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SPREP
Secretariat of the Pacific Regional Environment Programme

PacWastePlus
PACIFIC WASTE MANAGEMENT

This initiative is supported by **PacWastePlus**-a 85-month project funded by the European Union (**EU**) and implemented by the Secretariat of the Pacific Regional Environment Programme (**SPREP**) **to sustainably and cost effectively improve regional management of waste and pollution.**

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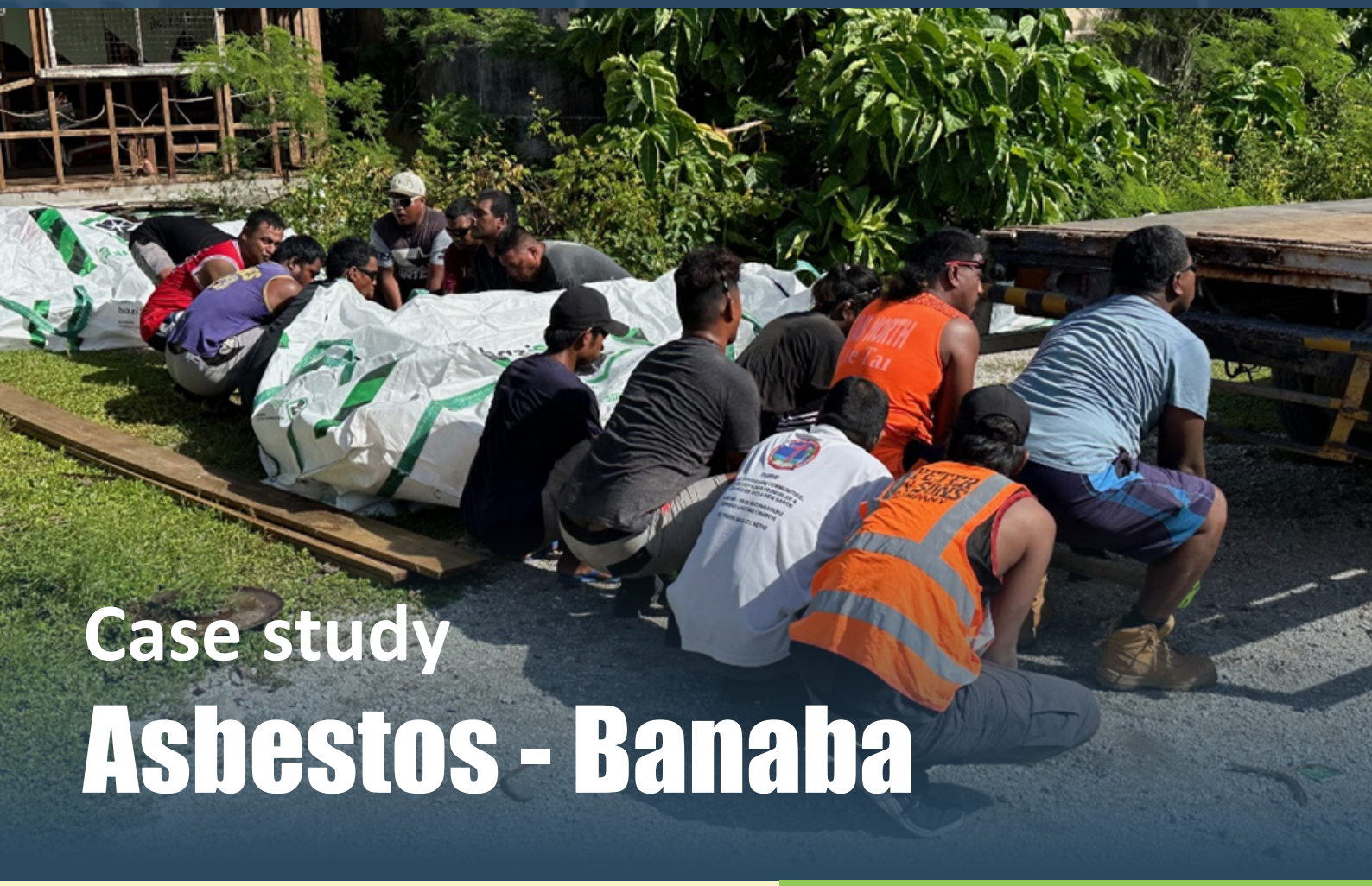

Case study
Asbestos - Banaba

Issue to be addressed

Asbestos Contaminated Materials are prevalent in most buildings on the island of Banaba. Studies done in 2014 and 2015 documented asbestos containing materials in many public and private buildings, exceeding 2,500 tonnes (238,050m^2), in the former British Phosphate Company residential properties. Asbestos abatement activities are made more difficult in Banaba due to the lack of infrastructure (i.e. limited handling, excavation and transport equipment), lack of appropriate ACM disposal facilities, and no trained ACM abatement personnel.

The study further noted, “Given the poor condition of asbestos at the former British Phosphate Company sites close to the main public road on Banaba and the unrestricted access to the sites, public exposure to asbestos fibres is likely.”

High risk sites were identified for abatement activities. These buildings were then assessed against project constraints, and three were selected to have the asbestos containing materials removed to international standards.

Project Design & Planning

The project involved the removal of asbestos containing materials from selected buildings on the Island of Banaba, and the development of a Strategic Asbestos Management Plan (SAMP).

Three buildings were targeted for abatement activities, with some 3,833 m^2 of Chrysotile and Amosite (non-friable asbestos containing material roofing sheets and cladding to be removed).

Project Design & Planning

Banaba is a very remote island with no airport or support logistics – such as accommodation, shops, equipment. The only way to reach Banaba is chartering a ship for the two-day trip. Ships cannot berth at Banaba, needing to anchor offshore, as there are no jetties or wharfs. All cargo is transferred to and from the ship by small boat.

There is single a truck on Banaba but no way to lift heavy loads such as the sealed bags (hazibags) containing asbestos.

There was no suitable method of disposal on Banaba or Kiribati and all the asbestos waste was shipped to New Zealand for disposal.

As the project was addressing several buildings, planning between the Ministry of Environment, Lands and Agricultural Development and the Banaba Island Council was required.

To safely and efficiently complete the works, the following was confirmed:

- A final decision on the buildings for ACM removal was a collaborative effort between the Ministry of Environment, Lands and Agricultural Development, Banaba Island Council, SPREP and the contractors. Several meetings and discussions were held to come up with the final list of buildings for abatement.
- Transportation of asbestos abatement equipment, i.e. asbestos waste "HaziBags", polyethylene sheeting, personnel protective equipment (Tyvek, Respirators, facemasks, etc.,) occurred on the same vessel as the workers transportation.

Prior to any work commencing, an Asbestos Removal Control Plan was developed and approved by SPREP and the Ministry of Environment, Lands and Agricultural Development. The Plan is a comprehensive document outlining the procedures for safely removing asbestos, including identifying asbestos containing materials, assessing risks, implementing control measures, and ensuring worker protection.

Location	Type of Asbestos	Asbestos containing Materials Removed on location
Banaba Hospital	Chrysotile & Amosite roofing and cladding	3,255m^2
Primary School	Chrysotile & Amosite roofing and cladding	382m^2
Junior Secondary School	Chrysotile & Amosite roofing and cladding	196m^2
Total	*[Note: final weight of ACM waste at NZ disposal site noted as 38.28 Tonnes (equivalent to 3,645m^2]*	**3,833m^2**
Project Cost		**US$278,494**

Prior to the project commencement in Banaba there was a substantial amount of preliminary work. A virtual Inception Meeting was held on 18 December 2023. The Work Plan was then developed and accepted on 22 January 2024.

A transboundary movement consent was required under the Basel Agreement and this process was set in place immediately.

The project was managed by Morecroft CEO Dirk Catterall and he travelled to Kiribati on 22 February 2024. Alex Wood of More Environmental also went to Kiribati on 22 February 2024 and later Banaba to carry out the necessary training and personnel preparation work.

Project Design

Utilising the findings of a 2023 asbestos assessment of Banaba Island, several buildings were identified to be clad in asbestos containing materials. To be eligible for the European Union funded project, specific criteria were required to be met for inclusion in this work.

Utilising these criteria, the Ministry of Environment, Lands and Agricultural Development engaged with Banaba Island Council to confirm suitable buildings. Following confirmation of the buildings, specialist asbestos control contractors were engaged.
The Contractors developed an Asbestos Removal Control Plan addressing the key elements of asbestos removal proposed. The Asbestos Removal Control Plan identified the specific control measures proposed to ensure workers and other persons are not at risk when asbestos removal work is being conducted. The plan focused on the specific control measures necessary to minimise any risk from exposure to asbestos.

Selection Criteria

Abatement activity can occur in buildings and structures that:

1. are owned by the Government of Kiribati,
2. are currently unoccupied (for the purposes of permanent or temporary housing),
3. If occupied for business purposes (any purpose other than housing) the users of the structure must be able to be physically restrained from entering areas where abatement activity is occurring (e.g. safety barriers installed, areas cordoned off, etc.), until such time as replacement materials (for the removed ACM) have been installed, and the area has been deemed safe by Environmental & Health inspectors.
4. Where buildings or structures meet the above criteria, they should be prioritised if:
   a. they are partially damaged or dismantled,
   b. at risk from damage from natural disasters (e.g. cyclones),
   c. provide a critical community function,
   d. the Kingdom of Tonga has approved funds to undertake any necessary re-construction activities needed to make the building or structure safe and usable following removal of ACM.

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Key elements included in the Asbestos Removal Control Plan

Identification:

» Details of the asbestos-contaminated materials to be removed.

» Listing of the facilities for abatement (e.g. the facility locations, amount of ACM that shall be removed, asbestos location in the building, and whether it is friable or non-friable).

Preparation:

» Consultation plans for regulators, owners and potentially affected stakeholders.

» Assigned responsibilities for the removal works (abatement team and Tonga Government officials).

» Program of commencement and completion dates.

» Safety plan (e.g. safe working at heights, manual handling).

» Asbestos removal boundaries, including the type and extent of isolation required and the location of any signs and barriers.

» Personal protective equipment (PPE) to be used (e.g. respiratory protective equipment).

Workers preparations for ACM removal:

» Training on the Asbestos Removal Control Plan

» Ensure perform work in compliance with best international practices, any direction of Environment officials, and with any local regulatory requirements.

» Act in a safe manner and that any unsafe condition is reported and corrected immediately.

» Work with due regard and attention to workplace health and safety issues.

Decontamination:

» Detailed procedures for the workplace decontamination.

» The decontamination of tools and equipment

» Personal decontamination of non-disposable PPE and RPE

Disposal Management:

» Confirmation of where the asbestos will be disposed (including assurance the disposal facility is licensed to accept asbestos waste, and they have agreed to accept the material)

» An asbestos management disposal plan to manage risks during transportation.

» Methods for disposing of asbestos abatement waste (e.g. Disposable protective clothing and equipment, structures used to enclose the removal area, etc.)

Project Planning

Given the remote nature of the works required, the contractors engaged a local contracting company to assist with the Kiribati based planning requirements, including all logistics, and licences necessary to allow the abatement activity to occur. The local contractor was responsible for the planning and delivery of the boat and equipment to be shipped to Banaba, and the boat returning with the asbestos containing materials.

The remote nature of Banaba meant there was no appropriate landing craft added additional complications to the abatement activity. Without the ability for mechanical assistance, additional hazibags were required, as the weight in each would need to be reduced to enable them to be manually lifted on and off the boat by abatement staff.

The local contractor was responsible for:

- Arranging the Environmental Permit required by the Government of Kiribati for the work to proceed.
- Chartering a vessel to take the asbestos crew to Banaba and pick them up after the work is completed.
  - » The charter ship departed from Tarawa to Banaba (a trip of about two days) and return two weeks later to pick up the work crew and asbestos waste. It would be expensive for the ship to stay as there is no anchorage.
- Providing twelve workers to undertake abatement, including an electrician and mechanic. The remaining workers were local Banaba residents
- Providing all the logistical support, including:
  - » meals and catering (supplies of food and water)
  - » Accommodation (there are large unused houses on the island and Equapac undertook to bring cleaning gear. Equapac undertook to build a temporary toilet block and shower block)
  - » Ancillary supplies and equipment (sea-sickness tablets, two generators, mattresses, mosquito nets, gas cookers, two motorcycles)
  - » providing a Starlink system to enable internet communications on Banaba
- Arranging the shipment of the waste back to New Zealand in three containers.

The Principal Contractor managed the asbestos removal work according to the step-by-step procedure set out in the Asbestos Control Management Plan is as follows:

- Assess situation in Banaba and work to be done. The Asbestos Control Management Plan was flexible and was to be adjusted to suit local requirements once they had been determined.
- Ensure sufficient signs and barrier tape to prevent access by untrained personnel, around the localised working areas.
- Set up tools, materials and equipment area on-site to safely store all materials, tools and equipment as required.
- All asbestos removal works to be carried out as ''B'' class conditions
- All Operatives on site to be trained to B Class (AUS/NZ) standards
- All personal protective equipment and respiratory protective equipment was correctly worn while within working areas
- Established a localised decontamination pod at the boundary of each building, to allow workers to safely decontaminate when exiting the dirty area
- Using a 24-person team, sheets to be removed from the buildings at the above locations and stacked into 3 cubic metre hazibags, weight approx. 500 kgs or approx. 10-15 sheets, depending on dimensions.
- all asbestos sheets and building components must be kept very clean and free of debris before placing in the hazibags.
- Screws / fixings undone, and sheets passed down to the ground, purlins and trusses to be HEPA vacuumed and visually certified clean by a NZ Licenced Asbestos Assessor.
- A 12-person team involved in unloading the hazibags from the truck, stacking them at the Banaba Port.
- Hazibags were lifted using manpower and a suitable lifting rig, onto a tray of a small truck for transport down to the wharf storage area. They were lifted by hand onto the shore-to-ship vessel for transport out to the ship where they are to be lifted by the ships crane into the hold.
- Once the asbestos was removed and stored on the ship, the ship sailed to Tarawa where the hazibags were craned from the ship into secure storage and then loaded into containers for transport to NZ.
- Disposal of all asbestos waste at an approved licensed waste facility in NZ, and decontamination of the containers which will then be sold and monies returned to the project cost as a credit.
- All Labour, shipping and local project were supplied by the local Tarawa company. Principal contractors supplied supervision, materials, training, monitoring and laboratory services, and management of costs associated with disposal in NZ once containers arrive.

Project Implementation

Safety Management

Safety Protocols implemented during the abatement works were:

- Creation of Asbestos Removal Control Plan.
- Sufficient warning signs & barrier tape will be located around working areas before works start and maintained until works completion.
- All contractor supervisors & operatives on-site are trained in working at heights & rope access.
- All safety harnesses worn will be in date and inspected prior to use on-site.
- All PPE & RPE correctly worn while within the working areas
- Setup a localised decontamination pod at the exit of each stage of work, this will allow workers to safely decontaminate when exiting off the roof.
- Clearance inspection by licenced contractor to be completed before area deemed safe for habitation.
- Non-friable asbestos removal training was provided by Alex Wood of More Environmental. A total of 38 workers were trained in two training sessions – one in Tarawa and one on Banaba. This included the workers to be used for Banaba removal project as well as consultants, and government employees. The Tarawa training took place on Saturday 24 February 2024 for 14 trainees. The Banaba training took place on 1 March 2024 for 24 trainees.

  The training was carried out in accordance with the NZQA Unit Standard 29765 Version 2, and supplementary on-the-job training was provided to all local workers during the removal work, by Dirk Catterall of Morecroft contractors. Workers were fully trained on and made fully acquainted with the

Asbestos Removal Control Plan (ARCP), including the full extent, location, and dimensions of asbestos materials to be removed, access availability, safety requirements, disposal availability, etc.

» Prior to works commencing workers were fully acquainted with the Asbestos Removal Control Plan and therefore understood, the full extent, location, and dimensions of asbestos materials to be removed, accessibility to materials, and from the site, all safety requirements, disposal processes.

Utilising standard construction tools (drills, etc.), asbestos containing materials were removed from the building structure in-tact and taken to the waste staging area for safe management.

The asbestos was then loaded into Hazibags. Hazibags are flexible intermediate bulk containers specifically designed for the safe transportation and disposal of hazardous waste, including asbestos. They offer a safer and more efficient alternative to traditional methods like black plastic wrapping or steel containers. Each bag was limited to 500kgs of asbestos containing materials waste due to the need to manage the Hazibags manually as there were no cranes available.

Travelling to Banaba, Arrival and Preparations

The ship arrived in Tarawa on 27 February and was loaded through the day, arriving in Banaba on 29 February. The first day included unloading gear, arranging accommodation, meeting with the Banaba Island Council, assessing the buildings and training local staff.

Asbestos Abatement Procedures

Abatement procedures were established in the workplan and Asbestos Removal Control Plan developed for the project. First is to set up a tool, materials & equipment area on-site for the contractor to safely store all materials, tools & equipment as required.

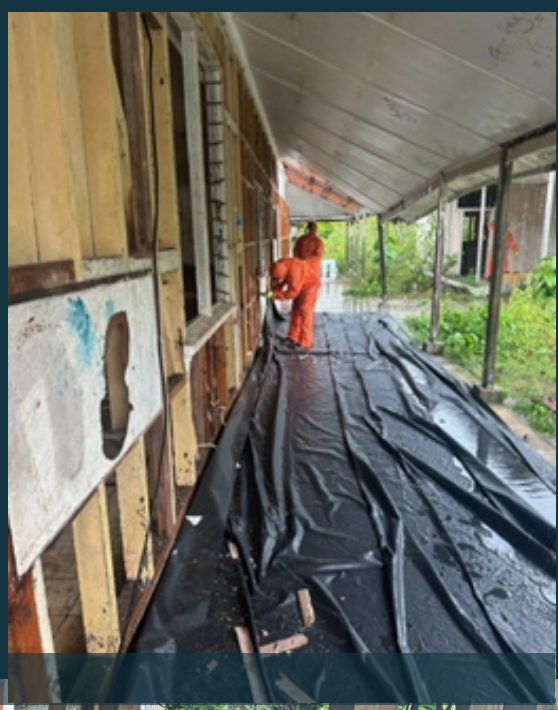
Work begins after the morning safety brief with the de-nail/unscrewing of the existing roof sheets and cladding to allow access for removal. Once that is done removal and disposal of the exterior corrugated fibre cement roof sheets and cladding occurred. All asbestos waste removed on-site was placed in Hazibags and placed in an allocated waste disposal area.

Lastly working areas and equipment used on site was decontaminated and cleaned each day.

It took six days to complete all abatement activities.

Removal of Asbestos from the Schools

Removal of Hospital Roof



Removal of Asbestos from Hospital Interior

Loading and Transport of the Waste Asbestos

A local truck was utilised to transport the wrapped waste asbestos to the port. The seating was removed to allow hazmat bags to be transported to port. All loading and unloading was undertaken manually. Due to the mooring situation (1km from shore) it took one day to load all the asbestos waste.

Truck Loading


Truck Loading

Shipment to New Zealand

The process of shipping the containers from Tarawa to New Zealand was a lengthy one. The containers arrived in Tarawa from Banaba on 20 March and finally left Tarawa on 9 August. Initially they needed to be unloaded, which only took a few days, and the asbestos waste hazibags were unloaded at the Betio Port in Tarawa and placed in a restricted zone with no public access.

To ensure the shipment complied with biosecurity requirements of New Zealand, so considerable care was taken, using a hard clean surface with the hazibags cleaned with a water blaster prior to being placed on pallets. The container floor was lined with polythene and kept clean during the final loading of pallets to the container.

- Each container was cleaned outside all around, including the underside, prior to loading into the ship.
- Each container was weighed on a weighbridge.
- A packing list was prepared for each container, with the number of packages, and method of packing/wrapping for each package.
- Each package was labelled as DG Class 9, with the labels pointing out.
- Clearly visible DG Class 9 placards were also used on all four sides of the containers.
- The container seals were put on at the Port, and a record was kept of each seal number on the relevant packing list.
- Detailed photographic evidence was kept of all on-site actions so that any queries could easily be answered.

Containers Arrival and Unpacking for Disposal

The containers arrived safely at the Port of Auckland on 17 September, were given biosecurity clearance, and were transported to the chosen disposal company EnviroNZ on 26 September 2024. The contractor carried out a waste asbestos removal exercise on 27-30 September 2024.

The waste asbestos was removed, the packaging was checked for integrity, and the removed waste was stockpiled for disposal to the EnviroNZ landfill at Hampton Downs.

Waste unloading exercise

Outcomes and Impacts

3,645m² of ACM removed

38 workers trained

The waste asbestos containing material was disposed of at the EnviroNZ landfill, Hampton Downs Auckland. With the final weight noted as 38.28 Tonnes (equivalent to 3,645m²)

Along with the removal and disposal of 3,645m² of asbestos containing materials, 38 local workers and government official were trained in asbestos abatement work. These personnel are now trained and experienced in safe and efficient removal of ACM. 12 of these from Banaba Island and are therefore able to assist the local community with any additional asbestos management activities needed.

Workers were provided with PPE and equipment that they can use in the future for asbestos abatement and disposal activities.

The removal of this material from these buildings has removed exposure risk from the roughly 330 people that live on Banaba Island.

Challenges and Lessons Learnt

Undertaking a large asbestos abatement task in a remote location with limited services or the logistical requirements for equipment, staff movements, safety protocols, and transport procedures, posed several challenges for the contractors.

Key challenges addressed, and lessons learnt from this activity are:

Challenge	Response	Lesson Learnt
Logistics of accessing Banaba Island	Banaba Island has no: • regular shipping route • airfield • local support structure • ready accommodation of food options • local disposal facilities	To manage these challenges the following was done: • a ship was chartered • travel to Banaba was two-day ship journey • Local Tarawa based sub-contractor engaged to manage all requirements • Local Tarawa based sub-contractor engaged to manage all requirements • The asbestos waste was brought to Tarawa by ship and then exported to New Zealand for disposal.
Environmental Management Plan approval	It proved to be quite difficult to obtain an EMP approval from MELAD. This threatened to delay the project and should have been resolved at an early stage. There was confusion as to who needed to apply for this environmental consent.	Planning should include an environmental review of regulations/policy as it relates to the action to be undertaken. Early coordination with local government officials during the planning process is needed.
Confusion with Banaba Island Council of the scope of works	Despite numerous meetings, and confirmation of scope of works in writing, the Banaba Island Council wanted the buildings to be re-clad after asbestos removal (this was not within project scope or budget).	Kesolved with the intervention of the MELAD representative who accompanied the Contractor and Work Crew. The offer was made to purchase roofing urgently with funding from an alternative source and the roofing was on the ship that returned to pick up the workers and waste asbestos.
Non-availability of Heavy Machinery	This was of particular concern when it came to manipulating the heavy hazibags that contained the asbestos waste materials.	This was overcome by underfilling the bags and using a team of local workers to manhandle the hazibags using a pole frame and working in a coordinated manner. This difficulty was anticipated, and the planned process worked satisfactorily, although it was not straightforward.

Challenge	Response	Lesson Learnt
Delay in the Return of the Ship to Banaba	The return of the ship was held up with bad weather and this meant that supplies were low for contracted staff.	Planning for delayed shipping should be included in future actions.
Preparing the Transboundary Documentation	There were some difficulties in preparing the transboundary documentation, partly due to an initial change in shipping route, but also because of some lack of understanding of local staff, despite clear instructions and advice from the consultant team.	This matter was finally resolved satisfactorily, mainly because the shipping route was further changed at a late stage to go through Fiji, and the Fiji Department of Environment, with encouragement from SPREP, were prompt with their transit approval. There were also delays with approvals from the consenting authorities, and SPREP was required to follow up with the Competent Authority to ensure this was processed in time.
Delays with the Moana Taka Partnership (MTP) Process	It took a very long time to obtain approval to use the MTP and intervention was needed from SPREP	The Moana Taka Partnership application and approval process is slow. Appropriate planning to manage these delays is required.
nloading asbestos waste in constrained environment in New Zealand	• All waste was placed into 30 m^3 bins. The bin was situated 15m from the container meaning only one container at a time. • A fork hoist was used to remove the bags from the containers. • Time was lost on bin change over. • Some of the parcels were damaged or burst open, requiring repair prior to final disposal.	Although the works eventually went well, a larger site, and more control of transport, this process would have been completed in 2-3 days not 4 days

Innovation and Excellence

The project was overall highly successful, given the considerable logistical and other challenges, and was delivered within the budget, although the timeframes needed to be extended through no fault of the Contractor, due to the long delay in moving the asbestos waste from Tarawa to an exporting ship. Importantly, there were no complaints from the Banaba Town Council or the local Banaba community. There were also no accidents or injuries, no detection of airborne asbestos adjacent to the worksite at any stage, and high levels of satisfaction with the job.

Numerous difficulties were experienced during the Contract, but these were all overcome with cooperation, a creative approach to the work, a good understanding of the issues, and considerable perseverance. There was also considerable assistance from SPREP throughout, and locally from the environmental agency and the local contractor.

In addition, a very useful Strategic Asbestos Management Plan (SAMP) was prepared as part of the Contract, which will inform any future asbestos removal work undertaken on Banaba.