the Village Water Committee to draw up a monitoring programme including whom to be responsible for the monitoring and data collation. Liaise with the Department of Health in providing training and supplying of H2S to Village Water Committee.</p> <p>Village Water Committee to develop Rainwater catchment WSP for all households with rain water tanks.</p>
<p>4. Insufficient information on the overall water consumptions and hence no information on the water demand for the</p>	<p>1. Introduce low cost technology for metering around the network. The experiences encountered will</p>	<p>No knowledge on water conservation water demand management.</p>	<p>Liaise with UNELCO on possibility of metering mele water supply network. The</p>

village.	be use as a model for other large water supply systems.		effectiveness and cost benefits of the project. Liaise and communicate possible metering to community and get feedback on adaptation to the change.
5. Inadequate Management skills from the Village Water Committee.	1. Inadequate know-how of managing the water system. (currently three plumbers doing all secretarial tasks)	Water Committee not knowing their tasks and no commitment. No improvement of the management skills.	DGMWR to implement a Water Committee Management Training with the Village Water Committee. DGMWR to implement Plumbers Training on simple maintenance schedules for the system.

5. Conclusion

The Water Safety Plan was finalised during the follow up mission 2 and improvement schedules was also compiled. The draft documents were presented to the Steering Committee and the Mele Village water committee who initially endorsed them as the final document. The committee was also requested to provide the cost of the improvements in local currency. It was realised that these two documents were very important for the countries to divert further funding in this area. The completed Water Safety Plan is an ideal document for donor agencies for implementation of water programmes for the rural and urban community.

Reference:

1. SMEC International Pty Ltd, Cooma, NSW, Australia, Consultancy Report, 1999.
2. Ministry of Health, 2005, Small Drinking Water Supplies- Preparing a Public Health Risk Management Plan. Wellington, New Zealand.
3. Water Supply Plans Books 1&2 -2004, WEDC Publication- Loughborough University, UK
4. Engineering Section Report-January 2007-Public Works Department, Santo

ANNEX: 1

Drinking water Risk Assessment Table

Judging Priorities – systematic risk assessment

i. For each hazard event, decide on the likelihood of the event happening

Likelihood Score	Possible Descriptions
Almost Certain	<ul style="list-style-type: none"> Occurs like clockwork Occurs every week, month or season
Likely	<ul style="list-style-type: none"> Has occurred more than once before Expected to occur every year
Possible	<ul style="list-style-type: none"> Has occurred before Expected to occur every 2-5 years
Unlikely	<ul style="list-style-type: none"> Has occurred before Expected to occur every 5-10 years
Rare	<ul style="list-style-type: none"> Has never occurred before and unlikely to occur less than every 10 years

ii. For each hazard event, decide on the consequence to people's health if it did happen.

Consequence Score	Possible Descriptions
Insignificant	<ul style="list-style-type: none"> No illness expected in the community or interruption to water availability
Minor	<ul style="list-style-type: none"> Very few of the community ill, or some interruption to water availability
Moderate	<ul style="list-style-type: none"> Some of the community ill
Major	<ul style="list-style-type: none"> Most of the community ill
Catastrophic	<ul style="list-style-type: none"> Most (or all) of the community ill with anticipation of some deaths

iii. For each hazard event, look up the likelihood and consequence scores in this table to find the corresponding priority (very low, low, medium, high, very high)

Likelihood	Consequence				
	Insignificant	Minor	Moderate	Major	Catastrophic
Almost certain	medium	medium	high	high	very high
Likely	medium	medium	medium	high	high
Possible	very low	low	medium	high	high
Unlikely	very low	very low	low	medium	high
Rare	very low	very low	low	medium	medium

(Adapted from NZ MoH, 2007)

Instruction: Using either of the methods outlined above, consider each of the hazard events separately and determine the priority for each. Enter the priority rating into the third column of the DWSP matrix.