

## 2.15 Management Approach

### 2.15.1 Management and Implementation Considerations

A variety of management approaches has been reviewed below in detail to determine the optimum approach for the selected islands.

**Table 2-11 Management Approach Evaluation**

Management & Implementation Options	Consideration	Advantage	Disadvantage
1. Use of Contractor	<p>A contractor could be contracted after a rigorous tendering process (using MOIP tender contract documents) for implementing the project.</p> <p>Local contractors will be encouraged to participate in the construction works program.</p>	<p>Fixed price defined in a construction contract.</p> <p>Efficient implementation in minimum time.</p> <p>Quality documentation prescribes project works.</p> <p>No need for the Project to purchase construction equipment.</p> <p>Contractor responsible for effective delivery and implementation of the project.</p>	<p>High cost to allow for contractor overheads, management and profit</p> <p>Large package of works required to achieve efficiency in delivery approach</p> <p>Detailed contract documentation required contract administration of construction contractor required by MOIP.</p> <p>Additional labour may need to be imported from other islands to suit contractor's program</p> <p>Reduced management opportunities for IA</p>
2. PMC manage the implementation of the Project	<p>The PMC will contract positions or parts of the project using Project Management Companies or personnel for project implementation.</p>	<p>PMC have direct involvement in the running of the project.</p> <p>All stakeholders are represented in one Committee with decisions directed through one channel.</p>	<p>PMC role compromised as over client's representative to the project.</p> <p>Skill level required for specialist role is required. PMC may not have specialist expertise. May need to procure these services often costly.</p>

	Different levels of involvement by specialist personnel or organisations will collectively participate in the design, management and implementation of the project.	Decisions are quick and project delays reduced.  Responsibilities are directed from the PMC including control of the project deliverables.	Coordination of the PMC becomes cumbersome.  Too many layers of responsibilities needing more administration and coordination from the PMC.
3. MOIP manages the implementation of the Project	MOIP to be given responsibility of managing the design, procurement and implementation process. This approach has been used before on projects in Rarotonga and proved to be successful, however, not so in the outer-islands.  While, MOIP has some highly skilled people, their capacity is stretched across many issues and projects throughout the Cook Islands.	Basic design documentation required reducing input by PMC.  MOIP can provide training to IA management.  MOIP responsible for quality of works through Monitoring and Evaluation.  Good for specialist projects requirement slow implementation.	Price and construction period not fixed.  Project provides specialist skill and heavy equipment for construction.  Due to limited resources of IA unable to implement large projects.  Compromises the core responsibility of MOIP to the islands concerned.
4. IA manages the implementation of the Project	The IA could supervise their day labour to implement parts of the works program. It is not suggested that this approach be taken for the entire project implementation but only as a support role to the project during commencement, training and commissioning stage.	After training and experience, IA can construct the works  Lower cost of construction as all local labour used  Greater IA capacity building through construction	Price and construction period not fixed  No external support to IA to meet risk Management objectives  Project must purchase heavy construction equipment  Dependence on retaining improved IA skill levels
5. NGO's manages the implementation of the Project	Non Government Organisations (NGOs) or volunteers are given responsibility for overseeing the Project.	NGO's could supervise the work constructed by local labour force.  The labour skills are considered reasonable to construct the works and with appropriate supervision by	This approach is risky as the necessary skill required to design and manage the job.  No local NGO operates these types of projects so support would have to

		NGO's will be able to effectively construct the works to the required standards.	come externally.  Appropriate reporting and quality can often suffer with this approach. International NGOs may have more capacity to undertake the Project and can submit a proposal during the tendering processes.
6. Implement the Project Phases 1 & 2 concurrently or singularly on confirmation of budget allocations.	Dependent on budget availability.	Can implement project on a Phase by Phase case.  Each Phase is reviewed after it is completed and lesson learnt in preparation for the next phase.	Project could be completed sequentially and not concurrently on each island.  The Project may not be able to be funded.

### 2.15.2 Resolution of Options

**Options 1** was considered the best implementation approach in that it utilises the most effective and available resources from the private sector, government department and Island resources collectively to maximise what is available to deliver the project. It was a matter of picking out the best solutions in the management of each option.

**Option 3 & 4** using MOIP and IA resources will both supplement and complement the project as MOIP will be given responsibility of managing the design and procurement and IA involved in the implementation process. This will enable MOIP and IA personnel both in Rarotonga and on island respectively to build capacity and strengthen its personnel in knowing how to implement projects of this size and increase knowledge and skill level during and after the project has been completed. Ownership of the project is highly regarded for sustainability reasons.

**Option 5** on the other hand was not considered as this approach is risky as the necessary skill required to design and manage the job needs to be available when the project commences, and this is not always readily available. No local NGO operates these types of projects so support would have to come externally. During discussions, the design team felt that it was important for Project success to have a single point of responsibility for the works program can be effectively liaised through the MOIP and IA.

**Option 6** focuses on the use of available budgets allocated to the project. This method could be adopted using most of the implementation methods identified above except in that it is restricted to the available budget allocated for Phase 1 and 2. If the available budget can complete Phase 1 and 2 then both phases can be implemented sequentially, however, if budget allocation is not available for two phases then both phases is designed to be implemented in sequence and budget for the second phase implemented once budgets have been confirmed. Phase 1 is completed mainly by Contractors while Phase 2 is to complete mainly using specialist contractors MOIP recourses and community labour.

## 2.16 Lessons Learned

The following points summarise lessons that have been learned from previous water supply systems operating in the Cook Islands:

- § Systems need to be constructed that minimise maintenance. Previous experience with the installation of non durable and applicable materials failed due to high maintenance problems. Proper installed water tanks connections are essential for sustainability of supply.
- § Upgrading of water supply in outer-islands was too dependent on the IA who is stretched for resources. This delayed construction of the water supply systems. It was only when a full time TA/Supervisor was sent to the islands did the construction proceed more smoothly. Having to sort out the situation in the middle of project activities was an expensive alternative.
- § Based on a large number of aid projects that have been completed in the Cook Islands, experience has indicated that a PMC style model is most appropriate for their circumstances and the inclusion of a TA and PM is then to oversee and monitor project activities and endorse planning documents prior to work commencement. They also ensure standards are being maintained and are aware of the activities underway. This model has worked successfully in the Cook Islands on many occasions.
- § Government should have a greater involvement in delivery and management of the Project to: (1) better facilitate and co-ordinate government inputs; (2) enhance sustainability and ownership of outcomes;
- § Need for all stakeholders to agree at the outset on the outputs or achievements they should expect from the project.

## **3.0 Design, Management and Implementation Plan**

### **3.1 Water Design Selection**

#### **3.1.1 Survey Information Response**

The survey information produced by AMD and MOIP of the selected islands along with discussions with key stakeholders on those islands have highlighted major issues comprising inadequate supply and quality of water, poor condition and water use practices of the water supply system. (See discussion in Annex B). The surveys have also highlighted the challenges faced by those islands during drought conditions affecting water resources and sanitation.

The selected approach for the project considered various ways to improve the water collection, storage and quality issues. The strategic elements selected address the problems identified in ways that improves the resilience of *Pukapuka*, *Nassau* and *Penrhyn* islands to natural disasters (including drought proofing) and to strengthen disaster management capabilities aimed at increasing capacity for water storage, collection and quality. Education, training and monitoring programs complements the increase of local participation and knowledge transfer.

#### **3.1.2 Water Supply Quality Guidelines**

The GHD (2004) report on “Upgrading of Mangaia Water Supply” recommends the use of the latest World Health Organisation – WHO (2004) Drinking Water Quality Guidelines (Version 3) as the appropriate approach for the selection, design and management of selected water supply systems for outer-islands. The guidelines are considered to be best practice and incorporate risk management and continual improvement into the provision of water supply to focus on a preventative approach to water supply management rather than a reactive approach.

The Falkland (2005) report on Pukapuka indicated that “at present, there are no minimum water supply standards or guidelines for outer-island water supply systems within the Cook Islands”. For planning and design purposes, Falkland suggested minimum water supply requirements and design guidelines should be prepared and the guidelines should allow for a minimum of 100 litres per person per day (L/p/day) of which at least 10 L/p/day should be potable water and the quality of potable water should meet WHO(2004) drinking water guidelines.

The ADB (2006) Technical Assistance Report “Strengthening Disaster Management and Mitigation (Preventive Infrastructure Master Plan) in Cook Islands” stated that none of the water sources is disinfected in all islands and selected communities. Water is either boiled or bought (i.e. bottled water) for potable use. Diarrhoea and other water-borne diseases were prevalent on the outer-islands and also on Rarotonga. Water quality monitoring is sporadic. Without a systematic approach it is difficult to track trends or trace causes of dips in water quality. On the outer-islands there are regular, but infrequent, surveys that test for conductivity (salinity) of groundwater, but bacteriological tests are very few. The poor quality of the groundwater (moderate salinity levels) on [outer-islands] is a prominent issue on all outer-islands.

The above ADB (2006) report have developed practical tools for integrating design and climate change principles into the operation of water supplies, both in rural and urban settings. These tools have been reviewed to determine their relevance to this project.

For groundwater installation work the design elements are highlighted in Falkland 2005 for Pukapuka Section 8.3 and in Falkland 2006 for Penrhyn Section 6.3 under water supply design guidelines.

### 3.1.3 Design Population from AMD & MOIP Survey

The water investigations surveys completed by AMD and MOIP (See Annex D) and discussion held with stakeholders provides a preliminary design population for the implementation of works plans. From the survey results:

1. Pukapuka: (Ngake: 191; Roto: 191 and Yato: 255): total = 637 persons
2. Penrhyn: (Omoka: 61; Tetautua: 75): total = 136 persons.

The population numbers for Pukapuka and Penrhyn included adults and children currently residing in those houses surveyed during the survey period. These population numbers is estimated to remain stable over the coming years therefore no major calculation for population projections have been made in the water supply design except what has been estimated for in the ground-water supply component.

From surveys conducted it is estimated that there are approximately 80 persons residing in Nassau, however, a large number of these residents in residential houses do not have suitable catchments (i.e. *kikau* - thatched roof houses). It would not be suitable to re-roof these houses due to structural and catchment capacity however, these houses should still have all community tanks upgraded and or improved (i.e. 3000 L) for onsite storage.

It is recommended that the 80 or so persons will need to source the majority of water from upgraded and improved community tanks located at strategic locations around the Island e.g.: Community centres, schools, churches etc.. It is also recommended that a tanker (i.e. 3000L on a trailer) is procured to deliver water to those residents who do not have proper catchment capabilities and are further away from community catchments

The design has been allowed for the preparation of a detailed cost estimate for the upgrading and installation works. Most buildings were surveyed and analysed which pointed towards the use of rainwater tanks as the option for the primary source of water for individual residents supplemented by the upgrade of community catchment tanks. During droughts the rainwater catchments would not have the capacity to meet residential and other water requirements (i.e. sanitation), and therefore the use of groundwater remains to be a supplementary source of water.

The recent decline in population on those selected islands and the prospect of it increasing when a reliable water supply has been made available causes some difficulty in selecting the design population. However the quantities selected provide flexibility in meeting populations greater than current figures without any significant increase in construction cost.

### 3.1.4 Implementing the Project on Selected Islands

The key implementation method is the upgrade, improvement and installation of an effective, efficient and safe water supply system for each of the selected islands under the supervision of a MOIP Works Supervisor (WS). The WS is to be contracted by MOIP on each Island. The WS reports directly to the Project Manager (PM), however, acts as the site representatives for onsite meetings in absence of the PM Alternatively the WS could be sourced from the IA infrastructure team.

The installation of water tanks for Phase 1 works program will be implemented by a contractor using available labour and construction materials. The WS will be provided full time during the implementation period to ensure construction complies with the required standards. The WS could have a lesser role with intermittent input during the implementation of the remaining works to support selected IA supervision. In this way the skills of the selected IA are improved progressively with ongoing support from the WS, and with increasing the level of responsibility taken by selected IA personnel. A nominal budget will supplement the IA for this work.

A similar implementation strategy is being recommended for the groundwater improvement works program (i.e.: Phase 2) except that a specialist contractor will be engaged for the installation of infiltration galleries with the majority of the work being implemented using IA, MOIP and community resources.

MOIP and IA staff must immediately commence ground water monitoring as per recommendations in the Falkland reports (2005 and 2006) as this is essential in finalising the design yields for the groundwater improvements works program. INTAFF staff will continue to have a monitoring role to assess equity and inclusion of population in accessing water supply as identified in the selection criteria Section 2.12 above.

Construction plant and equipment will be provided by the Contractor in Phase 1 and specialist contractor in Phase 2 and supplemented on a hireage arrangement of IA plant and equipment from the selected IA.

The inclusion of the OIDGF into the project is to create opportunities for select community and private groups to access funds on a loan and grant basis to promote economic development with specific emphasis on water supply materials and equipment. (e.g.: water tanks, pumps and filtration systems etc.)

From section 2.15 above, Options 1 was selected as the best implementation approach that utilises the most effective and available resources from the private sector, government departments and Island resources with supplementary support from using MOIP and IA resources (Option 3 & 4).

The recommended approach is to implement the project work sequentially (i.e. with Pukapuka first, then Nassau and finally Penrhyn). Phase 1 will be done while water monitoring and education and hygiene project is being conducted. Phase 2 will follow once Phase 1 activities have been fully completed and financial resources secured for Phase 2.

### 3.1.5 Community Consultation, Awareness and Education

The sustainability of the upgraded water supply project is dependent on the communities adopting water conservation measures (through safe and hygienic water use practices) and maintaining the system over the design life of the water supply system. Community consultation has been and will continue to be an important part of the project to further understand the community's views on water supply issues in preparation for natural global and environmental events and disasters (i.e. cyclones and droughts) and to form the basis of training local communities in ownership, maintenance and hygienic use of the supply. (See stakeholder analysis Annex B).

A community education program will be used to educate the community on maintaining the water supply system, conserving water, and health risks associated with the water supply system. Payment for the installation of the water supply system for individual communities is likely to depend on donor contribution. This has been well documented in recent consultation meetings with the selected island communities therefore the expectation for this project to occur is high.

The matter in the operation and maintenance of the water supply rests with community recipients. This indicates that an awareness program is needed for all community recipients that the maintenance of the water tanks being installed is the responsibility of the recipients after the defects liability period has ended. As mentioned previously, it will be important that all community issues are identified and addressed and the appropriate resolutions be in place prior to implementation to ensure the sustainability of ongoing activities.

The public health officers in each of the selected islands in consultation with the IAs and Island council will support the project by implementing a water safety plan is to ensure safe drinking water through good water supply practice. (See Annex E – Water Safety Work Plan). Public health officers will also be involved in the wider education programs being implemented under the project.

### **3.2 Proposed and Existing Project Synergies Investigated.**

Table 3-1 assembles a list of proposed and existing infrastructure projects with cost estimates for the selected islands. The projects are not in any order of priority. The list has been identified from the prioritization process, ADB (2006) including data received from the MFAI, CIIC, and NZAID (Rarotonga).

**Table 3-1 Proposed and Existing Project Synergies Investigated**

PROPOSED OR EXISTING PROJECTS	ESTIMATE COST <sup>8</sup> NZ\$MILLION	BENEFIT FROM SYNERGY
<b>Pukapuka</b>		
Airport Improvement	0.88	Machinery, tools and skilled labour. Improved knowledge. Greater resource planning, Budget merging and sharing. Materials and equipment merging and sharing. Donor harmonisation. 8x 25,000L community Tanks.
Jetty Development	0.38	
Electricity supply upgrade	2.5	
Cyclone Centre Building	2.0*	
Tropic twilight-NZ Armed Forces (TT09)	Not available	
<b>Nassau</b>		
Nassau Harbour Development	0.38	As above. 2 x 25000L community Tanks.
Tropic twilight-NZ Armed Forces (TT09)	Not available	
<b>Penrhyn</b>		
Airport Improvement	0.88	Machinery, tools and skilled labour. Improved knowledge. Greater resource planning, Budget merging and sharing. Materials and equipment merging and sharing. Donor harmonisation. Omoka School = 100,000L Tetautua School = 105,000L
Harbour Rehabilitation	0.98	
Exchange of Penrhyn generators	Not available	
School Upgrade Project	0.7**	
* Source MFAI, EU Funded		** Source CIIC, NZAID Funded

To benefit from infrastructure project synergy requires all work to be planned, budgeted, and scheduled in time-phased increments. However, managing project schedules and costs and providing detailed reports without stakeholder support is labour intensive, time consuming and prone to delays and errors.

In order to amalgamate the above infrastructure projects is the need to manage financial resources as well as human resources. The project team members must collaborate effectively and must manage time spent on the project by sharing information and report project status to clients. The above projects are not part of this project. However this project will greatly benefit from project synergies listed in the table above.

Donor harmonisation is critical in the delivering of high valued projects to recipient governments. Donor harmonisation is not discussed in any great detail in this PDD.

<sup>8</sup> Asian Development Bank, 2006; TA 4605-COO: Strengthening disaster management and mitigation (component 2: preventive infrastructure master plan) Volume 5: Project profiles & multi criteria prioritization process

### 3.3 Australia and New Zealand Potential to Contribute

The Australian and New Zealand Governments have committed to assist the Cook Islands Government in the improvement of water supply systems and the management of water supply as advocated in the CRRP 2006 – 2010 plan. The National Sustainable Development Plan (NSDP); Budget Policy Statement 2005-06 and the Disaster Risk Management Plan (DRMP) form the basis of the commitment of both Australia and New Zealand in the outer islands.

The CIGov have identified as a priority infrastructure repair and upgrade of the water supply for the northern islands which highlights the intention of its policies in the CRRP plan. The key message in the recovery plan relating to this project is improving the resilience on *Pukapuka*, *Nassau* and *Penrhyn* islands to natural disasters (including drought proofing) and to strengthen disaster management capacities aimed at increasing capacity for rainwater storage and collection, sanitation and hygiene education programs.

**It is hereby requested to the donor/s that a total budget of NZ\$3.413 million be allocated to the three Islands of Pukapuka, Nassau and Penrhyn for Phase 1 and 2.**

Depending on budget availability the project can be split into two phases as summarised below.

**Table 3-2 Budget Allocations**

SELECTED ISLANDS	CI Gov	Phase 1	Phase 2
PUKAPUKA	\$91,214	\$723,114	\$919,193
NASSAU	\$23,340	\$134,922	\$85,126
PENRHYN	\$92,865	\$670,980	\$879,802
DISBURSEMENTS			
YEAR 1: June 2009 to June 2012 - CIGov	<b>\$207,419</b>		
YEAR 2: June 2010 to June 2011 - Donor		\$1,529,016	
YEAR 3: June 2011 to June 2012 - Donor			\$1,884,121
<b>DONOR CONTRIBUTION NZ\$</b>		<b>\$1,529,016</b>	<b>\$3,413,137</b>

### 3.4 Cook Islands Government to Contribute

Recognising the budgetary constraints facing the Cook Islands Government (CIGov), the project design proposes that specific in-kind financial resources be allocated to the project by CIGov. However, within the overall total project cost it is estimated that about **NZ\$207,419** of in-kind funding will be contributed by the CIGov.

There is the opportunity to use the project as a 'training ground' for less experienced staff within MOIP and IA, e.g. this may require the allocation of extra staff to cover the duties of those officers seconded to the project during the project period.

Items for which CIGov will be responsible through MOIP include:

*a. Budget*

- § providing sufficient budgetary resources to the IA to allow them to make a more adequate contribution to the project;

§ Supply the project with timely exemption from VAT and customs duty charges on project related procurements.

*b. Staffing*

§ Contribution to project management through the recruitment of officers to ensuring attendance at meetings and keeping changes of officers to a minimum.

§ Providing INTAFF, Public Health and Environmental Officers for functions and responsibilities under the project.

*c. Buildings / Facilities*

§ Provision of IA office facility on project site;

§ Provision of storage for imported project materials when required.

## 4.0 The Project

### 4.1 Goal and Purpose

The project goal is to improve the resilience of the selected islands of *Pukapuka*, *Nassau* and *Penrhyn* to natural disasters (including drought proofing) by increasing the capacity for rainwater storage and collection supplemented by groundwater resources.

An important feature of the goal is to encourage sustainable growth of the selected islands with opportunities for employment, improved public health and well being, and promote environmentally sustainable economic development.

The specific purpose is to upgrade water supply systems on the three selected islands and strengthen local capacity for improved operation and maintenance of the installed water supply.

### 4.2 Project Overview

#### 4.2.1 Component Structure

The project structure comprises three components as shown in Table 4-1. The first two components emphasise the provision of infrastructure to implement including the provision of education and awareness programs for improved public health and well being while the third component focuses on management, supervision and monitoring during the implementation of the project.

**Table 4-1: Project Components and Outputs**

<p><b>Components</b></p>	<p>4. Water Supply Infrastructure upgrade.</p> <p><i><b>Objective:</b> To plan, design, construct and commission upgraded water supply systems on the three Islands.</i></p>	<p>5. Water, Sanitation and hygiene, education &amp; training of public.</p> <p><i><b>Objective:</b> Implement appropriate awareness, education &amp; training of communities of public health water use.</i></p>	<p>6. Project Management Supervision &amp; Monitoring.</p> <p><i><b>Objective:</b> To provide effective project management, supervision training, monitoring during implementation.</i></p>
<p><b>Outputs</b></p>	<p>1.4 Preliminary survey for the upgrade works prepared.</p> <p>1.5 Detailed design and documentation of upgrading works prepared.</p> <p>1.6 Procurement and implementation of the upgrade works.</p>	<p>2.1 Implement appropriate awareness education, hygiene and sanitation training programs for public health water use.</p> <p>2.2 Provide specialist on-island support for awareness and education</p>	<p>3.1 Project management and administration provided.</p> <p>3.2 On-Island project support established and maintained.</p> <p>3.3 Effective stakeholder communications provided.</p>

		<p>programs.</p> <p>2.3 Report on progress of awareness, training and monitoring programs.</p>	<p>3.4 Project progress monitored and reported on.</p>
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#### 4.2.2 Component 1: Water Supply Infrastructure Upgrade

This component has the objective of planning, designing, constructing and commissioning an upgraded water supply system on the three selected islands of Pukapuka, Nassau and Penrhyn.

##### OUTPUT 1.1: PRELIMINARY SURVEY OF UPGRADING WORKS PREPARED

MOIP will ensure that cadastral survey information is prepared for the selected Island villages covering the proposed works prior to commencement of the project. The survey will define the location of existing and proposed water supply facilities such as groundwater galleries, community tanks, individual houses; and existing infrastructure for roads and electricity. In particular a survey showing where new tank installations are being installed, improved and or upgraded.

Tender and specification instructions of the house catchment installation works are required before letting the implementation of the work schedule to a contractor. Technical engineering drawings and scheme map designs of the water tanks will be provided for and reviewed to ensure it is appropriate for the work concerned.

The Falkland June 2006 report on Penrhyn Water Investigation and the Falkland 2005 report on Pukapuka: Water Investigations are here used as the preliminary design of the appropriate groundwater supply system for both Penrhyn and Pukapuka. Note: Pukapuka improvements are for Wale only.

Drawings of the upgrading works for each village will be prepared digitally by MOIP after the water tanks have been mapped and installed. Preliminary cost estimates will be confirmed to ensure the upgrading works can be constructed within budgeted amounts. As part the design process, consideration will be given to planning for effective construction of the three water supply systems i.e.: 1a) House catchment installations and 1b) Community catchment upgrade 2) Groundwater Installation.

Preliminary work has also been prepared on other water facility upgrades and installations being planned for the selected islands. These are highlighted in table 3.1 under *Proposed and Existing Project Synergies Investigated*. There are some clear benefits discussed in section 3.2. The PMC and MOIP will need to ascertain both the level of involvement and collaboration if any with the design of this project.

This design report is prepared to compile and summarise the basis for the implementation works plans. The design report will be included as the basis of the scope of works when MOIP prepares the tenders for the house catchment installation contract including parts of the groundwater installation works program.

MOIP will prepare an Initial Environmental Effects report for acceptance by PMC and NES. To date there is no EIA requirement for the outer-islands, although legislation is under development. However, it remains prudent to apply local environmental processes regardless of legislation.

The activities that are anticipated for Output 1.1 include:

- § Conduct cadastral surveys of houses and community facilities;
- § Review and validate all information on the existing water supply system;
- § Confirm preliminary design;
- § Confirm preliminary cost estimate;
- § Confirm planning for efficient implementation;
- § Prepare Design specifications for tendering purposes;
- § Prepare Initial Environmental Effects Report.

#### OUTPUT 1.2 DETAILED DESIGN AND DOCUMENTATION OF UPGRADING WORKS PREPARED

MOIP will prepare the detailed designs and specifications to allow construction of the upgrading works to be tendered to contractors. Detailed construction drawings and schedules will be prepared to finalise the scope of the upgrading works for both the house and community catchment contract and groundwater installation work. The detailed Phase 1 work designs for the house catchment installation is outlined in this PDD and the community catchment and groundwater installation work designs for Phase 2 work are to be extracted from the Falkland (2005) report on Pukapuka and Falkland (2006) report on Penrhyn Water Investigation. MOIP will ensure that the documents clearly define the roles, duties and responsibilities of the team and contractors implementing the project.

The completed documentation will be issued to the PMC for acceptance prior to issuing to pre-qualified construction contractors.

The activities that are anticipated for Output 1.2 include:

- § Prepare detailed design;
- § Prepare materials schedules and specifications;
- § Prepare final cost estimate;
- § Prepare Final Implementation Report.

#### OUTPUT 1.3: PROCUREMENT AND IMPLEMENTATION OF THE UPGRADE WORKS

The upgrading works will be implemented by a contractor and commissioned by the selected IA. All equipment, plant, and materials will be procured by the contractor through MOIP using the MFEM Procurement Guidelines. The PM and WS will supervise construction and commissioning of the works. MOIP will ensure that the contractor complies with the requirements of the specifications and schedules, and achieves the quality requirements stated in the specification.

MOIP will monitor the progress of the works to protect the environment and mitigate potentially negative environmental impacts during the construction period. MOIP will be responsible for monitoring the performance of the contractor during the implementation of the project.

The PM and WS will be responsible for monthly progress certification of the project works.

The activities that are anticipated for Output 1.3 include:

- § Procurement of services, equipment, plant and materials for the project;
- § Implement through a contractor the project to quality standards and outputs;
- § Provide construction supervision for construction of the works;
- § Provide support personnel to assist communities in preparing their sites for water tank installation;
- § Prepare as-built drawings of all project improvements

A fulltime WS on-island is required to oversee the implementation of the works program.

Responsibility for Component 1

The responsibilities of the various stakeholders in implementing Component 1 are summarised in Table 4-2

**Table 4-2: Responsibilities for Component 1**

<b>MOIP</b>	<b>Contractor</b>	<b>PMC</b>
<p>Work in close cooperation with IA to:</p> <ul style="list-style-type: none"> <li>§ Define technical design standards;</li> <li>§ Prepare preliminary design and report;</li> <li>§ Prepare initial Environmental Effects Report;</li> <li>§ Prepare design, tender documentation and cost estimates;</li> <li>§ Procure services, of a contractor for all construction work;</li> <li>§ Provide construction supervision.</li> <li>§ Support community in the preparation works.</li> </ul>	<p>Work in close cooperation with the IA and MOIP to:</p> <ul style="list-style-type: none"> <li>§ Implement project to technical design standards;</li> <li>§ Provide progress reports of the project;</li> <li>§ Provide materials, plant, tools and equipment for the project;</li> <li>§ Provide and pay local labour for construction of work.</li> <li>§ Implement the water supply project as specified and to standard.</li> </ul>	<p>Approve</p> <ul style="list-style-type: none"> <li>§ Technical design standards and report</li> <li>§ Detailed design, documentation and cost estimates</li> <li>§ The selection of contractors for the project</li> <li>§ Independent project review and assessments.</li> <li>§ Final project handover report.</li> </ul>

#### 4.2.3 Component 2: Water, Sanitation Education & Training

##### OUTPUT 2.1: IMPLEMENT APPROPRIATE AWARENESS EDUCATION & TRAINING PROGRAMS FOR PUBLIC HEALTH WATER USE.

Awareness, education and training activities will be primarily delivered through partnership arrangements (i.e. MOU) between MOIP/MoH/INTAFF. Annex E includes the water safety work plan and section 2.12 provides for the INTAFF selection process for water tank recipients. Ongoing activities will be delivered through mainstream MoH/INTAFF programs.

##### OUTPUT 2.2 PROVIDE SPECIALIST ON-ISLAND SUPPORT FOR AWARENESS AND EDUCATION PROGRAMS.

Critical to the ongoing sustainability of the upgraded water supply system is that communities develop an understanding of their water supply, learn to conserve water and be fully aware of the public health risks associated with their water supply system. Community awareness, education, training and extensive consultation with the selected island communities is required to raise awareness in the communities of water quality problems, water conservation (through water use practices), by incorporating relevant risk management strategies to mitigate contamination of drinking water and the need for recipients to maintain their water systems. These issues are critical to the development of the upgraded water supply systems. A community consultation and education program will be developed and implemented to highlight the importance of water conservation measures and to encourage the community to adopt safe public health standards in the use of their water supply system. The education program should include:

- § Discussion of the water supply being installed and upgraded and water cycle; (i.e. rain-water and groundwater resources).
- § Discussion of issues on drinking water quality, public health and risk assessment,
- § Consumer responsibilities after installation and commissioning and how water quality can be affected;
- § Need for and methods of water conservation (through water use practices) by selected communities; and
- § Responsibility of the community in protecting their water system and sources.

Many of these issues have already been discussed with key community members so they have contributed to the process already and are aware of many of the issues that need to be addressed. As part of the development of this PDD, significant community consultation was undertaken as evaluated in Annex B. This work needs to be built upon to ensure ongoing success of the project. Methods that should be considered in developing the community participation and education and training programs include individual and community meetings, awareness videos, printed material and school programs.

The activities that are anticipated for Output 2.1 include:

- § Developing community awareness education and training programs on the use, conservation and public health risks by incorporating relevant risk management

strategies to mitigate contamination of drinking water of the installed water supply systems;

§ Prepare awareness, education, and training materials associated with this output;

§ Implement education and training programs associated with this output.

Note: estimating safe distances between groundwater sources and sanitation systems would require input from other specialist who has an understanding of groundwater flows. The public health officials may see it necessary to obtain specialist hydro-geological input into their programs and awareness material.

#### Indicative resources and Inputs of Component 2.1 & 2.2

The expected inputs comprise the PM and short term inputs by a public health specialist. The public health specialist will develop the education program and materials through intermittent inputs during implementation to highlight associated health risks and methods to reduce risks in the use and consumption of water from the water supply system including safe water use protocols.

The PM will be expected to oversee the preparation and implementation of the education and training materials associated with this output.

#### OUTPUT 2.3 REPORT ON PROGRESS OF AWARENESS, TRAINING AND MONITORING PROGRAMS

The Drinking Water Quality Management System Framework (DWQMF) outlined in the WHO Drinking Water Quality Guidelines - Version 3; (2004) will form the basis of the awareness and training programs. The programs will be appropriate to the type of water supply systems and water resources by incorporating relevant risk management strategies to mitigate contamination of drinking water on the selected islands. The key elements of the training and awareness programs are presented below.

##### Water Safety Plans

A major focus of WHO (2004) in the field of water and sanitation has been the development and dissemination of guidelines related to drinking water quality. Special emphasis for this project is the development of Water Safety Plans. The programs will be less dependent on laboratories and specialised equipments and more tuned towards trained observations and practical controls. A specialist from Public Health will engage with communities and key stakeholders on the selected islands by conducting awareness and training workshops which focuses on developing water safety plans and the risks of insufficient and poor quality water and the impacts they have on their health, well-being, and their children's health. Improved quantity and quality of water is also important economically where it has been seen to also greatly affect commercial activities.

##### Training Workshop Objectives.

The objectives of the training workshops for the participants are able to demonstrate:

1. Improved understanding of the water safety planning process, through practice.
2. Prepare draft water safety plans of village water supply systems;
3. Introduce and implement water safety planning programme in each recipient village;

4. Incorporate relevant risk management strategies to mitigate contamination of drinking water.
5. Engage all relevant government agencies, NGOs and other potential partners in the monitoring and distribution of

Operation and Maintenance

A demonstration of the use and maintenance by building local knowledge and reinforce community management of water resources and the water supply system will be prepared by the contractor during installation of house water tanks and specialist personnel for on-site training workshops defining the proper use of the water supply and the extent of maintenance required to ensure the continued operation of the water supply system in good working condition. Maintenance schedules for all elements of the system will be compiled to define the activities required daily, monthly and annually. Monitoring of water quality and volumes should be conducted regularly by the selected IA or Island Public Health Officers to ensure the water supply complies with its requirements. Tests will be conducted quarterly or annually as required. A program of monitoring tests and required standards will be compiled by MOIP.

The activities that are anticipated for Output 2.3 include:

- § Identify public health issues relating to source and use of the water supply system;
- § Build local knowledge and reinforce community management of water resources in a sustainable manner.
- § Prepare operations and maintenance operational guidelines;

Responsibilities for Component 2

The responsibilities of the various stakeholders in implementing Component 2 are summarised in Table 4-3.

**Table 4:3 Responsibilities for Component 2**

<b>INTAFF, MoH, and Specialists)</b>	<b>MOIP (PM &amp; WS)</b>	<b>PMC</b>
<p>Work in close cooperation with IA, to:</p> <ul style="list-style-type: none"> <li>§ Improved understanding of the water safety planning process, through practice and introduce risk mitigation programs in each recipient village;</li> <li>§ Prepare draft water safety plans of village water supply systems;</li> <li>§ Engage all relevant government agencies, NGOs and other potential partners in the monitoring of the water supply systems.</li> </ul>	<p>Work in close cooperation with the IA and Specialist Trainers,, to:</p> <ul style="list-style-type: none"> <li>§ Participate in review of existing water safety plans</li> <li>§ Participate in training use and maintenance of water systems</li> <li>§ Participate in development and implementation of community consultation of the training and awareness programs;</li> </ul>	<p>Approve</p> <ul style="list-style-type: none"> <li>§ Water Safety programs</li> <li>§ Independent project review &amp; assessments.</li> <li>§ Final project handover report.</li> </ul>

#### 4.2.4 Component 3: Project Management, Supervision & Monitoring

Component 3 has the objective of providing effective management and technical support and supervision during project implementation. MOIP with support from the PMC is required to develop and implement effective strategies and practices to maximise the impact of the project.

MOIP will be responsible for project management and receive advice and support from the PMC established specifically for the project. MOIP will work closely with the selected IA but will retain responsibility for the development of the water supply design and documentation for upgrading of the water supply. The PM with assistance from the WS will be directly responsible to MOIP for project quality control, including planning and design, cost estimates, contract documentation, quality of construction and financial management.

##### OUTPUT 3.1: PROJECT MANAGEMENT AND ADMINISTRATION PROVIDED

This output will provide the administrative and management support required for the successful implementation of the project and includes utilising the selected Island IA project offices and facilities with the strategic, logistical and technical support from the home office at MOIP Rarotonga. Communications utilities such as telephone fax and internet onsite will be provided by the IA specified under budget allocations.

MOIP will recruit project personnel (i.e. PM & WS) to be actively involved in the management and administration of the project. The PM is responsible for directing the project, providing support and resources, reviewing outputs, maintaining high quality performance of the contract, and communication with the PMC through the TA. Procurement requirements will follow the MFEM procurement procedures manual. The procurement of parts and materials shall also allow for an appropriate stock of spare parts, parts catalogues, maintenance manuals and operating instructions where appropriate.

The activities that are anticipated for Output 3.1 include:

- § Establish office, facilities and recruit project personnel on the selected islands;
- § Establish lines of communication with selected IA , PMC and home office support services;
- § Prepare project administration and management procedures; and,
- § Mobilisation of project staff.

##### OUTPUT 3.2: ON-ISLAND PROJECT SUPPORT ESTABLISHED AND MAINTAINED

Implementation of the project on the selected islands will require a broad range of technical and social economic skills to address all aspects of the upgrading works program.

The activities that are anticipated for Output 3.2 include:

- § Determining the requirements for in-country support and how these are coordinated;

- § Establishing the roles of the various stakeholders in support of the project;
- § Engaging the various stakeholders through a written and unwritten form of agreement of their responsibilities as per the project activities and work plans.

In support of the project the following individuals and organisation and groups of people will need to be established with defined roles and clear communication and reporting lines. Their responsibilities will need to be confirmed through a MOU between individuals and organisations. General responsibilities of key government resources comprise:

- § Works Supervisor – Contract by MOIP. One works supervisor to be engaged for the three islands for works to be constructed sequentially.
- § MOIP and IA Work Teams: GIS, survey, coordinating and facilitating on-islands work activities under government responsibilities.
- § Finance personnel support using both IA, MOIP and AMD resources
- § Women’s representatives – from local NGO and community organisations
- § Community representatives; INTAFF and IA.
- § Health and Education Representatives: INTAFF and Public Health.

The above government resources will work closely with MOIP throughout project implementation. The project structure and communication lines will have been outlined in section 5.5 below and detailed in contract documents.

### OUTPUT 3.3 EFFECTIVE STAKEHOLDER COMMUNICATIONS PROVIDED

Effective communication is an essential part of sound project management and critical for promoting ownership, sustainability and a coordinated approach for the project. The project will be implemented in the social, cultural and political environment of the Cook Islands and will need careful communication and liaison with relevant government departments and project stakeholders. The different communication needs of men and women must be considered.

Regular communication is required with the PMC and MOIP. The PMC will need to establish formal and informal reporting mechanisms to ensure that both the CIGov and the Aid Donor are kept advised of progress, including any difficulties or changes that arise and proposed action to resolve any problems or delays.

MOIP must maintain close communication with the IA in those selected islands through the Island Secretary. The PM will conduct regular field visits to inspect the work, update and revise work plans and to maintain effective communications with field based personnel. Liaison with local communities will be arranged through the selected IA staff.

Methods of communicating with all stakeholders will need to be carefully considered by both MOIP and the PMC. MOIP with assistance from the selected IA will prepare a communications plan to document the various communication needs of all categories of stakeholders and the responsibilities of the various agencies and departments in establishing the communications. (See also organisation structure in section 5.5).

### OUTPUT 3.4: PROJECT PROGRESS MONITORED AND REPORTED ON

Progress monitoring, review and reporting of the project is required to provide the Aid Donor, CIGov, the PMC and project personnel with details of project progress in accordance with contract requirements.

MOIP through the TA (with assistance from the PM) will ensure that the CIGov, the Aid Donor and the PMC are fully informed of the technical, physical and financial progress of the project. Reports must be practical and focus on actual progress, problems encountered, and solution adopted or proposed. The reports must highlight the environment for project implementation rather than routine activities.

The reports are likely to comprise monthly progress reports, annual reports and a project completion reports. The format of the reports will be agreed with the PMC and the Aid Donor. Progress payments to MOIP will be linked to realistic deliverables and the achievement of agreed outputs. Project payments are to be processed through AMD. The project reports must accurately indicate the progress achieved towards completing deliverables. (See also section 4.7 Budget Disbursements).

Implementation plans will be prepared for submission at the start of the project by MOIP. The implementation plan will present the planned activities for the duration of the project and will show expected expenditure for that period. The Plans must be distributed to all PMC members and to the Aid Donor (with full financial details) at least two weeks prior to the relevant PMC to allow finalisation and approval of plans prior to the commencement of the project.

The activities that are anticipated for this Output 3.4 include:

- § Conduct regular review of project activities;
- § Ensure approvals have been received from PMC and donor;
- § Monitor financial and technical progress of the project; and,
- § Prepare exception reports, progress reports and final report.

#### Indicative resources and Inputs for Component 3

The expected inputs will generally be provided by MOIP, includes the PM and locally engaged office staff. Procurement will consist mostly of the procurement of project equipment and items to support the project team. Other necessary items will include support for the IA. Budget allocations in support of IA responsibilities have been included in budget tables.

#### Responsibility for Component 3

The responsibilities of the various stakeholders in implementing Component 3 are summarised in Table 4-4 below.

**Table 4-4: Responsibilities for Component 3**

<b>Project Management (Contractor &amp; Project Team)</b>	<b>MOIP and AMD</b>	<b>CIGov &amp; the AID DONOR</b>
<ul style="list-style-type: none"> <li>§ Establish office and accommodation on selected islands;</li> <li>§ Engage local staff;</li> <li>§ Procure project equipment;</li> <li>§ Provide contract insurance;</li> <li>§ Provide for Occupation Health &amp; Safety plan;</li> <li>§ Plan, manage, coordinate and implement project activities;</li> </ul>	<ul style="list-style-type: none"> <li>§ Establish the PMC,</li> <li>§ Review and appraise project reports;</li> <li>§ Monitor and report on project outputs;</li> <li>§ Support the operations of the PMC;</li> <li>§ Operate a project account for procurement.</li> <li>§ Resolve contractual problems if they arise.</li> </ul>	<ul style="list-style-type: none"> <li>§ Provide the funding support for the project;</li> <li>§ Participate in PMC meetings and discussions ;</li> <li>§ Review and appraise project reports;</li> <li>§ Liaise with the PMC.</li> </ul>

### **4.3 Project Management & Implementation**

The project management and implementation component of the project includes the following skilled inputs:

- § Project Management;
- § Water supply design;
- § Water supply system implementation;
- § Community education, awareness and training.
- § Environmental management;
- § Works supervision.

These are considered essential for the smooth running of the project and ensuring the appropriate skills are provided at the selected islands. As the project progresses the aim is to install the required water supply system and transfer skills, as much as possible in the installation and maintenance of the water supply system.

From section 2.15 above, Options 1 was selected as the best implementation approach that utilises the most effective and available resources from the private sector, government departments and Island resources with supplementary support from using MOIP and IA resources (i.e.: Option 3 & 4). Option 6 focuses on the use of available budgets allocated to the project.

The recommended approach is to implement the project work sequentially (i.e. with *Pukapuka* first, then *Nassau* and finally *Penrhyn*). Phase 1 will be done while water monitoring and education and hygiene project is being conducted. Phase 2 will follow once Phase 1 activities have been fully completed and financial resources secured for Phase 2.

#### **4.3.1 Rainwater Project & Catchment Improvements – Phase 1**

Implementing the project sequentially will make better use of the MOIP resources and make better use of plant, equipment machinery which could be shipped from one island

to next. Total expenditure and timeframe will be phased over a three year period. This approach maximises the opportunity for a swift delivery of the project while optimising the available budget allocated for the project.

The PMC will oversee the implementation of the project. MOIP will be responsible for the operational management, tendering process and for administering both the implementation and service contracts. MOIP will also conduct inspections during implementation and oversee the shipping and delivery of project equipment and materials to ensure compliance with the specification of contract delivery.

MOIP will prepare the tender documentation comprising specification and contract terms and conditions for preferred contractors and suppliers. These documents will be issued to the PMC for approval. MOIP will then issue the tender documents to potential bidders and respond to queries during the tender period. Completed tenders will be checked for accuracy and compliance with the specification of the contract documents. A tender report will be prepared by MOIP providing the basis for the recommended tenderer and submitted to the PMC and Tender Committee for acceptance.

MOIP will compile the contract documents and facilitate signing of the contract between the donor, the CIGov and the successful contractor and ensure insurances are effective. MOIP will recruit both a PM and WS to facilitate the responsibilities of MOIP and at specific milestones dates order for independent reviews of progress of the project and delivery of outputs.

The contractor will arrange shipping of plant, equipment, personnel and materials to the selected Island project sites and arrange unloading to a barge to shore. The contractor will utilise the IA through either direct hire or supply of fuel and parts for the transport of all contract plant, equipment and materials to the project site. The contractor will be responsible for insurance and safe delivery of plant, equipment and materials to the project site and ensure they all contract property are safely delivered, complete and supplied in accordance with specification and properly secured.

The selected IA will be responsible for all public consultation and disputes by the community in relation to the project and will arrange for community labour to be available to the contractor for selection should the contractor require personnel to implement the project. Any personnel engaged under the project by the contractor will be paid (using standard Cook Island pay rates) by the contractor. The selected IA will only provide the names of personnel registered for employment however the final selection rests with the contractor.

The IA will also arrange provision of local materials such as sand and coral aggregate in place for the construction of tank stands and or platforms. The IA key responsibility on this project is the provision of a suitable sand platform under the tanks and removal of all rocks to ensure the tanks are not punctured on filling with water. The contractor through the tank supplier will provide a detailed installation manual, and provide training on tank installation to selected Island IA supervisors during installation of the first batch of tanks. The selected IA will identify the location (from approved survey list) and order for installation of tanks at building locations and inform the contractor to arrange transport of the tanks, fittings and materials to each tank site.

The community is expected to gain knowledge from the contractor in the installation of their tanks and fittings so that once commissioned the recipient is able to maintain their installed tank. The MOIP WS will conduct an inspection of the installation tanks and approve all claims from the Contractor as per the agreed payment schedule.

The community catchment improvement work is a provisional sum item and is to be implemented at the discretion of the MOIP TA. However, all materials for the community catchment improvement work will be supplied on one shipment and separated from house catchment upgrade programs.

#### 4.3.2 Groundwater Installation Works Program – Phase 2

MOIP will use this PDD and the associated documents (Falkland 2005 and Falkland 2006) to finalise the tender documents for a specialist commercial contract for **Phase 2** (2<sup>nd</sup> year) activities and have the project implemented similarly to Phase 1 once budget allocations have been confirmed. The decision to proceed with Phase 2 will be made after the first annual independent review of Phase 1 is provided for PMC consideration. The recommendation from this review will determine the most effective implementation method for the use of available resources and budgets. The current budget in Phase 2 caters for specialist supervision and contractors to be involved including IA infrastructure team involvement.

### 4.4 Project Engagement Arrangements

Despite the fundamental importance of synergies between the various Ministries involved in Outer Island projects, generally there is often no internal (horizontal) co-ordination and mutual reinforcement in the implementation of activities because different levels of government have their own legal position, responsibilities and resources.

In the context of this project it is important to have a clear view of existing relationships between the various levels of government in order to assess which stakeholders are of importance for a given activity. The main project stakeholders implementing the various activities will need to work together in partnership with the various IA and with the recipient communities by establishing early the priority needs of the project through both a written document (MOU) and unspoken method of understanding to meet the requests and needs of the project.

#### 4.4.1 Ministry of Internal Affairs Work Plan and Involvement

The INTAFF' welfare officers in each of the selected islands in consultation with the IA and Island Councils could support the project by:

- § Identifying which houses meet the eligibility criteria – using the methods suggested in Section 2.12.
- § Provide ongoing training and awareness for the maintenance of the tanks and benefits of efficient and safe water use;
- § Identify and refer disputes, complaints and appeals to the project management team.

#### 4.4.2 Public Health Department Involvement

The public health officers in each of the selected islands in consultation with the IA and Island Councils is to support the project by implementing a water safety plan to ensure safe drinking water through good water supply practice, in order:

- § To prevent contamination of the source;
- § To advise the community on water safety issues;
- § To prevent re-contamination during storage, distribution and handling of drinking water.

Activities involved in delivering the water safety plan as outlined in Annex E focuses on:

- Risk assessments;
- Surveillance and Monitoring;
- Awareness of sanitation and hygiene issues;
- Water sampling.

The goal of the plan is preventative actions aimed at reducing or eliminating water health concerns.

#### 4.4.3 Stakeholder Responsibilities

The responsibilities of the various stakeholders in implementing the provision of the project are summarised in Table 4-5 below.

**Table 4-5 Stakeholder Responsibilities**

<b>MOIP</b>	<b>PMC (MoH &amp; INTAFF )</b>	<b>Selected Island Administration (IA)</b>	<b>The AID Donor &amp; CIGov</b>
Prepare tender documentation for the project. Issue tender documents and report on tenders received. Compile contract documents and facilitate signing of contract. Administer contract on behalf of the PMC. Conduct regular inspection of project. Recruit TA, W. Supervisor and Engineer for the project. Provide completion report PMC Sign contract with contractor	Provide overall guidance and high level decisions for the project. Establish an MOU between MOIP and partners (e.g. MoH/INTAFF/IAs) to agree common goal, roles & responsibilities plus disputes resolution mechanism. Goal here is to tap into resources of partners to sustain project goals. Conduct community consultation and engagement of communities into specific activities: (i.e. planning, awareness and training).	Assist in the unloading of plant, equipment and materials from ship. Provide secure storage of plant, equipment and materials for project. Prepare base of tanks for installation of tanks. Provide community labour and local materials to the contractor for inclusion on the project. Implement or assist in the upgrade of ground water resource installation works program.	Appoint PMC to implement the project. Approve tender documentation. Accept tender review report. Provide timely payments for the project. Provide independent reviews of the project.

## 4.5 Project Schedule

Sufficient labour will be required to be available for work during the implementation period. All project materials should be shipped and delivered onto the selected islands before the start of the installation and construction works programs. There is no reason why installation work on the island could not be conducted over the cyclone period, provided the contractor has and implements a disaster management mitigation plan that reduces the risk to the project and personnel over the cyclone period. Cyclone management mitigation plans must be in place before project mobilisation. The indicative schedule in figure 4-1 below has been designed for work to be implemented throughout the year over the cyclone period.

The work schedules on each island will follow a **two (2) phase approach over two (2) years** and implemented sequentially (i.e. with *Pukapuka* first, then *Nassau* and finally *Penrhyn*). Phase 1 will be done while water monitoring and education and hygiene project is being conducted. Phase 2 will follow once Phase 1 activities have been fully completed and financial resources secured for Phase 2.

The Island administration will receive project support budget for Island infrastructure works as part of its Government responsibilities. The IA responsibility will depend on the project funding as part of the operation of the IA. Support budgets needs to be appropriated early.

The timing of receiving funding approval, the release of government budgets and donor contribution has been geared during the procurement and implementation of upgrading works.

Figure 4-1 below summarises the indicative schedules of the project for Phases 1 & 2.

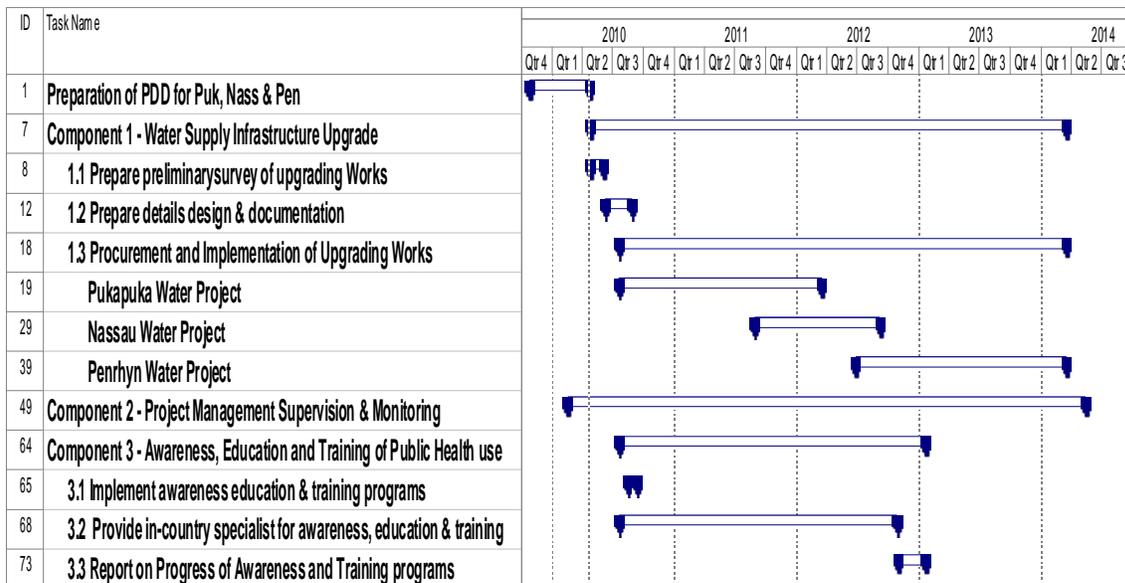


Figure 4-1 Indicative Schedule of Project

#### 4.5.1 Summary Timetable in Months

Table 4-6 below summarises the timing of the project from PDD preparation, approval, procurement, implementation, training and awareness to project closure in months. Note: project management and supervision, implementation and training are conducted sequentially on the three islands.

**Table 4-6 Summary Timetable in Months**

Project Activities	Months <i>Planning, Design, Procure, Mobilise, Awareness, Train</i>	MONTHS ACTUAL IMPLEMENTATION	
		Phase 1	Phase 2
§ Preparation of PDD for Pukapuka, Nassau & Penrhyn	5		
§ <b>Component 1 - Water Supply Upgrade</b>		<b>Phase 1</b>	<b>Phase 2</b>
<b>Pukapuka</b> Water Project – House Catchments	3	7	
Community Catchments	2	4	
Groundwater Installation	2		4
<b>Nassau</b> Water Project – House Catchments	1	4	
Community Catchments	1	4	
Groundwater Installation	1		3
<b>Penrhyn</b> Water Project - House Catchments	3	7	
Community Catchments	3	4	
Groundwater Installation	2		4
§ <b>Component 2 - Project Management Supervision &amp; Monitoring</b>	9		50
§ <b>Component 3 – Community Awareness, Education and Training</b>	3		30
<b>Total Estimated Project Months</b>	<b>50 months (approx 4 years)</b>		

The table above separates the passive management tasks with that of the actual implementation of the activities. The table also assumes that the project will be implemented for all the selected islands. The 50 months is the total months of the project from design, approval through to implementation to completion. Annex F details the activities and duration of the project from start to finish.

Note: The period for Phase 1 activities are the same for Pukapuka and Penrhyn, (i.e.: even though there are less houses in Penrhyn) are due to the fact the Pukapuka have recently benefited from the re-roofing program of residential houses unlike Penrhyn which did not receive this assistance. Extra time is allocated to Penrhyn in order for roofs to be rehabilitated. Materials for roofs have been budgeted for this extra work.

#### 4.6 Estimated Project Cost & Disbursements

The estimated cost for the project as recommended in the implementation plans and management approaches of the project is listed in Table 3-3 below.

All related expenses to support project personnel are included in these calculations. Table 4-7 below summarises all project estimates. See Annex G for detailed breakdown of cost for selected activities.

**Table 4-7: Summary Project Cost**

SELECTED ISLANDS	CIGov	Donor	Donor
<b>TOTAL FOR PUKAPUKA</b>	<b>\$91,214</b>	<b>\$723,114</b>	<b>\$919,193</b>
<b>TOTAL FOR NASSAU</b>	<b>\$23,340</b>	<b>\$134,922</b>	<b>\$85,126</b>
<b>TOTAL FOR PENRHYN</b>	<b>\$92,865</b>	<b>\$670,980</b>	<b>\$879,802</b>
DISBURSEMENTS			
YEAR 1: June 2009 to June 2012 - CIGov	\$207,419		
YEAR 2: June 2010 to June 2011 - Donor		\$1,529,016	
YEAR 3: June 2011 to June 2012 - Donor			\$1,884,121
<b>PROJECT ESTIMATES NZ\$</b>	<b>\$207,419</b>	<b>\$1,736,435</b>	<b>\$3,620,556</b>

## 4.7 Budget Disbursements

Table 4-8 below distributes the total budget over three years for two phases of activities.

### 4.7.1 Year 1 Activities – Procurement, Design and Monitoring

Year 1 involves the preparation of the design and confirmation of data collected including securing the funding of the project followed by the recruitment of contractors and specialist personal for the project. During this time data on the monitoring of groundwater is collected from the selected islands. Some community awareness program will commence on the selected islands to determine current capabilities on the selected islands in preparation for the upcoming project. Total budget = **NZ\$207,419**.

### 4.7.2 Year 2 Activities – Phase 1

Year 2 involves the procurement of services (tender & award) and the mobilisation of the contractor and personnel for **Phase 1** activities, initially to Pukapuka, Nassau and then Penrhyn. The activities include *house catchment upgrade and community tank improvement*. During this time ongoing data and monitoring of groundwater is collected and designs formulated for the selected islands. Some community awareness program will have already commenced. The second visit will be for monitoring progress of awareness programs and to evaluated current status of the project. Total budget = **NZ\$1,529,016**.

### 4.7.3 Year 3 Activities – Phase 2

Year 3 involves the final design of the groundwater installation works program and the procurement and mobilisation of a contractor and personnel for Phase 2 activities, Pukapuka, Nassau and then Penrhyn. The activities include the installation of water galleries and installation of pumps to storage tanks. Most of the monitoring work of groundwater resources should be fully operational and will continue throughout this period and into the future. The community awareness programs will continue. The

monitoring and evaluation of the recent Phase 1 project will also be undertaken over this period. Total budget = NZ\$1,884,121.

**Table 4-8 Budget Disbursements**

<b>Pukapuka Island</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Year 3</b>
<b>Phase 1 – Water Project</b>			
1. Capital Cost			
<i>House Catchment Upgrade - Contract</i>		\$473,937	
<i>Community Tank Improvements – Provisional Sum Contract</i>		\$30,000	
2. Sea freight for Phase 1		\$71,091	
3. Implementing Contractor - Contract		\$94,787	
<i>Contingencies (10%) - Contract</i>		\$9,479	
4. MOIP Working Capital – Government	\$47,394		
<b>Phase 2 – Groundwater Installation Works Program</b>			
5. Groundwater Installation - Contract			\$688,600
6. Water Monitoring - Government	\$6,260	\$6,260	
7. Water Sanitation & Hygiene Program – Gov	\$6,260	\$6,260	
8. Specialist Consultant Input – Contract	\$31,300	\$31,300	
9. MOIP Working Capital - Government			\$23,000
10. Freight for Phase 2 - Donor			\$50,000
Contingency (10%)			157593
<b>GRAND TOTAL FOR PUKAPUKA</b>	<b>\$91,214</b>	<b>\$723,114</b>	<b>\$919,193</b>
<b>Nassau Island</b>			
<b>Phase 1 – Water Project</b>			
1. Capital Cost			
<i>House Catchment Upgrade - Contract</i>		\$74,664	
<i>Community Tank Improvements – Provisional Sum Contract</i>		\$25,532	
2. Sea freight for Phase 1 - Donor		\$15,000	
3. Implementing Contractor - Contract		\$14,933	
<i>Contingencies (10%) - Contract</i>		\$1,493	
4. MOIP Working Capital – Government	\$15,000		
<b>Phase 2 – Groundwater Installation Works Program</b>			
5. Groundwater Installation - Contract			\$40,000
6. Water Monitoring - Government	\$2,520		
7. Water Sanitation & Hygiene Program – Gov	\$2,520		
8. Specialist Consultant Input – Contract	\$3,300	\$3,300	
9. MOIP Working Capital - Government			\$13,000
10. Freight for Phase 2 - Donor			\$10,000
Contingency (10%)			\$22,126
<b>GRAND TOTAL FOR NASSAU</b>	<b>\$23,340</b>	<b>\$134,922</b>	<b>\$85,126</b>
<b>Penrhyn Island</b>			
<b>Phase 1 – Water Project</b>			
1. Capital Cost			
<i>House Catchment Upgrade - Contract</i>		\$400,083	
<i>Community Tank Improvements – Provisional Sum Contract</i>		\$80,000	
2. Sea freight for Phase 1 - Donor		\$60,013	
3. Implementing Contractor - Contract		\$80,017	
<i>Contingencies (10%) - Contract</i>		\$8,002	
4. MOIP Working Capital – Government	\$50,000		
<b>Phase 2 – Groundwater Installation Works Program</b>			
5. Groundwater Installation - Contract			\$687,380
6. Water Monitoring - Government	\$5,000	\$5,000	
7. Water Sanitation & Hygiene Program– Gov	\$5,000	\$5,000	
8. Specialist Consultant Input – Contract	\$32,865	\$32,865	
9. MOIP Working Capital - Government			\$23,000
10. Freight for Phase 2 - Donor			\$20,000
Contingency (10%)			\$149,422
<b>GRAND TOTAL FOR PENRHYN</b>	<b>\$92,865</b>	<b>\$670,980</b>	<b>\$879,802</b>
<b>DISBURSEMENTS</b>			
<b>YEAR 1: June 2009 to June 2010</b>	<b>\$207,419</b>		
<b>YEAR 2: June 2010 to June 2011</b>		<b>\$1,529,016</b>	
<b>YEAR 3: June 2011 to June 2012</b>			<b>\$1,884,121</b>
<b>TOTAL CUMMULATIVE</b>	<b>\$207,419</b>	<b>\$1,736,435</b>	<b>\$3,620,556</b>

## **5.0 Monitoring and Management Strategies**

### **5.1 Key Result Areas**

Successful implementation of the Project will provide the following key outputs:

- § The establishment of project operational, implementation, maintenance, monitoring and evaluation systems for the benefit of IA's, MOIP and other key government department and project stakeholders;
- § An upgraded water supply that will provide a continuous supply of water at a quality that complies with appropriate guidelines;
- § Improved installation and maintenance skills of the community recipients and the selected IA so that upgraded water supply system operates optimally and sustainably in the long term;
- § The project builds local knowledge and reinforce community awareness and management of a sustainable water resource and incorporates relevant risk management strategies to mitigate contamination of drinking water;
- § Increased storage of water through selected communities adopting water conservation measures;

Regular testing and monitoring will lead to more sustainable water supply for the selected islands and overall improve the social and financial conditions of the population.

### **5.2 Project Performance**

Overall project performance will be assessed with regular reports and site inspections which demonstrate the impact of the project. MOIP will be required to develop a comprehensive list of milestones with indicative timings to be provided to the PMC for measuring performance during the implementation stage of the project. The list of milestones will assist assessment of both the contractor and project support team's performance and achievements from the designed outputs.

For the PMC, the quality, quantity and continuity of water available to selected communities will confirm the success of the design and installation of the water supply system. MOIP will be responsible for the design and for the supervision of construction of the works by the selected contractor. Regular monitoring of project progress will help to ensure optimisation of the water supply systems for the selected communities.

Performance assessment will include an analysis of progress reports and work plans along with field visits by the project management team.

An indication of the project performance in quality control will be evident during and after the installation and upgrade work at the selected islands including reports and evidence of the success of the community awareness, hygiene training and education programs. The sustainability of maintaining project milestones and outputs will be reflected in the project providing continuous water supply system and encourage economic development for the selected island population.

#### **5.2.1 Reporting Requirements**

MOIP will provide the PMC with quarterly progress reports in accordance with the

requirements of the monitoring and supervision of the project and should include;

- § Progress and quality of the project including photographs;
- § Deviations from the cost plan with justification and proposals for corrective action and details of preventative and remedial action, or proposed action.

Summary of the milestones achieved during the quarter and expected to be achieved in the following period. The quarterly reports will be prepared to coincide with PMC meetings and to provide PMC members with a status report on the project.

MOIP will prepare a project completion report to detail the achievements of the project by component and output, identify constraints and strengths, and details expenditures and inputs provided in accordance with CIGov requirements.

### **5.3 Payment Procedures**

The MFEM procurement procedures through AMD will form the basis for payments of project expenditures. The payments will provide regular cash flow on a monthly basis based on inputs and outputs-based payments relying on deliverables completed within the required milestones and designed outputs.

MOIP and its service providers (i.e. Contractor, specialist support personnel, suppliers etc.) will be required to develop a comprehensive list of milestones and indicative timings, based on the indicative schedules illustrated in Figure 4-1 above.

### **5.4 Risks and Risk Management**

A preliminary risk assessment is provided in Annex H.

The main area of risk for the project identified relates to lack of continuous flow of project funds to support the project and personnel involved in the project to implement the works program and weather dependencies of the project. Risks associated with not implementing the project are the Public Health and environmental risks linked to groundwater pollution due to lack of hygiene practices which potentially has long term health and environmental impacts. All of these issues impact on the sustainability of the project in implementing, operating and monitoring the project and IA's ability to support the unforeseen circumstances of the project.

#### **5.4.1 Key Assumptions and Risks**

The project design has identified some of the inherent risks that may impact on project performance and outcomes. The 'high' risk' rating given is concerned predominantly with aspects associated with the contractor being able to deliver the project on time and within budget. The identified risk events are grouped into categories and subjectively ranked by potential order of impact. Possible methods of treatment are summarised in Annex H.

The categories of risk types are as follows:

- § Public Health Risks
- § Political Risks;
- § Infrastructure Development and Local Contractor Management Risks;

- § Financing Risks;
- § Natural Hazards;
- § Sustainability Risks;
- § Program Design, Development and Management Risks

#### 5.4.2 Risk Management Plan

MOIP shall revise and update the current Risk Management Plan within the first three months of the project and update it in each quarterly report. MOIP will review the Risk Management Plan and modify it following discussion with the PMC. It will recommend strategies to eliminate or mitigate risks. The plan will identify existing or potential risks over the duration of the project. Risks will be categorised according to their probability and consequence. Risk monitoring, minimisation and mitigation strategies will be developed. Risks affecting both the implementation and sustainability of the project are to be considered. The Risk Management Plan is to be linked to the project's Monitoring and Evaluation Plan to ensure continual monitoring and assessment of actual and potential risks to the project's successful completion.

### 5.5 Management and Coordination Strategies

The proposed organisation structure and primary relationships proposed for the project is summarised in the diagram (Figure 5-1) below. The proposed structure is limited to the key participants and agencies. Position functions are described in the following sections.

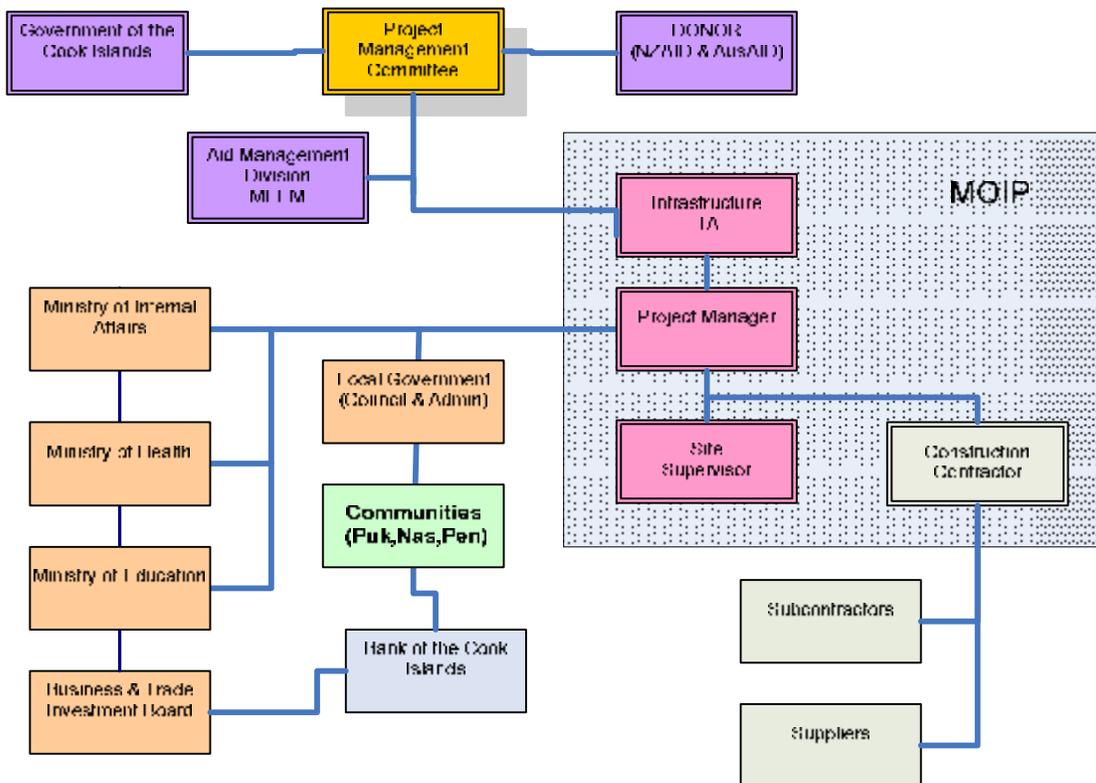


Figure 5-1 – Proposed Organisation Structure

### 5.5.1 Management Arrangements

The project will mainly be funded by donor contributions of NZAID and the Australian Government through its development agency with in-kind support from the CiGov. The donor will be responsible for the timely injection of project funding under the schedule of costs. The PMC through MOIP and AMD will provide internal and external monitoring for the successful implementation the project. MOIP will report to the donor and CiGov via the PMC and AMD.

Other government agencies will also have direct or indirect involvement with the project through the PMC, MOIP and IA.

BTIB on the other hand will manage through the BCI the responsibilities of the loan and grant payments disbursed under the outer island development grant fund<sup>9</sup>.

### 5.5.2 Implementation Arrangements.

An overview of those involved in the implementation arrangements is provided below. The positions noted are indicative of the responsibilities required. MOIP will engage personnel and contractors that collectively can fulfil the responsibilities defined.

#### 5.5.2.1 MOIP & Infrastructure TA

MOIP through the Infrastructure TA will be responsible for the institutional and management arrangements and ensure the optimal performance of the project's inputs and outputs. The Infrastructure TA will have a part time commitment on the project and will be responsible for monitoring project performance in terms of quality, cost and timeliness and for providing backup support to project personnel particularly the PM. As a member of the PMC, the Infrastructure TA will have a pivotal role in the relationship between the project and relevant stakeholders.

#### 5.5.2.2 Project Manager

The Project Manager (PM) will be responsible for managing the project on a day to day basis and for the technical performance of the project. The PM must maintain open and effective communication with the Infrastructure TA and senior selected government and community representatives. The PM will have the authority to make certain decisions on the running of the project.

The PM will have skills in project management, water supply management, design of water supply systems, tender and contract documentation, administration, liaison with partner government agencies, and working in Outer-Island environments.

The PM will be responsible for providing the responsibilities and reports as outlined in Section 4.2 above. The PM will maintain financial records with back up data from the MOIP home office.

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<sup>9</sup> OIGDF - The Business Trade and Investment Board (BTIB) as the implementing agency and the New Zealand Agency for International Development (NZAID) as the donor are providing funding support for Small and Medium Size Enterprises (SME) in the Cook Islands under the Outer Islands Development Grant Fund (OIGDF).

#### 5.5.2.5 Works Supervisor (WS)

The WS will assist the PM and the selected IA with the supervision of contractors and personnel involved in the implementing the project. A key objective of the WS is to work efficiently and effectively with communities, contractors, project personnel and the selected IA in the implementation of the water supply projects at the selected islands. It is envisaged the WS will be stationed full-time and accommodated at the selected islands. The project will be implemented sequentially therefore the same WS can move from one island to the next after the successful completion at each island. The WS will be part of the IA infrastructure team, however reports directly to the PM.

#### 5.5.2.4 Government Agencies

At intermitted periods partner agencies and or line Ministries will be engaged in community education and awareness programs and assist in the delivering of the education materials through consultation workshops with recipient communities preferably at the start and during the project. The program will be implemented by those line Ministries with knowledge in relevant risk management strategies to mitigate contamination of drinking water and maintenance of the water supply system. Specialists will be engaged for the roles and responsibilities outlined in their work programs. The specialists must be able to develop systems that are appropriate to the knowledge, available resources and skills of the selected islands.

#### 5.5.2.5 BTIB, BCI and the OIDGF

BTIB will coordinate through BCI the OIDGF. The inclusion of the OIDGF into the project is to create opportunities for select community and private groups to access funds to promote economic development for the benefit those islands with specific emphasis on water supply.

### 5.5.3 PMC Coordination

Inter-government monitoring and coordination of the project will be conducted through the Project Management Committee (PMC). The PMC will meet regularly, more so at critical stages of the project (i.e. beginning, mid-term reviews and end periods) or as often as required and is responsible for providing guidance and support during the project implementation and for reviewing progress. The Infrastructure TA will act as Secretariat to the PMC. The PMC is expected to comprise:

- § Mayor – of the selected islands;
- § Island Secretary, of the selected islands;
- § Representative from Infrastructure Committee;
- § Representative from Aid Management;
- § Representatives from INTAFF and Ministry of Health;
- § Community representative from the selected islands;
- § Activity Manager from the donor/s;
- § BTIB representative;
- § MOIP Secretary and or Director.

### 5.5.4 Financial Management

AMD is able to hold and administer donor funds for project activities in the Cook Islands on the authorisation of authorised line ministries personnel. In this case the Secretary of MOIP and Infrastructure TA will have those responsibilities for this project.

Project administration of Contractor claims will be processed and authorised by MOIP

and request for payments will be made by AMD.

Project design recognises the need for a flexible but accountable approach towards management of procurement finance in view of the high volume and diverse nature of procurement types required for project activities.

Procurements are expected to include:

- § specialist professional services;
- § construction and installation contracts;
- § building material purchases;
- § Others.

## **6.0 Feasibility and Sustainability**

### **6.1 Management of the Project**

The project will be managed by MOIP working with the selected IA, contractor and technical specialists. With careful management, supervision and monitoring of the project the contractor and the project team will have the ability to implement this type of infrastructure project using local government and community resources to implement the work plan. This arrangement will improve the capacity of organisations like MOIP and the selected IA to implement and maintain water supply projects. This approach optimises the projects inputs and their cost providing appropriate support to implement the project.

The selected IA and island communities have indicated their strong support for the project approach. The selected IA have committed to providing appropriate resources to implement the project.

The project is not difficult to implement provided the appropriate project management model and methods have been proven successful. The method recommended here is through outsourcing of some activities with the assistance of the selected IA and communities. The project design is not complex and maximises the benefits of the project for the people on those selected islands.

### **6.2 Technical Feasibility**

The technical interventions proposed for the upgrading works are relatively conventional and comprise installing of water tanks for residential housing and upgrading the existing community catchments including the installation of water galleries from groundwater resources while providing education and awareness programs. These projects are not new as referenced from the NZAID-CIGov Mauke water supply project (under construction) and the CIGov Mangaia water-tank installation project – (completed with lesson learnt). There is also the NZAID Mangaia water supply project currently being prepared for implementation taking account of lesson's learnt from other projects in its design.

MOIP will be responsible for preparing the design and specifications for the implementation activities, procuring the services and supervising the implementation of the works plan.

MOIP will also be responsible in conjunction with the selected IA to improve local skills and knowledge during implementation of the water supply system. In order for the community to take ownership of the installed water system it is critical that MOIP conducts community awareness and consultation programs and adopts water conservation and safety (through water use practices) measures through public health programs to achieve the project outcomes and goals.

### **6.3 Economic Feasibility**

A cost benefit analysis was not undertaken as part of the project design study. However, the expected economic benefits resulting from the project include:

- § Increasing the opportunity for community employment and IA staff involvement and skills transfer in the installation and operation of the water supply system;
- § Increased profits and potential for business expansion of contractors (in Rarotonga) who may improve their technical and managerial capacity as a result of the project;
- § Increased sales activity will be experienced by building material suppliers in Rarotonga;
- § Commerce generated by employment for the project duration will benefit general commercial businesses in both the Rarotonga and the selected islands;

The inclusion of the OIDGF into the project will create an environment that promotes economic development for the benefit and well being of all Cook Islanders with specific emphasis on the outer islands. BTIB manages and disburses the fund through a loan arrangement with selected community and private groups to access funds to promote sustainability and reduce poverty of those selected islands.

### **6.4 Impact on Poverty**

Economic development on selected islands has been hindered by the lack of a reliable and continuous water supply. The limited economic growth on the selected Island has resulted in many of the younger population leaving for better opportunities in Rarotonga or overseas. These factors contribute to long term poverty and limited development on the selected islands.

Development of a reliable and safe water supply on the selected islands can provide a foundation to initiate increased economic development on those islands. A number of other factors will be required to ensure that business develops such as ongoing commitment of the communities to work and develop appropriate business strategies. However, water is a key element to many businesses and the availability of a water supply is important especially during both drought and cyclone seasons. While water will not solve all the issues that face selected islands as it endeavours to become economically sustainable, it will however assist in providing a valuable and safe resource to the communities during unpredicted events. (i.e.: droughts and cyclones and health related outbreaks).

### **6.5 Social and Cultural Impact and Gender Implications**

The communities on the selected islands generally lead a relatively traditional lifestyle and the roles of men and women are also quite traditional. The men tend to be employed by local government, run farms or local businesses. Opportunities for women to be employed are more limited but some work for the local government or local businesses. Many women are housewives. Increasingly, the traditional roles are changing and women are also helping out in the fields and starting up small cottage industries. (i.e.: arts and craft for export to Rarotonga).

This project provides an opportunity for women to be involved in ensuring that the water supply system is operational and safe to use, seeing most women are at home near the water supply system women should be involved in remedial maintenance of the system. The project allows for maintenance workshops to be delivered to the communities by both the contractor and specialist personnel.

Currently the jobs for island infrastructure works are focussed on physical labour. With the introduction of the water supply scheme for residents the communities will learn new skills in the installation and maintenance of their water supply system which will contribute to the overall skills on the Island. Many of the hands-on skills developed from the training received during project implementation can be applied to other activities and could assist in establishing local businesses. (i.e.; plumbing, roof repair and tank installation work).

Another aspect of life on the selected islands is the ownership of land by traditional owners. To date the chiefs have supported the water supply project from the investigation stage and have reaffirmed the support of activities which benefit the Island. It will be important for any future work to continually involve chiefs in decision making of the project to ensure ongoing support.

In addition to the above benefits the consultations and training programs being planned for the project will also provide an opportunity for both men and women in the community to share ideas and together prepare a program for ongoing awareness and training to maintain their water supply system.

In summary the upgrade of the water supply system on the selected islands has the potential to compliment the existing cultural and social environment, and promote opportunities for women on the Island as long as appropriate implementation strategies are adopted.

## **6.6 Institutional Feasibility**

The focus of the project is on quality, quantity and continuity of water supply to the selected communities. Regular monitoring of the project will optimise the quality and quantity of water provided to selected communities.

The project will use and build both local and institutional knowledge and reinforce the feasibility through up-skilling and knowledge transfer in the safe use, storage and distribution of water throughout the community.

MOIP and the selected IA will increase its own institutional capabilities both through understanding how to implement types of projects and being prepared and aware of risks associated with a range of issues by gaining skills experienced on this project.

The consultation process with key stakeholders indicated a high degree of support for the project from CIGov at all levels. In common with other government agencies in the Cook Islands, MOIP is experiencing resource constraints whilst at the same time demand for the supply of quality delivery is growing. The project supports the CIGov's long-term aim for the provision of high quality infrastructure projects to communities of the outer-islands.

## **6.7 Environmental Impact**

The environmental impact of the project will be minimal and any potential impacts will have a management strategy in place to ensure their impacts are minimised. An environmental effects report along with a plan of action will be developed during the preparation of the implementation plan by MOIP.

Environmental impacts for similar water supply projects are largely related to the construction of newly installed reticulation systems and major upgrading of the water supply system. For this project the main activities are the installation of water storage systems at existing facilities including public buildings and will be constructed in areas which have already been cleared of significant surrounding vegetation. Apart from sourcing of foundation materials for the tanks (i.e. sand and aggregate which is abundant on the islands) there will not be any significant environment impacts.

Groundwater environmental impacts are covered intermittently in Falkland (2005) for Pukapuka in section 5 and 6 under Groundwater Investigation and Monitoring including Groundwater Development Strategy and Falkland (2006) for Penrhyn in section 5 and 6 under Groundwater Investigation and Monitoring including Design Guidelines.

The long term impact of the project will have minimum negative impact on the environment but the increased storage of water will ensure that the adequate volume's of water is available during drought and or other natural hazard periods.

## **6.8 Factors in the Design to Promote Sustainability**

The project design developed for the project on the selected islands has adopted long term sustainability as a key design criterion. Due to the remoteness of the selected islands and the resulting investment of installing, constructing, operating and maintaining a water supply system in this environment, sustainability was essential to ensure value for money for project funds and affordable for the selected communities.

The possible use of solar pumps as a renewable energy source for infiltration galleries are covered in Falkland (2005) for Pukapuka in section 6.4.5 and Falkland (2006) for Penrhyn in section 7.3.6 under pumps and solar power. Similar technology should be used for Nassau.

Introducing training and awareness in the use and maintenance of the system further contributes to the sustainability of the system. It is widely accepted that regular maintenance by owners and operators allows water supply systems to work more efficiently and over a longer timeframe. Improving the harvesting of water is a key sustainability factor that will promote capacity building of IA staff and prepare operation and maintenance routine procedures. The design allows all stakeholders to be involved, including the communities, farmers and local businesses, so that they understand the importance of a safe water supply.

The community awareness and consultation program is a critical first step in project implementation as communities become aware of the challenges with providing a safe continuous water supply. Ongoing education to reinforce improved maintenance practices for owner and operators of the water supply system will be necessary after completion of the project but the community at least is aware that they are an integral part of the process.

## 7.0 Conclusions and Recommendations

### Project Goal & Purpose

The PMC recommends concentrating on three northern islands namely; *Pukapuka*, *Nassau* and *Penrhyn* and focus on upgrading the existing water harvesting capabilities with minimal cost in order to maximise output by including groundwater improvements as a drought proofing measure.

The NWater project goal is to encourage sustainable growth with opportunities for employment, improved public health and well being, strengthen local capacity, operation and maintenance and promote environmentally sustainable economic development.

### Penrhyn - Proposed Water Supply Improvements

Water supply improvements have been proposed as follows:

- § Rainwater catchment and storage improvements on *Omoka* and *Tetautua*. The aim is to ensure that the minimum potable water requirement of 10 L/p/d can be supplied at all times with a “safety margin” to allow for possible changed conditions.
- § Installation of a groundwater supply system on *Omoka* to provide supplementary water for non-potable purposes when rainwater is not sufficient to supply all or most water needs.
- § The proposed ground water system to include infiltration galleries equipped with solar pumps and storage tanks at the airstrip, and a distribution pipeline to standpipes fitted with water meters near houses and community buildings.
- § Water sanitation and hygiene programs.
- § Water monitoring program.

### Pukapuka – Proposed Water Supply Improvements

Water supply improvements have been proposed, as follows:

- § Rainwater catchment improvements on all three island villages of *Yato*, *Ngake* and *Roto*. The aim is to ensure that the minimum potable water requirement of 10 L/p/d can be supplied at all times with a “safety margin” to allow for possible changed conditions.
- § Installation of groundwater supply systems on all three island villages. The aim of this work is to enable people to have access to good quality groundwater for non-potable uses when rainwater is not sufficient to supply all or most water needs. The proposed groundwater systems include infiltration galleries equipped with solar pumps, storage tanks and distribution pipelines to standpipes within the villages.
- § Water sanitation and hygiene programs.
- § Water monitoring program.

### Nassau – Proposed Water Improvements

Water supply improvements have been proposed, as follows:

- § Rainwater catchment improvements on selected residential houses and community catchments. The aim of these improvements is to ensure that the minimum potable water requirement of 10 L/p/d can be supplied at all times with a “safety margin” to allow for possible changed conditions.
- § It is also recommended that *kikau* houses will need to access and share water from upgraded and improved community tanks located at strategic locations around the island. It is also recommended that a tanker (i.e. 3000L transported on a trailer) is procured to deliver water to those residents who do not have access to readily available water during dry periods.
- § Water sanitation and hygiene programs.
- § Water monitoring program.

### **Stakeholder Analysis**

The following proposition was received during the stakeholder analysis:

- § An eligibility criterion for those who should receive assistance in consultation with INTAFF and summarised in section 2.12 *Selection Criteria of Recipients*.
- § Incorporate relevant risk management strategies to mitigate contamination of drinking water.
- § Maximising the benefit of the scoping work already done by using and checking existing bills of materials and budgets.
- § For the construction design aim for minimum maintenance and provide employment for northern Island communities where-ever possible.
- § A supply and construct model is favoured to firmly place the ordering, delivery and security of supplies with the contractor.
- § In the design strive for value for money, timely completion and deliver the project using relevant Cook Islands Government procurement systems.
- § Use and build local knowledge and reinforce community management of water resources in a sustainable manner.
- § All existing projects and works on the islands are mapped and opportunities to benefit from synergies investigated.

### **Existing Water Supply**

Rainwater is collected from communal and private roofs and stored in adjacent above ground storage tanks. Groundwater from wells in villages is currently used in dry periods for non-potable purposes when rainwater becomes depleted.

The main problems identified were:

- § Inadequate supply and quality of water;
- § Poor condition of water supply system;
- § Limited management of water supply;
- § Potential contamination of water sources.

### **Minimum water supply requirements**

As no water supply standards are available in the Cook Islands, a set of interim standards are here adopted for planning purposes (See Annex C).

The project recommends the use of the latest World Health Organisation – WHO (2004) Drinking Water Quality Guidelines (Version 3). The design allows for a minimum of 100 L/p/d during normal conditions of which at least 10 L/p/day should be potable use.

For groundwater the supply requirements are highlighted in Falkland 2005 report for Pukapuka Section 8.3 and in Falkland 2006 report for Penrhyn Section 6.3 under water supply design guidelines.

### **Importance of Monitoring Boreholes**

There is a need to ensure that the current monitoring programs of boreholes identified by the Falkland reports for Pukapuka (2005) and Penrhyn (2006) are conducted regularly (i.e. every 3 months and the data sent to MOIP water resources department in Rarotonga for future analysis and use in design).

The data collected is for the ongoing sustainability of the project in the operation, maintenance, management and monitoring of ground water resources. The monitoring programs identified in the Falkland reports for Pukapuka (2005) and Penrhyn (2006) needs to commence immediately.

### **Implementation Options**

The option considered in section 2.7.3 points towards a phased approach in delivering the project. (i.e.: the primary supply scheme - Phase 1 and the secondary water supply scheme - Phase 2.).

*Phase 1* requires upgrading residential and community catchments and connecting these to newly installed or rehabilitated water tanks. *Phase 2* requires the upgrading of groundwater resources by installing infiltration galleries. Both phases require Water sanitation, hygiene and water monitoring program.

From section 2.15 the use of Contractors (Option 1) was the preferred implementation approach that utilises resources from the private sector, government departments and Island resources. The approach is to implement the project work sequentially (i.e. with Pukapuka first, then Nassau and finally Penrhyn). Phase 1 will be done while water monitoring and education and hygiene project is being conducted. Phase 2 will follow once Phase 1 activities have been fully completed and financial resources secured for Phase 2.

The proposed organisation structure and primary relationships proposed for the project is summarised in Figure 5-1. The proposed structure is limited to the key participants and agencies.

### **Water Contamination & Hygiene Training**

The PDD report covers components and options for managing potential health risks, including criteria for establishing common sewerage systems; well-head protection policy options; siting, design, and maintenance of sanitation systems; monitoring procedures; treatment of water supplies; and public awareness programs. These provide a range of measures that can be adapted by local communities to meet their needs for safe water supplies. (See Annex I)

Public health officers in each of the selected islands in consultation with the IAs and Island council will support the project by implementing a water safety plan to ensure safe drinking water through good water supply practice. (See Annex E – Water Safety Work Plan).

## Project Costs, Budget and Disbursements

The estimated cost for the project as listed is summarised in Table 4-7 below. See Annex G for detailed breakdown of costs allocated to selected activities. All related expenses to support project personnel are included in these calculations.

The MFEM procurement procedures through AMD will form the basis for payments to MOIP. The payments will provide regular cash flow on a monthly basis based on inputs and outputs-based payments relying on deliverables completed within the required milestones and designed outputs.

SELECTED ISLANDS	CIGov	Donor	Donor
TOTAL FOR PUKAPUKA	\$91,214	\$723,114	\$919,193
TOTAL FOR NASSAU	\$23,340	\$134,922	\$85,126
TOTAL FOR PENRHYN	\$92,865	\$670,980	\$879,802
DISBURSEMENTS			
YEAR 1: June 2009 to June 2012 - CIGov	\$207,419		
YEAR 2: June 2010 to June 2011 - Donor		\$1,529,016	
YEAR 3: June 2011 to June 2012 - Donor			\$1,884,121
<b>PROJECT ESTIMATES NZ\$</b>	<b>\$207,419</b>	<b>\$1,736,435</b>	<b>\$3,620,556</b>

**Table 4-7: Summary Project Cost**

## Project Schedule and Appropriation

The work schedules on each island will follow a *two (2) phase approach over two (2) years* and implemented sequentially (i.e. with *Pukapuka* first, then *Nassau* and finally *Penrhyn*). Phase 1 will be done while water monitoring and education and hygiene project is being conducted. Phase 2 will follow once Phase 1 activities have been fully completed and financial resources secured for Phase 2.

The IA will receive project support budget for Island infrastructure works as part of its Government responsibilities. Support budgets needs to be appropriated early.

The timing of receiving funding approval, the release of government budgets and donor contribution has been geared during the procurement and implementation of the upgrading works program.

## Monitoring and Management Strategies

Successful implementation of the Project will provide the following key outputs:

- § The establishment of project operational, implementation, maintenance, monitoring and evaluation systems for the benefit of IA's, MOIP and other key government department and project stakeholders;
- § An upgraded water supply that will provide a continuous supply of water at a quality that complies with appropriate guidelines;
- § Improved installation and maintenance skills of the community recipients and the selected IA so that upgraded water supply system operates optimally and sustainably in the long term;
- § Improved local knowledge and reinforce community awareness and management of a sustainable water resource and incorporates relevant risk management strategies to mitigate contamination of drinking water;
- § Increased storage of water through selected communities adopting water conservation measures;

Regular testing and monitoring will lead to more sustainable water supply for the selected islands and overall improve the social and financial conditions of the population.

**Project Performance**

Overall project performance will be assessed from regular reporting and site inspections which demonstrate the impact of the project. MOIP will be required to develop a comprehensive list of milestones with indicative timings to be provided to the PMC for measuring performance during the implementation stage of the project. The list of milestones will assist assessment of both the contractor and project support team's performance and achievements from the designed outputs.

Performance assessment will include an analysis of progress reports and work plans along with field visits by the project management team.