ENVIRONMENTAL IMPACT ASSESSMENT

Aleipata Wharf and Slipway
Samoa Ports Authority

March 2008

Prepared by

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ACRONYMS

SPA:	Samoa Ports Authority
PUMA:	Planning and Urban Management Authority
MNRE:	Ministry of Natural Resources and Environment
DEC:	Division of Environment and Conservation
MPA:	Marine Protected Area
EIA:	Environmental Impact Assessment
CIM Plan:	Coastal Infrastructure Management Plan
GEF:	Global Environment Facility
IUCN:	World Conservation Union
CI:	Conservation International
SSC:	Samoa Shipping Corporation
CHD:	Coastal Hazard Database
EPC:	Electric Power Corporation
MSDS:	Material Safety Data Sheets

EXECUTIVE SUMMARY

This report provides the finding of the Environmental Impact Assessment conducted by Pacific Environment Consultants Ltd on behalf of Samoa Ports Authority for the proposed Aleipata Wharf Extension and Slipway. The EIA was conducted over the period of January to April 2008.

The EIA process included,

- Consultations with representatives of the SPA, representatives of UNIMA, the current contractors for designing, building and initial management of the Slipway.
- Public consultations at Aleipata with the district, and other relevant stakeholders
- ,Marine rapid assessment,, and review of Aleipata MPA Biodiversity Assessment Survey, Aleipata MPA Reef Monitoring reports,
- Assessment of the design plans.
- Review of the draft EIA by SPA and UNIMAR as the proposed contractors and managers the Slipway over its first two years.
- Review by PUMA of the draft report
- Preparation and final submission of the final EIA report to SPA

The EIA noted that the proposed site already has an existing wharf that was built in the late 1970's but was not fully utilized for commercial operations until now. The wharf is currently sitting idle with only some fishing boats currently using them for anchorage.

The EIA further noted that the district of Aleipata has since 1999 declared its inshore reef as part of the Aleipata Marine Protected Area through a project funded under the Global Environment Facility. The Aleipata MPA conducted a comprehensive baseline marine biodiversity study which was used for the development of a MPA Management Plan. Some of the activities implemented under the MPA management plan include the establishment of No-Take Zones for each of the 11 village of Aleipata, a rehabilitation programme for the Aleipata islands, regulations for the sustainable harvesting of marine resources, and a reef monitoring programme. The MPA recently established a Conservation Trust Fund for the future sustainable management of the natural resources which is managed through a co-management agreement between the Ministry of Natural Resources and Environment and the Aleipata MPA District Committee.

The Aleipata inshore reef is home to a diverse and very vibrant marine biodiversity, ranging from a wide range of fish species, sea grass communities, invertebrates, and corals. IT is also home to some of globally and nationally threatened species such as nesting hawksbill turtles, migrating whales, and giant clams. All this biodiversity is very vulnerable to changes that would impact their natural state.

Furthermore, the inshore reef of Aleipata is critical for livelihood of the people wherein the MPA baseline study and the Inshore Resources of Upolu (Zann, 92) noted that around 78% of the district depends upon the sea for its livelihood, either for commercial use or domestic consumption,

The EIA concludes that the proposed wharf extension and slipway at the Aleipata wharf will generate economic benefits for the SPA and local boat operating companies such as the SSC and local fishing fleet. Furthermore, the supporting industry providing services for the slipped boats will also provide needed income for the country. Thirdly the promise of increase tourism services from the cruise ships will generate additional income to the district and the national economy.

The EIA further concludes that the development will generate social benefits such as the provision of employment for people of the district through the provision of employment. Some negative social issues might eventuate such as the disruption of cultural values through the increase traffic of workers, and visitors to the district. Such social issues will need strong commitment from the Alii and Faipule of Aleipata district working in collaboration with SPA to stop it.

On the environmental implications, the EIA concludes that the proposed development will have both short term and long term implications on the marine environment of Aleipata. As such, mitigation measures proposed is envisioned to stop or minimize any potential impacts to from the wharf development activities. Any slip in the proper operation of the Slipway and wharf will have detrimental impacts on the marine resources which the district is highly dependent upon for livelihood.

The EIA therefore provides an overall conclusion that the development is economically and socially beneficial to the district and country as a whole, while the potential environmental impacts can be stopped or minimized to the level that will not pose risks to the environment for the present and future generations of the Aleipata district.

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1. INTRODUCTION

1.1 PURPOSE

This document presents the finding of the Environmental Impact Assessment (EIA) conducted for the development of the proposed Samoa Ports Authority (SPA) Aleipata Wharf Upgrade and construction of a Slipway. The proposed development will be built within the existing SPA wharf at Satitoa Aleipata in the Aleipata I Lalo district of Upolu. (Figure 1.).

The EIA forms part of the documentary evidence in support of a development consent application for the Planning and Urban Management Agency (PUMA), which is the development regulatory agency of the Ministry of Natural Resources, Environment & Meteorology, Samoa Government.

1.2 BACKGROUND

SPA developed the Aleipata wharf in the late 1970's but was never fully utilized for any commercial operations for over 20 years. During the height of the commercial fishing operations several of the Aleipata fishing boats utilized the wharf for anchoring, while in the mid 2000's some tour and dive operators utilized the wharf for the launching of its dive and tour operations.

The proposed Slipway and Wharf extension are part of SPA Corporate Plan 1999. The proposed development is anticipated as cost saving measures for the slipping of Samoa-based boats that currently used the American Samoa, Fiji and New Zealand slipways. SPA identified the costing savings for one of its tugboats to be approximately SAT$40,000 exclusive of the fuels costs for traveling. Furthermore, having the slipway in Samoa will also have additional flow on benefits to the local businesses and communities.

In deciding on the Aleipata wharf for the slipway, SPA conducted engineering studies and consultations with the various stakeholders and agencies at three of the possible sites namely Mulifanua wharf, Fagaloa Bay and Aleipata district. The conclusions of these discussions are documented in a report present to the SPA Board for final consideration (Annex 1) of which the Aleipata wharf was agreed as the best option.

Along with the construction of the proposed slipway, SPA has taken the opportunity to widen its use of the Aleipata wharf by extending it for anchorage of small to mid level Cruise ships. Long term plans includes the development of a resort on the wharf and associated amenities.

The Samoa Shipping Corporation will be operating a small cruise ship around Samoa starting in April, and the Aleipata wharf is targeted as one of it stop points for the cruise. The proposed wharf extension further includes docking station for possible future use by the SSC for its Samoa-American Samoa ferry trip.

1.3 METHODOLOGY

The EIA was carried out by PECL on behalf of the SPA from the period of January 15th to March 31st 2008. The work undertaken as part of the EIA included,

- Consultations with representatives of the SPA, representatives of UNIMA, the current contractors for designing, building and initial management of the Slipway.
- Public consultations at Aleipata with the district, and other relevant stakeholders, Marine rapid assessment, and review of Aleipata MPA Biodiversity Assessment Survey, Aleipata MPA Reef Monitoring reports,
- Assessment of the design plans.
- Review of the draft EIA by SPA and UNIMAR as the proposed contractors and managers the Slipway over its first two years.
- Review by PUMA of the draft report
- Preparation and final submission of the final EIA report to SPA

2. DESCRIPTION OF THE DEVELOPMENT

The proposed development at the Satitoa Aleipata wharf is the construction of a boat slipway with a slipway shed along the southern end of the existing wharf, the extension of the wharf to the north end by another 100m, deepening the channel and reclaiming the back portion of the wharf to shore. The current wharf is under the auspices of the Samoa Ports Authority.

The proposed costs for the Slipway and wharf extension is approximately SAT$ 5, 431,321.00 .

2.1 DEVELOPMENT COMPONENTS

A conceptual design for the site has been prepared which include a precincts plan of the wharf. The major components of the development are shown in Figure 2 and detailed below:

Phase One

- Deepening and widening the channel to the wharf
- Boat Slipway extension
- Wharf extension

Phase Two

Wharf accommodation and Border control offices

- Marina development
- Hotel development

The current project will only cover Phase One which is the construction and operation of the Slipway, and the extension of the wharf for cruise ship and Ferry use.

2.2 DEVELOPMENT PHASING

2.2.1 Construction Phase

The phasing of the development as proposed in the conceptual plan is as follows

1. finalize the design plans for the slipway and the wharf extension
2. dredging of the channel to the specific depths and reclaiming the current wharf for all the proposed facilities
3. drilling and installation of the beams for the slipway rails
4. construction of the wharf extension for midsize cruise ships
5. installation of the slipway and associated facilities needed for its effective operation

The final designs and construction of the hotel development are not planned for this phase.

Dredging and reclamation

The dredging and reclamation works will be the first phase of the construction operation. This will be conducted using two excavators (x-200 and EX-70). The excavators will be berthed on top of the SPA barge as it moves along the channel during the dredging. A third barge will be used for loading the sand and rubble for transportation onto the wharf where it will be stored for later use. Additionally, the SPA sand dredger machine will later join the dredging operation once it's available from it other work around the other ports.

The dredging is anticipated to last at least 2 months, taking into consideration the days off when the weather or the wave conditions are not conducive to work.

Slipway construction

The Slipway shed is a fully contained shed currently used in Tauranga New Zealand. It will be dismantled and put in containers for transportation to Samoa. The shed will be reassembled at the Aleipata wharf with additional work to be that of a new foundation, the wastewater system and the supporting infrastructure such as water tanks, electricity, and fencing. The full design of the slipway shed construction works are being finalized, while the design drawings for the slipway rail are shown in Annex 2.

The proposed steel piles will extend from the slipway to 115m into the channel. A vibrating hammer will be used to drill the poles to the appropriate depth needed. This work is anticipated to last around a month.

A three stage wastewater system (Annex 3) will be constructed for the slipway to collect all the wastewater from within the slipway shed and the compound. A comprehensive solid waste management system will also be put in place for the collection, treatment and disposal of all solid waste generated from the operation. All the solid waste will be transported to the Tafaigata landfill, while bio-hazardous waste will be treated based on recommendations provided by the MNRE.

2.2.2 Operational Phase

The slipway will be operational once it is completed. Currently, SPA is negotiating for a Company that will install the Slipway to operate it for an initial period of two years, while training SPA officials to take over after the two years.

All the work to be carried out for boat repair and maintenance will conducted within the Slipway shed to contain any possible pollution to the surrounding area and especially the Aleipata Marine Protected Area. The specific repair and maintenance work that will be undertaken at the Slipway shed include:

- Surface Preparations and Cleaning
  - √ Removal of antifouling paint
  - √ Removal of biological hull foulants and marine biota
  - √ Manual and mechanical scraping, scrubbing and cleaning
  - √ Pressure water blasting
- Surface Coating
  - √ Manual painting
  - √ Spray painting
- Fibregalssing
- Welding and metal fabrication
- Engine maintenance and repair

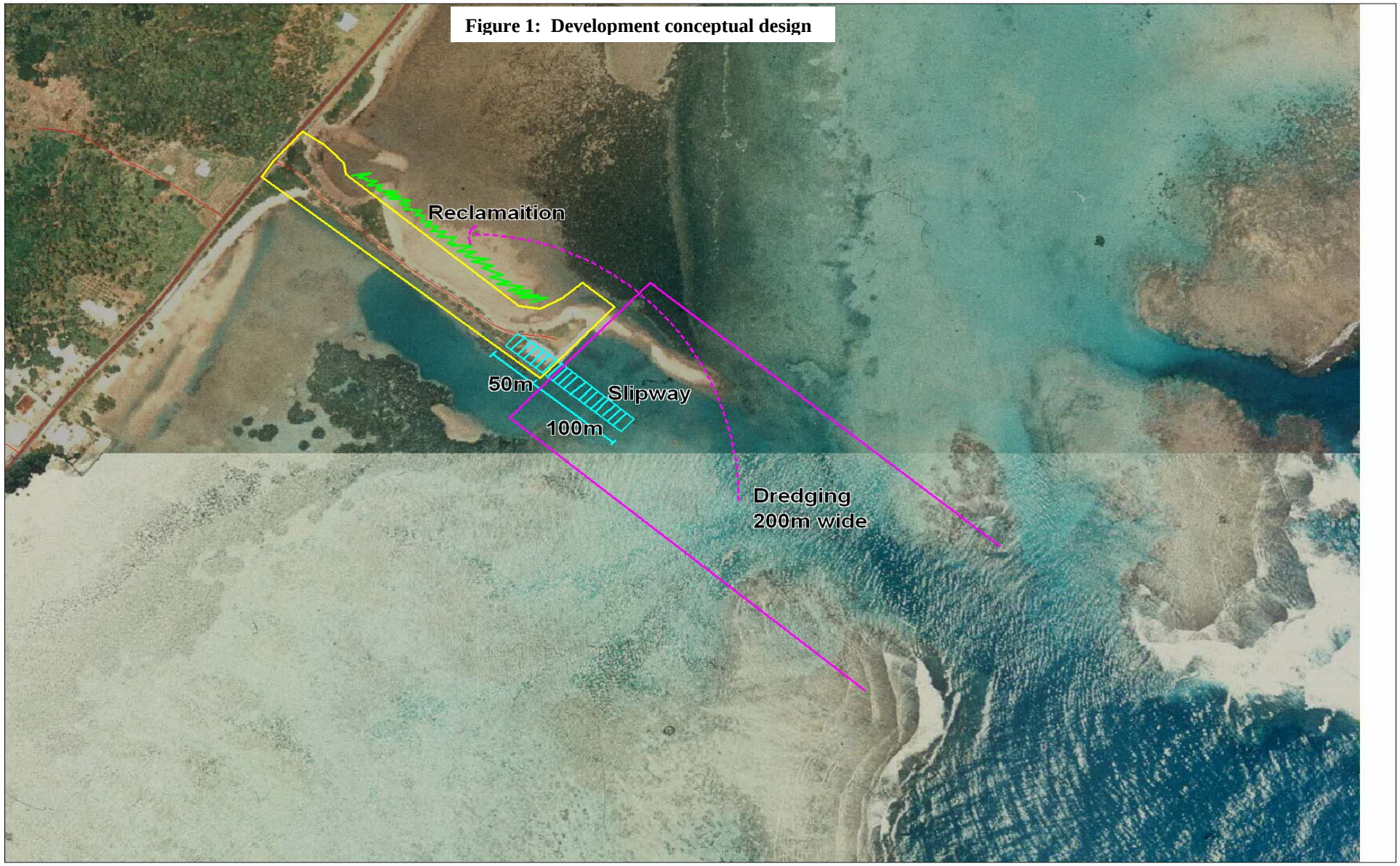
Slipway

The Slipway will employ 14 full time staff for the operation such as security guards, Slipway shed staff, and wharf maintenance staff. Temporary staff will be employed during the slipping of boats depending on the nature of repair and

maintenance work required. Additionally, other services provided for boarder control and the loading and unloading of cruise ships or ferry boats will be on deck when such boats are anchored.

The SPA tugboat will be permanently anchored at the Apia wharf, but only visiting the Aleipata wharf when boats to be slipped are brought in or when cruise ships call into port.

Figure 1: Development conceptual design



Cruise-ship wharf

The wharf extension is anticipated mainly for the use of small to mid level cruise ships around 100m length and with a 5m draft. At the moment, a couple of these cruise ships currently use Samoa as port of call,. The new SSC Talofa Cruises operating out of the Matautu wharf is also scheduled to use Aleipata as one of its main hub of operations for the eastern Samoa cruises as well as during the whale watching season around the middle of the year.

3. DESCRIPTION OF THE ENVIRONMENT

3.1 PHYSICAL ENVIRONMENT

3.1.1 Location & Climate

The proposed site is situated on the eastern end of Upolu Island within Satitoa village of the Aleipata I Lalo district as shown in Figure 2.

The climate of the site area is tropical where the prevailing south east trade winds dominate for half the year, although winds are more variable from April to September. Change with altitude is the main climatic parameter that in turn influences variation in temperature and humidity at this area.

The site has a mean annual rainfall between 4000 and 5000mm. The dry season is from April to September and the wet season is from October to March.

3.1.2 Soil and Geology

The Aleipata district land area is made up of soil Fusi Mutiatele soils. The Mutiatele soils are usually, dark reddish grey mottled sands and peaty sands, locally accompanied by a shallow surface layer of reddish fibrous rush or sedge peat. When drained they are very fertile soils, usually slightly acid and with abundant exchangeable potassium. Under natural conditions, with unimproved drainage, they range from alkaline to slightly acid and have a high salt content. Littoral vegetation including coconuts that survive partially saline areas grow naturally along the coast, while agricultural crops grow well after drainage has been improved. (Wright 1963, 70)

The inner lagoon extending from the beachfront to the reef edge is mainly of fine sand and coral rubble, with growth dominated by seagrasses with mixed coral assemblages

3.1.3 Natural Hazards

The development site is exposed to the natural hazards associated with cyclones, flooding and erosion from the Aleipata mountains, coastal marsh and mangrove wetlands. Cyclones related hazards consist of high velocity winds, flooding from intense rainfall, and coastal flooding and erosion from storm surge. The Coastal Hazard Database (Annex 4) estimates that maximum stormwave runup is between 0.8-1.0m along the Satitoa coastal area which includes the wharf.

3.1.4 Ocean Current and Longshore Drift

The south coast of Samoa is predominantly influenced by the southeasterly swells which flow all year round. These swells can vary in strength and height depending on the weather patterns but can be very rough. The southwesterly swells which come around mid year are less frequent and normally not as strong.

Aleipata district being located on the eastern most part of Upolu, means the southeasterly swells predominately regulates the longshore drift. As such most of the sand generated from southern end moves along to the northern end of the district with the three main channels at Satitoa, Saleaaumua and Samusu being the main outlet of the sands.

Since the establishment of the Aleipata wharf in the 1970's the current and subsequently, the sand movement along the coast has been altered. It now appears that most of the sand from the south goes back offshore at the Satitoa channel

where the wharf is located, while the wharf is now functioning as a groin providing protection for the northern end of the district from strong as shown in the Figure 3 (1958 aerial of Aleipata) and Figure 4 (Coastal Hazard Map of Aleipata; 2001). The groin protection provided by the wharf is also limiting the natural flushing of the sedimentation from the inland streams at Samusu, the Lalomanu coastal marsh and the Lotopu'e-Malaela mangrove Forest. The build up of sedimentation has resulted in the muddy substrate between Malaela and Samusu (Figure 4) where in the past was mainly white sandy area as shown in Figure 3.

3.1.5 Land Use

The wharf extension and Slipway shed will be constructed on the existing wharf owned by SPA. The site currently has the offices for the Aleipata MPA and a compost toilet facility. The wharf is currently used by some fishing boats from within the district for anchoring.

3.2. ALEIPATA MARINE PROTECTED AREA

The Aleipata inshore marine environment has been described as amongst the best in Samoa, not only for its beaches, but its rich marine biodiversity such the abundance of fish and shellfish life, and the well protected coral reef system.

This great importance of the Aleipata coastal area was highlighted by the Government of Samoa and the Global Environment Facility (GEF) project in 1999 that lead to the establishment of the area as a Marine Protected Area in 2001. The GEF project undertook a comprehensive marine biodiversity survey of the whole Aleipata district from Tiavea village to Lalomanu village. The results of the survey and consultations with the villages lead to the establishment of No-Take-Zones for each village. The GEF project was completed in 2003 and the Government of Samoa in partnership with the Aleipata District continues to implement the MPA Management Plan activities which include the monitoring of the No-Take-Zones as well as regulations for the sustainable harvesting and enjoyment of the marine resources in the area.

3.3 BIOLOGICAL ENVIRONMENT

A rapid marine assessment of the immediate area for the proposed development was undertaken on January 10th 2008. The methodology employed included a swim through from the wharf out to the reef edge and a swim through from approximately 100m to the north of the wharf all the way to approximately 40m south of the wharf. In this swim through, data was collected on the fish species, with estimates of relative abundance. An estimation of the substrate was also noted.

The rapid marine assessment reaffirms the findings of the Aleipata MPA baseline study and the Satitoa No-Take Zone monitoring in that the proposed dredging area is dominated by fine sand material with live coral covering around 5-10% of the area. Dead corals along with coral rubble from either cyclone damage, crown of thorn damage, or regular storm surge breakage make up around 10-15 % of the substrate. Abundance of fish was observed with the majority species that of Crescent Perches, Damselfish, Parrotfish Surgeon and Parrotfish. Around the wharf, schools of juvenile mullets and trevallys were abundant.

A more detailed survey of the Aleipata MPA is provided below to show the diversity and importance of the area as they were more comprehensive studies of the area.

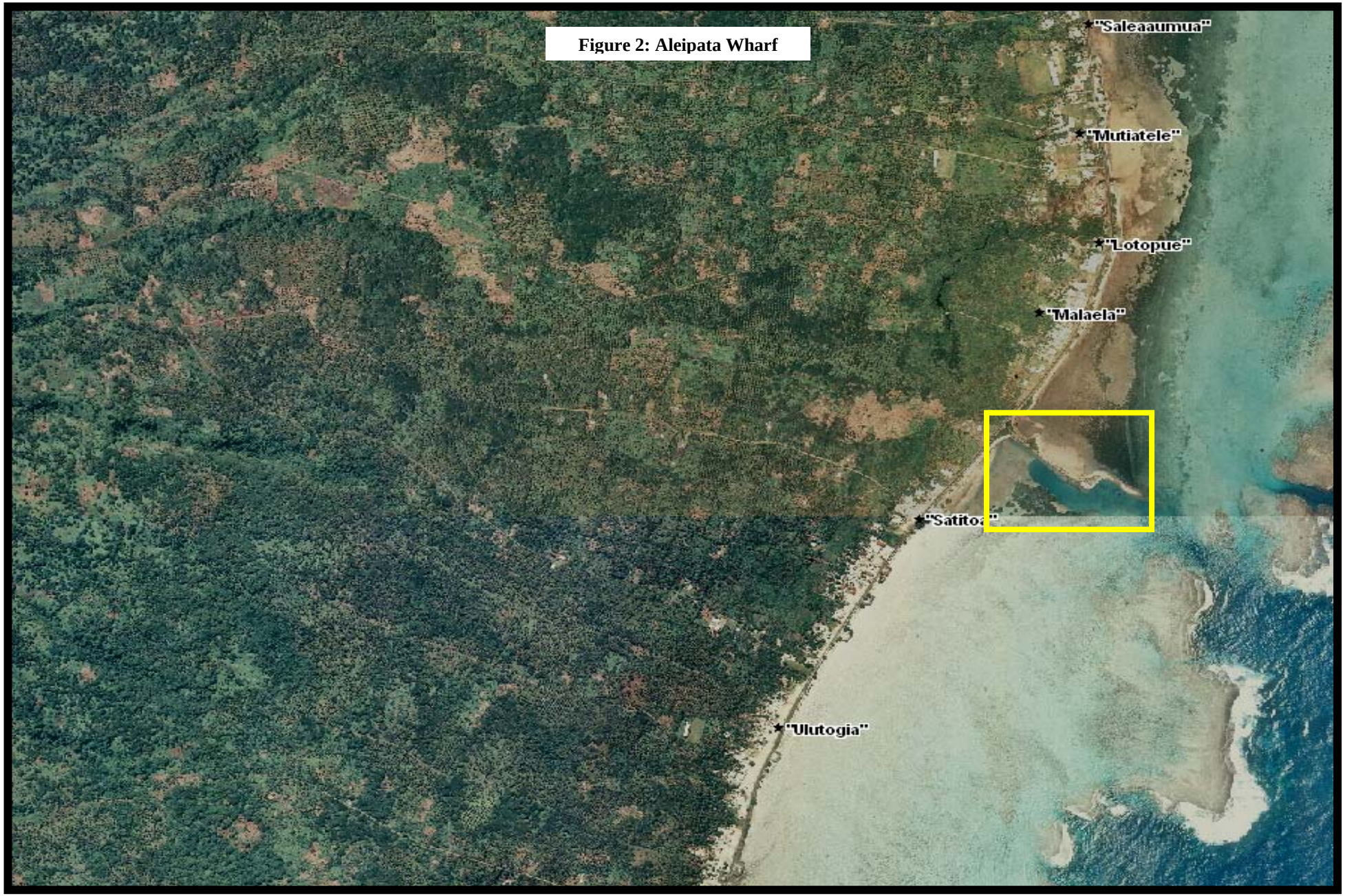


Figure 2: Aleipata Wharf

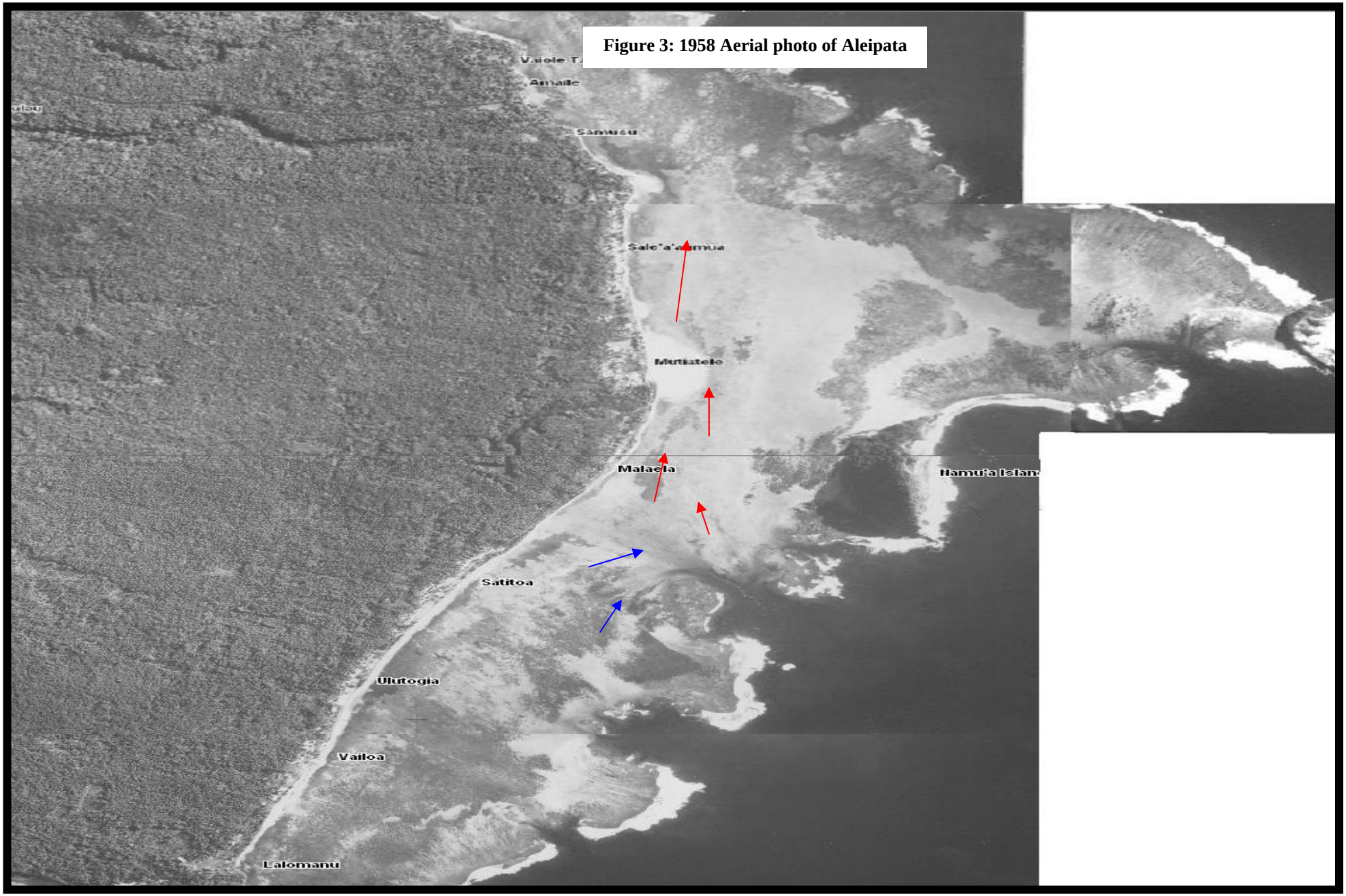


Figure 3: 1958 Aerial photo of Aleipata

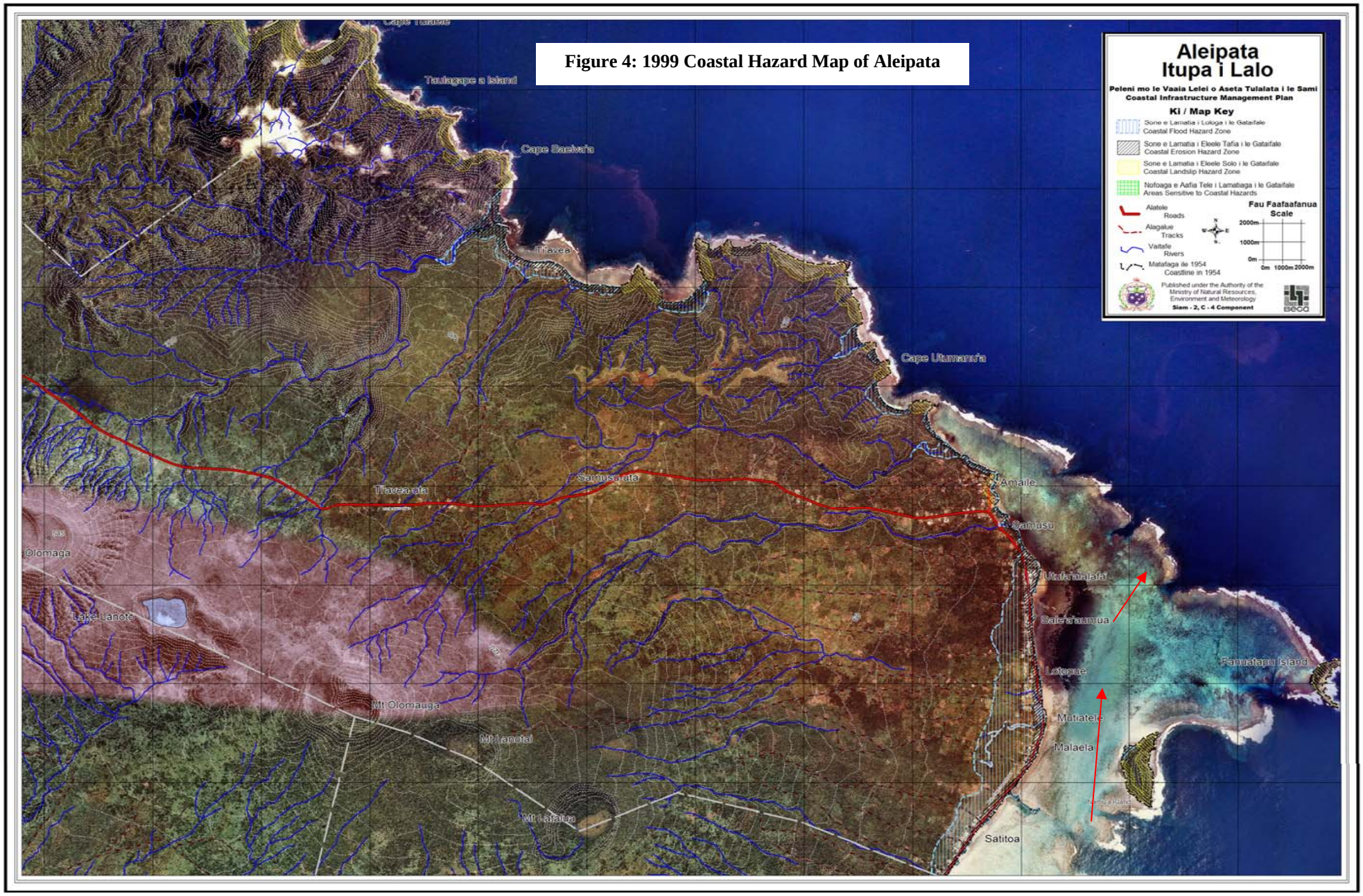


Figure 4: 1999 Coastal Hazard Map of Aleipata

3.3.1 ALEIPATA MPA MARINE BIODIVERSITY

The following summary of the baseline information from the Aleipata MPA Marine Biodiversity Assessment Survey (IUCN 2002) provides a broad inventory on the status of the marine environment within the Aleipata district. The summary shows the interconnected role of the marine environment and how activities at the Slipway and wharf if not managed effectively can severely impact the district's marine resources.

(a) Habitat

Habitats in the Aleipata MPA are grouped into 6 major categories with many habitat types within each category. The categories are: Outer Slope, Crest, Reef Flat, Ava, Lagoon, and Estuarine (including mangroves). Slopes varied in shape and slope angle due to the underlying basalt substrate or to differences in growth response of coral communities. The crest zone consists of rubble or encrusting coralline algae communities. The reef flats are composed of mainly rubble banks. Ava's generally are smooth sided with very low coral and predominantly encrusting coralline algae. Lagoons are shallow along the northern part of the proposed development whilst on the southern side, the lagoons are relatively deeper. The Lotopue mangrove and the Saleaaumua coastal marsh also influence the inshore reef biodiversity and water circulation.

(b) Community

Most habitats are healthy and support the major macro benthic groups in the normal habitats expected on coral reefs. Live hard coral communities were the most dominant benthic group, followed by encrusting coralline algae, macro algae, turf algae, seagrass, and soft coral communities, in descending order of frequency of occurrence. In hard coral communities, there was a dominance of tabulate Acropora spp in the slope habitat compared to dominant branching Acropora spp and massive species in the lagoon habitat.

Benthic Communities

The dominant benthic groups were live hard coral, followed by encrusting coralline algae, followed by macro algae, turf algae, and then seagrass and soft coral. Dominance of benthic groups in different habitats generally shows the preference of these forms to varying degrees of water flushing from lagoons and water turbulence. Hard coral was the dominant benthic form in lagoons and outer slope zones (65% and 73% of tows, respectively) where maximum turbulence would be expected. Macro algae and crustose coralline algae were the next most frequently recorded benthic forms in the Ava's and outer slopes, respectively.

Seagrass was most abundant close the proposed wharf development with the two most abundant species being *Syringodium isoetifolium* and *Halophila ovata*

These results suggest that most habitats are healthy and are supporting the major macro benthic groups in the normal habitats expected on coral reefs.

Coral Cover

Average cover for live hard coral, dead hard coral, and soft coral varied substantially across the 3 major habitat zones of slope, lagoon and ava. Live coral cover was over twice as high as dead coral cover on the slope and in the lagoon. The lagoon live coral cover was lower than on the slope. Soft coral was present in low abundance at all three habitats and occurred in isolated patches in the outer lagoon and slope

Macro Invertebrate Species

Giant clams were rare throughout the District and were mainly observed along the northern part of the proposed development site. Holothurians were exclusively found in lagoon habitats, and were uncommon in the Northern Zone where there is little development of lagoons. A sparse population of the commercial holothurian *Holothuria nobilis* was recorded along the lagoon. Two sea urchin species were commonly observed in the outer lagoon habitat in such high numbers that most hard substrate surfaces were being eroded away due to grazing pressure.

Fish Abundance and Dominance

Fish abundance is very high as noted from the Marine assessment whereby over 57% of the manta tow surveys observed fish populations of over 250 individuals. Surgeonfish were the most frequently dominant fish family, particularly in slope habitats. The next most dominant fish group was Damselfish, followed by Parrotfish and mixed assemblages of fish (predominantly Surgeon and Parrotfish

The families most frequently reported with high abundances were Surgeonfish, Damselfish, Mixed, and Parrotfish, and most assemblages were recorded in either the lagoon or outer slope habitat.

In summary, fish were most commonly in high abundance throughout the District. High fish abundance was relatively more commonly recorded in the outer slope habitat but the lagoon habitat also recorded frequent high abundance.

Rare And Threatened Species

The Aleipata MPA is home to a slew of rare, endangered and threatened marine species such as the giant clams *Hippopus hippopus*, *Tridacna squamosa* and *Tridacna maxima*, and coconut crabs *Birgus latro*. The Green (*Chelonia mydas*) and hawksbill (*Eretmochelys imbrica*ta) turtles are common along the Aleipata inshore reef which uses it as its main foraging area –due to the abundance of seagrass- especially during the mating season where the nearby offshore islands are the main nesting beaches. The globally threatened Sperm (*Physter macrocepalus*) and humpbacks (*Megaptera novaeanglaiae*) whales are frequently seen offshore of Aleipata during their migration to the tropics around July to September each year.

3.3.2 SATITOA NO-TAKE-ZONE

Amongst the most critical issues from the Aleipata MPA Management Plan is the need to improve the status of the marine area for the sustainable harvesting of marine resources by the people for present and future generations of Aleipata. To ensure the continued healthy status of the marine environment, the Division of Environment and Conservation (DEC) of the Ministry of Natural Resources and Environment (MNRE) conduct a reef monitoring programme in partnership with the Aleipata MPA Management Committee using the Aleipata MPA Marine Biodiversity Assessment Survey 2002 as baseline. Results of the monitoring work have shown the vibrant recovery of the biodiversity in the area, including the Satitoa No-Take-Zone immediately south of the existing wharf.

The latest results of the reef monitoring at the Satitoa No-Take Zone as of the end of 2007 by the DEC is summarised in the box table below.

SATITOA NO-TAKE ZONE

Fish abundance
The average number of targeted fish species within the Satitoa NTZ was approximately 97. The dominant fish species were the wrasse, surgeonfish and parrotfish. Other recorded fish species included the butterfly fish, trevally, grouper and mullet. The average size of the three most dominant fish species were less than 10cm.
Coral health
The area is mainly seagrass and the area of coral growth had approximately 35% live corals, 7% broken corals and 2% dead and/or bleached corals. The overall coral cover is estimated to be 44%.
Macro algae
Edible seaweed, *Caulerpa racemosa* (limu fuafua) and non edible seaweed was recorded present within the area.
Macro invertebrates
Very high abundance of holothurians were present, most of these were *Stichopus choloronotus*, *Holothuria atra* (loli) and *Stichopus horrens*. Echinometra and Diadema sea urchins were present in high numbers while *Synapta maculata* were recorded low in numbers. Other invertebrates were not recorded within the area.

3.3.3 TERRESTRIAL BIODIVERSITY

The site being a reclaimed area is only populated by a few coconut trees and some littoral vines and plants. These will all be cleared and landscaped once the Slipway and wharf extension have been completed.

Typical native avifauna such as Wattled Honeyeaters *Foulehaio carunculata*, Cardinal Honeyeaters *Myzomela cardinalis*, Blue crowned Lory *Vini australis*, and Samoan starlings *Aplonis atrifusca* were notable native birds while the invasive Common and Jungle Myna *Acridotheres fuscus* along with the Red Vented Bulbul *Pycnonotus cafer* are the dominant birds around the site.

The assessment found the presence of the invasive Yellow ant around the wharf area, which is also reported to be found in the Aleipata area and Nuulua island.

3.4 SOCIAL & CULTURAL ENVIRONMENT

Aleipata district has a human population of 4928 as of the 2007 census. The 1989/1990 Coastal Inventory of Fisheries Database " the Inshore Resource of Upolu, Western Samoa" by Leon Zann noted that of 434 households of Aleipata,, 339 households were fishing households. This shows that around 78% of the district depends upon the sea for its livelihood, either for commercial use or domestic consumption, as was also noted in the Aleipata MPA assessment report in 2003.

This high dependency on the sea for livelihood is a critical issue regarding the potential impact of pollution from the Slipway or the wharf should it happen.

Additionally, the Aleipata district is one of the most popular tourism destinations in the country. The beach fale's along Lalomanu village serves as the most popular beach for both locals and foreigners, while the supporting services such as fish and shellfish for the beach fale industry are almost completely supplied from Aleipata reefs. Other popular uses of the marine area include deep sea fishing, diving and snorkeling in the Aleipata waters. There is also great potential for ecotourism activities such as whale and turtle watching.

3.5 UTILITIES

3.5.1 ELECTRICITY

The whole district is currently supplied by the electricity provided by the EPC grid. A few families living inland along the access roads do not have electricity, but plans are for all the electricity lines to reach such families.

The district supply is currently sufficient to provide supply to the Aleipata wharf developments without much pressure on the existing needs for the district. The SPA is proposing the establishment of a 440V-3 phase 50Hz supply with a minimum of 150 to 200Amps for the Slipway use.

3.5.2 WATER SUPPLY

The current water supply for the district is provided both by the SWA reservoir in Samusu and a district owned water reservoir in Satitoa. The two water networks are not sufficient for the district and are also unreliable with the water supply going off regularly during the week days.

The slipway and the wharf operations will require a substantial amount of water for its operation especially during the water blasting of boats. The estimated water needs for the water blasting operations is 20,000lt alone. This excludes other activities such as the cleaning of the working area on a regular basis. All these needs point to a substantial supply of water for the Slipway. SPA is proposing to construct 3 to 4 10,000lt water tanks for the Slipways use. The water tanks will primarily be filled with water trucked to the site from other sources to ensure the district water supply is not inconvenienced.

3.5.3 TELECOMMUNICATIONS

The current land lines for telephones have reached the district so they will provide the necessary phone lines for the wharf. These will be operated together with cell phones which the service is also available in the district.

3.6 ECONOMIC ANALYSIS

The economic analysis of the wharf extension and Slipway reviewed the actual costs for the construction and operation of the wharf, the environmental opportunity costs, and the economic benefits to be generated from the development.

As identified in the SPA cost-benefit analysis, the slipway will save the Authority approximately SAT$40,000 per tugboat plus fuel charges. As relayed by SPA officials during the EIA, each boat will need to be slipped once every two years. Noting that SPA has 4 boats, of which at least two are slipped each year, it can be estimated that SPA will produce a saving of $80,000/year in fees plus fuel charges of going to American Samoa, New Zealand or Fiji, another cost savings. (Annex 4)

Additionally, the SPA is also expecting to gain revenue from the slipping of the 4 SSC boats, 1 Police Boat, and 8 Fishing boats locally based. Furthermore, the Slipway will also be looked upon as an ideal place for visiting yachts for repair works as it will be cheaper than the closest Pacific Island countries slipways in American Samoa and Fiji.

Along with the slipping costs and initial boats cleaning which will directly benefit SPA, other services offered such as repair and maintenance, painting, welding and metal fabrication, and fibreglassing will be subcontracted to local businesses, thus providing additional employment for Samoans.

The extension of the wharf as proposed by the SPA is envisioned to be predominantly used by midsized cruise ships and the SSC cruise ship currently operating in Samoa. The revenue generate from the wharfage fees are additional revenues for the SPA. The tourists sites within Aleipata for diving, snorkeling and general site seeing will also dramatically increase, thus providing extra revenue for the people of Aleipata.

The dredging operation and subsequent use of the wharf by boats will pose short term impacts to the marine environment through the short term smothering of corals from increase turbidity during dredging, and the extraction of corals within the immediate channel path. Over the long term, accidental oils spills and waste from the slipway can harm the marine biodiversity. Nevertheless, if the proposed mitigation measures are strictly followed, any damage will be immediately acted upon to as to minimize the environmental damage. Therefore, minimum economic loss could occur via the dead fish or corals.

4. CONSULTATION

As part of the EIA, a range of stakeholders were consulted to garner views, issues and concerns that needed to be addressed during construction and its operation.

Overall the consultation results were positive for the construction and operation on the Slipway and cruiseship wharf. The major concern expressed were to ensure that the operation will not have detrimental impact on the Aleipata Marine Protected Area and marine biodiversity of which the majority of the villagers depend upon for subsistence and commercial livelihood.

Two main stakeholder consultations were done for the project. The first being the small meeting by the Minister of SPA, representatives of the SPA with the Member of Parliament from Aleipata Itupa I Lalo, and the two Highest chief of the Aleipata District. The MP for Aleipata Itupa I Luga was not present due to an overseas trip but relayed support for the project. The SPA presented the proposed development and intensions for the SPA for the wharf extension and Slipway. Tafua and Fuataga of Aleipata raised issues of ensuring that the development has an environmental Impact Assessment that will provide necessary mitigation measures to limit any damage to the Aleipata Marine Protected Area and should be in line with the Aleipata MPA Management Plan. They further noted the changes along the coastal area of Saleaaumua with the increase sedimentation compared to when Tafua was young, at which time, the beach fronting Saleaaumua was white and not muddy like it is now.

The meeting concluded, with support from the District chiefs and MP for the project, but requested that a district consultation be done at Aleipata to garner the views of other villages and chiefs. This second meeting was scheduled for the following week

The main district consultation was lead by the Minister of SPA, Associate Minister of SPA, and included Representatives of SPA, members of the SPA Board, General Manager of Samoa Shipping Corporation, ACEO of Ministry of Natural Resources and Environment, and staff of the Aleipata Marine Protected Area. For the Aleipata district, the representation included Tafua Maluelue and Fuataga Kasimani as the two highest ranking Matai of the Aleipata district, the Member of Parliament for Aleipata Itupa I Lalo district, tamalii and failauga from most of the villages, including Amaile, Lotopue, Satitoa, Mutiatele and Malaela, Saleaaumua, Vailoa and Lalomanu. The meeting was organized at Saleaaumua and the majority of the alii ma faipule of Saleaaumua attended.

The meeting discussed the proposed project and implications to the district including economic and social benefits as part of the presentation from the Minister of SPA and representatives of the SPA.

The district leaders were given the opportunity to hear their views and concerns, whereby Fuataga Kasimani and Tafua Maluelue both reiterated their support for the project as well and reminding the SPA group about ensuring their concerns raised in a previous meeting were addressed. Representatives from the other villages also provided support for the project while cautioning upon ensuring the benefits were fulfilled for the district.

The meeting concluded with the support given by the whole district for the project and assurances by the SPA that it will work at ensuring the project will realize benefits for the district and that all the necessary environmental issues will be addressed. Members of the Aleipata MPA District Committee were also present and were amongst those that expressed support for the project.

The EIA consultant further held discussions with the Division of Environment and Conservation of the MNRE as the main Agency currently implementing the Aleipata Marine Protected Area Programme in partnership with the Aleipata MPA District Committee. Present at the consultation was the ACEO of MNRE (DEC) and the Senior Marine Conservation Officer.

The consultations with DEC included the presentation of the information currently available to the EIA consultant of the proposed development, which was the slipway construction, the dredging, and the extension of the wharf for mid-size cruise ships. DEC sought clarification about the rumours of a hotel development at the site, whereby it was clarified that the current EIA is only for the phase 1 of the project which is the Slipway and the wharf extension. A map of the proposed development was presented for DEC understanding as well as the initial environmental issues that are being addressed by the EIA. As discussed, additional consultations with the district is not needed as the Highest level of endorsement has been given for the project, thus any consultations might conflict the traditional protocol that SPA has already taken.

DEC did reiterated the concerns of the district that the project puts in all the necessary processes and mitigation measures to ensure the long term sustainability of the Aleipata MPA when the development is done.

5. ALTERNATIVES

An assessment was undertaken by the SPA in 2007 on potential sites for the location of the Slipway. Three sites were assessed, which are namely Mulifanua Wharf, Fagaloa Bay and Aleipata. The basic factors in conducting the best sites included having a good inlet access for boats, land ownership, and economic costs of establishing the slipway. The conclusion of this study is attached as Annex 6 whereby the recommendation of Aleipata Wharf was recommended to the SPA Board. The main issues provided in the recommendation are, the existence of the Aleipata wharf which will reduce costs of a new construction, the access and channel are already in place with just a limited new dredging, and the potential for other businesses that could be implemented at the wharf such as the proposed cruise-ship anchorage.

6. ENVIRONMENTAL SCREENING CHECKLISTS

The checklist is adapted from the DEC Guidelines. Identified environmental impacts are further discussed in Section 4.

6.1 CONSTRUCTION PHASE SCREENING CHECKLIST

6.1.1 Natural Resources

	No	Lo	Hi?	
1.	☐	☐	■	Is there potential for water (freshwater or marine), land or air pollution?
2.	☐	■	☐	Will the level of sewage treatment for the activity eliminate the threat of pollution?
3.	☐	☐	■	To what extent might the quantity of water available for other uses be affected the activity?
4.	☐	☐	■	To what extent might the quality of water resources be affected by the activity?
5.	■	☐	☐	Will there be a loss of indigenous vegetation cover?
6.	■	☐	☐	Will there be a radical change in the vegetation cover over the large area?
7.	☐	☐	■	Is there danger of soil erosion?
8.	☐	☐	■	Is there danger of run-off from eroding land surfaces carrying sediment into the lakes, rivers, lagoon, reef, etc.?
9.	☐	☐	■	Is there potential for increased solid waste generation from the activity?
10.	☐	☐	■	Is it likely that there will be other damage to the reef, or the lagoon system?
11.	☐	☐	■	Is it possible that the important species of flora and/or fauna, on land or in water, might be affected?
12.	☐	☐	■	Will there be destructive areas with high conservation value or potential for conservation?
13.	☐	■	☐	Is there potential for the exportation of flora/fauna species overseas?
14.	☐	■	☐	Is there potential for introducing plant or animal pests, or diseases that would affect plants or animals in Samoa, or would affect agriculture, fishing or other resource uses?
15.	☐	■	☐	Is there potential for introducing diseases that would affect plants or animals in Samoa, or would affect agriculture, fishing or other resource uses?

16. ☐ ☐ ■ Will there be adequate energy supplies to meet the needs of the proposed development (*especially electricity)?*

17. ☐ ■ ☐ Are the arrangements for waste disposal likely to cause problems?

6.1.2 Social and Cultural

	No	Lo	Hi?	
18.	☐	☐	■	Is the activity likely to have significant impact on the local way of life?
19.	☐	■	☐	Is the activity likely to affect the daily or normal activities of men and women?
20.	■	☐	☐	Will any local people be displaced by the proposed activity?
21.	☐	■	☐	Is there concern amongst local people about possible changes in their way of life?
22.	☐	■	☐	Will the proposed development place too great a pressure on any local services?
23.	☐	■	☐	Are there particular issues relating to the social or economic position of women?
24.	☐	■	☐	Are there particular issues relating to the social or economic position of men?
25.	☐	■	☐	Are there particular issues relating to the social or economic position of young people?
26.	☐	■	☐	Are there potential adverse impacts that are likely to affect particular groups in the community to a markedly greater extent than other groups?
27.	☐	■	☐	Is it likely that the proposed development will attract a significant number of people from outside the area, the island or the country (*and therefore create problems for the local communities)?*
28.	☐	■	☐	Are there likely to be any health implications associated with the proposed activity?
29.	☐	☐	■	Are there likely to be any risks to human health and safety through accidents?
30.	☐	☐	■	What would be the wider environmental consequences of accidental release of hazardous materials used in the activity?
31.	☐	■	☐	Are there likely to be any impacts on cultural resources or values?
32.	☐	■	☐	Are there likely to be any impacts on traditional knowledge and practices?
33.	☐	☐	■	Will the proposed activity affect scenic or amenity values*?*
34.	☐	☐	■	Will the proposed activity affect recreational resources available to the community?
35.	■	☐	☐	Will the proposed activity affect any alienated lands?

6.1.3 Policy and Plan Context

	No	Lo	Hi?	
36.	☐	☐	■	Will there be an irreversible commitment of important resources to the activity?
37.	☐	☐	■	Will future options for resource use be prevented or severely constrained?
38.	☐	■	☐	Is the Activity consistent with the policies and plans of government departments or agencies?
39.	☐	■	☐	Are the policies and plans of the government departments or agencies in themselves a source or cause of impacts?
40.	☐	■	☐	Will there be impacts because the proposed activity is not in accord with local village views?

6.1.4 Relationship to other Activities

	No	Lo	Hi?	
41.	☐	■	☐	Will the overall impacts of the activity exacerbate problems caused by existing activities?
42.	☐	■	☐	Will the activity require other actions that themselves will have significant impacts on the environment?
43.	☐	■	☐	To what extent would the supply of electricity to the area be affected as well as other utilities?
44.	☐	☐	■	Will there be sufficient parking space provided?

6.1.5 Public Consultation

	No	Lo	Hi?	
41.	☐	■	☐	Are there likely to be problems with local people because their views have not yet been sought?
42.	☐	☐	■	If local views are not known, are there likely to be any contentious issues?
43.	☐	■	☐	Are there likely to be problems because the proponent has not indicated how the proposal will be modified, or at least justified the decision not to change the proposal, to address known local community concerns?

6..2 OPERATIONAL PHASE SCREENING CHECKLIST

6.1.1 Natural Resources

	No	Lo	Hi?	

1.	☐	☐	Is there potential for water (freshwater or marine), land or air pollution?
2.	☐	☐	Will the level of sewage treatment for the activity eliminate the threat of pollution?
3.	☐	☐	To what extent might the quantity of water available for other uses be affected the activity?
4.	☐	☐	To what extent might the quality of water resources be affected by the activity?
5.	☐	☐	Will there be a loss of indigenous vegetation cover?
6.	☐	☐	Will there be a radical change in the vegetation cover over the large area?
7.	☐	☐	Is there danger of soil erosion?
8.	☐	☐	Is there danger of run-off from eroding land surfaces carrying sediment into the lakes, rivers, lagoon, reef, etc.?
9.	☐	☐	Is there potential for increased solid waste generation from the activity?
10.	☐	☐	Is it likely that there will be other damage to the reef, or the lagoon system?
11.	☐	☐	Is it possible that the important species of flora and/or fauna, on land or in water, might be affected?
12.	☐	☐	Will there be destructive areas with high conservation value or potential for conservation?
13.	☐	☐	Is there potential for the exportation of flora/fauna species overseas?
14.	☐	☐	Is there potential for introducing plant or animal pests, or diseases that would affect plants or animals in Samoa, or would affect agriculture, fishing or other resource uses?
15.	☐	☐	Is there potential for introducing diseases that would affect plants or animals in Samoa, or would affect agriculture, fishing or other resource uses?
16.	☐	☐	Will there be adequate energy supplies to meet the needs of the proposed development (*especially electricity)?*
17.	☐	☐	Are the arrangements for waste disposal likely to cause problems?

6.1.2 Social and Cultural

	No	Lo	Hi?	
18.	☐	☐		Is there activity likely to have significant impact on the local way of life?

19. ☐ ■ ☐ Is the activity likely to affect the daily or normal activities of men and women?

20. ■ ☐ ☐ Will any local people be displaced by the proposed activity?

21. ☐ ■ ☐ Is there concern amongst local people about possible changes in their way of life?

22. ☐ ■ ☐ Will the proposed development place too great a pressure on any local services?

23. ☐ ■ ☐ Are there particular issues relating to the social or economic position of women?

24. ☐ ■ ☐ Are there particular issues relating to the social or economic position of men?

25. ☐ ■ ☐ Are there particular issues relating to the social or economic position of young people?

26. ☐ ■ ☐ Are there potential adverse impacts that are likely to affect particular groups in the community to a markedly greater extent than other groups?

27. ☐ ■ ☐ Is it likely that the proposed development will attract a significant number of people from outside the area, the island or the country (*and therefore create problems for the local communities)?*

28. ☐ ■ ☐ Are there likely to be any health implications associated with the proposed activity?

29. ☐ ■ ☐ Are there likely to be any risks to human health and safety through accidents?

30. ☐ ☐ ■ What would be the wider environmental consequences of accidental release of hazardous materials used in the activity?

31. ☐ ■ ☐ Are there likely to be any impacts on cultural resources or values?

32. ☐ ■ ☐ Are there likely to be any impacts on traditional knowledge and practices?

33. ☐ ■ ☐ Will the proposed activity affect scenic or amenity values*?*

34. ☐ ☐ ■ Will the proposed activity affect recreational resources available to the community?

35. ■ ☐ ☐ Will the proposed activity affect any alienated lands?

6.1.3 Policy and Plan Context

No Lo Hi?

36. ☐ ☐ ■ Will there be an irreversible commitment of important resources to the activity?

37. ☐ ☐ ■ Will future options for resource use be prevented or severely constrained?

38. ☐ ■ ☐ Is the Activity consistent with the policies and plans of government departments or agencies?

39. ☐ ■ ☐ Are the policies and plans of the government departments or agencies in themselves a source or cause of impacts?

40. ☐ ■ ☐ Will there be impacts because the proposed activity is not in accord with local village views?

6.1.4 Relationship to other Activities

No Lo Hi?

41. ☐ ■ ☐ Will the overall impacts of the activity exacerbate problems caused by existing activities?

42. ☐ ■ ☐ Will the activity require other actions that themselves will have significant impacts on the environment?

43. ☐ ■ ☐ To what extent would the supply of electricity to the area be affected as well as other utilities?

44. ☐ ☐ ■ Will there be sufficient parking space provided?

6.1.5 Public Consultation

No Lo Hi?

41. ☐ ■ ☐ Are there likely to be problems with local people because their views have not yet been sought?

42. ☐ ☐ ■ If local views are not known, are there likely to be any contentious issues?

43. ☐ ■ ☐ Are there likely to be problems because the proponent has not indicated how the proposal will be modified, or at least justified the decision not to change the proposal, to address known local community concerns

7. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

An impact is any change to the existing condition of the environment caused by human activity or an external influence. Impacts therefore may be positive (beneficial) or negative (adverse). They may also be direct or indirect, long term or short term. Both positive and adverse environmental impacts could arise during construction and the operations phases of the Aleipata Wharf and Slipway development. This section identifies the environmental impacts, and suggested mitigation measures and elaborates on the issues identified in the Environmental Screening in Section 4.

7.1 CONSTRUCTION PHASE

7.1.1 Dredging and Reclamation.

The Slipway and wharf extension construction works will involve widening the channel and dredging to 6m depth for boats and ferries to safely access the wharf. Additionally, part of the existing wharf will be reclaimed using dredged substrate and large rocks from an inland quarry.

The potential sources of pollutants generally associated with channel and harbour dredging operations include

- silt and sediment;
- risk of fuel, lubricant and hydraulic fluid release;
- airborne emissions from dredging equipment; and
- noise pollution from dredging activities.

Mitigation Measures

Mitigation measures to reduce the environmental concerns associated with dredging and reclamation works that need to be followed by the contractors:

- A sediment-sampling program should be conducted prior to dredging to determine the environmental quality of the harbour sediments.
- Work should be scheduled to avoid periods of heavy rainfall, or heavy swells.
- Solid waste should be put in the appropriate solid waste bins for disposal at the Tafaigata landfill.
- All machinery should be inspected for leakage of lubricants or fuel and must be in good working order prior to dredge work each day. Any accidental spills or leaks will be promptly contained, cleaned up, and reported according to the Oil Spill Contingency Plan.
- All fuel handling and storage should be done in a way that minimizes the risk of fuel, lubricant or hydrocarbon release.
- Oil spill clean-up equipment is to be on-site and made accessible to all contractors and/or employees during dredging and reclamation works.

7.1.2 Marine Ecosystem

Dredging activities have the potential to contaminate and/or disturb soil, surface water, and groundwater resources. Dredging activities have the potential to introduce sediment and pollutants to the marine environment that may have a negative impact on fish resources and habitat. Construction activities have the potential to result in nuisance impacts due to increase noise and air pollution.

Mitigation Measures

- All machinery will be inspected for leakage of lubricants or fuel and must be in good working order.
- Work will be scheduled to avoid periods of heavy precipitation. Erosion control structures are to be used, if necessary, to prevent erosion and silty runoff during the dredging and spoil disposal program.
- Dredging should only be carried out during low wind/wave conditions.

7.1.3 Earth material sourcing

Earth materials needed for construction are normally obtained from quarry and mining operations. Conscious or unwitting purchase of these materials from unlicensed operations indirectly supports, encourages and promotes environmental degradation at the illegal quarry sites and causes medium to long-term negative impacts at source.

Mitigation measures:

- Earth materials must be obtained from officially licensed and approved quarries

7.1.4 Material transportation

The various materials required for the construction and building (e.g. steel, blocks, lumber etc) will be obtained from sources elsewhere and transported to the site. Transportation of these materials typically in uncovered trucks usually results in undue road wear-and-tear.

In the case of fine earth materials, dusting and spillages occur on the roadways between source and site. Dusting degrades local air quality and material spillages worsen driving conditions and increase the risk of road accidents. These occurrences represent indirect, short-term, reversible, negative impacts on public health and safety.

Mitigation Measures:

- All fine earth materials must be enclosed during transportation to the site to prevent spillage and dusting. The cleanup of spilled earth and construction material on the main road should be the responsibility of the Contractor and should be done in a timely manner so as not to inconvenience or endanger other road users. These requirements should be included as clauses within the contracts made with relevant sub-contractors.
- As far as possible, transport of construction materials should be schedule for off-peak traffic hours. This will reduce the risk of traffic congestion and of road accidents on the main south coast road to the site.
- Appropriate traffic warning signs, informing road users of a construction site entrance ahead and instructing then to reduce speed, should be placed along the main road to the Aleipata wharf.
- Flagmen should be employed to control traffic and assist construction vehicles as they attempt to enter and exit the project site.

7.1.5 Materials storage

The improper sitting of stockpiles and storage of sand, gravel, cement etc at the construction site could lead to fine materials being washed away, during heavy rainfall events, into the marine environment. This would not only represent a waste of materials but would also contribute to mud and sedimentation with consequent negative impacts on the inshore marine water quality and possible the ecology of the shallow marine environments, including corals.

Hazardous and flammable materials (e.g. paint etc) improperly stored and handled on the site are potential health hazards for construction workers and spilled chemicals would have the potential to contaminate soil and inhabit plant

growth in the area. It is anticipated that refueling or maintenance of large vehicles will take place on the construction site and therefore there will be a requirement to store fuel and lubricants in a safe manner on the site.

Mitigation Measures:

- The stockpiling of construction materials should be properly controlled and managed. Fine materials should be stockpiled on the mainland and not on the wharf.
- Hazardous chemicals (e.g. fuels) should be properly stored in appropriate containers and these should be safely locked away. Conspicuous warning signs (e.g. 'No smoking') should also be posted around hazardous waste storage and handling facilities.

7.1.6 Construction waste disposal

Solid waste generated during site preparation and construction work would include concrete, steel, waste earth materials, pipes, roofing iron, general waste, etc. This waste would negatively impact the site and surrounding environment if not properly managed and disposed appropriately. Poor construction waste management constitutes a short-term, possible long-term negative impact.

Mitigation measures

- A site waste management plan should be prepared by the contractor prior to commencement of construction. This should include designation of appropriate waste storage areas, collection and removal schedule, identification of approved disposal site, and a system for supervision and monitoring. Preparation and implementation of the plan must be made the responsibility of the building contractor.
- Special attention should be given to minimizing and reducing the quantities of solid waste produced during site preparation and construction.
- Vegetation and combustible waste must no be burned on the site.

7.1.7 Sewage and litter management

Inadequate provision of toilets for use by construction workers can lead to ad hoc defecation in secluded areas on the site, thus creating on unsanitary condition and sources of fly infestation. Improper disposal of food cartons and other domestic forms of construction camp garbage could lead to littering of the site and pollution of adjacent coastal waters.

Mitigation measures:

- Proper solid waste receptacles and storage containers should be provided in sufficient numbers, particularly for the disposal of lunch and drink boxes, so as to prevent littering of the site. These should be disposed appropriately as identified in the construction site waste management plan.
- Temporary toilet facilities should be installed during construction for us by the workers

7.1.8 Construction Site Management

Construction site plans with proper layout of storage and working areas are important first steps to ensuring potential environmental impacts would be minimized.

Mitigation measures

- Design a construction plan prior to construction that clearly identifies the working areas, storage areas, waste disposal areas, and sanitary facilities as well as waste collection schedules to coincide with the construction plan.

- Put up a temporary fence around the construction site to minimize dust pollution onto the surrounding environment

7.1.9 Employment / Income generation

At this stage it is not possible to accurately determine the number of worker that will be employed on the site during the construction phase but most of the construction will be undertaken by local contractors with some specialized professionals which could possible be expatriates. Short-term employment for the district skilled and unskilled labour would be needed during the construction.

7.2 OPERATIONAL PHASE IMPACTS

7.2.1 General Facility Management

The facility needs to have well kept records to ensure compliance with environmental management measures identified in the EIA.

Good housekeeping:

- Compile a list of facility rules and environmental management conditions, associated with the use of the slipway and wharf for clients and contractors to sign before slipping and working on their boats.
- Maintain a slipping register containing the details of all vessels slipped and of the work done on each vessel. Vessel details should include the name of the vessel, distinctive numbers or letters, length, gross tonnage, paint history (types of hull coatings applied and application dates) and recent voyage history (i.e. whether from intrastate, interstate or overseas).
- Keep a record of all anti-fouling work done and record the following information for all vessels slipped:
    - Type of anti-fouling system used;
    - Dates of application of anti-fouling system;
    - Name of anti-fouling system manufacturer;
    - Name and colour of anti-fouling system;
    - Type, name and colour of sealer coat, if applied; and
    - Date of application of sealer coat.
- Maintain a list of all liquids and powder products kept on the premises together with up to date copies of all Material Safety Data Sheets (MSDSs).
- Establish a daily checklist to ensure that key work areas are kept clean and that appropriate storage, work and management procedures are being adhered to. Assign different inspection responsibilities to specific facility staff members.
- Use the Environmental Management Plan for Operational Best Practice to develop a procedures manual for common activities carried out at the facility.

7.2.2 Materials Use and Storage

The Slipway will use and store a wide range of chemicals and other materials, many of which may be hazardous and/or dangerous. Examples include fuels, oils, alkaline and acidic solutions, cleaning solvents, disinfectants, detergents, degreasers and paints. These materials may be subject to inappropriate and unauthorised use, vandalism and/or theft.

All chemicals and other hazardous and dangerous materials should be stored appropriately to prevent potential negative environmental and/or public health impacts.

Mitigation Measures

Chemical storage areas:

Chemicals and any hazardous and dangerous liquid materials should be stored in sealed containers in a secure covered area with a bunded impervious surface to contain leaks or spills. The bunding must be large enough to contain 110% of all liquids stored inside it.

Storage areas should be located away from through traffic, stormwater drains, pipes or any areas prone to flooding.

Storage areas must be adequately ventilated according to the nature of the stored substances and their use.

Display signage to identify chemical hazards and restrict access to the storage area.

Segregate and store as little as possible of the chemicals, hazardous and dangerous liquid materials used on site.

Incompatible chemicals, such as flammable liquids and toxic substances, should be stored separately. Methyl Ethyl Ketone Peroxide is often used as a fibreglassing catalyst and should not be stored anywhere near flammable liquids or other dangerous goods.

Storage containers:

All storage containers and smaller decanting containers should be tightly sealed and clearly labelled.

Replace the lids on containers of solvent, resin, fibreglassing initiator and accelerator promptly after use. This reduces evaporation and material loss and prevents contamination by dust.

Volatile liquids (solvents) must be kept cool and stored in a covered container to prevent evaporation and they should be pumped or fitted with taps to avoid the need to pour the liquid and hence minimise the potential for spills.

Trays should be positioned under chemical container taps to catch spills or drips. The tray material must be compatible with the stored chemical.

Material Safety Data Sheets and safe handling:

Keep Material Safety Data Sheets for all liquids and powder products used or stored on site. In case of an emergency, the MSDS is the most effective means of assessing risk.

Ensure that all personnel responsible for handling chemicals are aware of the potential hazards of the materials they handle.

Provide required personal protective equipment (refer to MSDS) and train staff in the use of the equipment.

7.2.3 Environmental Safety And Emergency Response

Many of the chemicals used for boat repair and maintenance are hazardous and/or dangerous, and may cause environmental harm through their inappropriate handling, use, and container disposal, as well as through leaks, accidental discharge and spills.

To prevent or minimise the environmental impacts associated with accidental spills or releases, the following mitigation measures need to be done.

Mitigation measures

Facility Contingency Plan:

Develop a facility contingency plan that outlines environmental safety provisions and emergency response procedures in the event of fire hazards, chemical and other spills, damage to equipment and personal injury.

Review the contents of the plan with relevant facility staff at least once a year.

Emergency spill response measures:

Keep spill clean-up equipment, absorbent materials, and materials for neutralising or decontaminating spills on the premises and train staff in the use of these materials.

Attempt to contain spills where possible and if it is safe to do so.

Clean up spills or leaks immediately (if this can be done in a safe manner) and do not hose the substances onto soil or into sea.

Do not reuse contaminated clean-up materials.

Spill clean-up equipment:

Spill equipment for combating oil and diesel spills includes booms (mechanical barriers for containing liquids), sorbents (materials for recovering liquids through absorption or adsorption), special non-toxic dispersants and materials to block stormwater and other drainage areas.

Avoid the use of sawdust or other readily combustible absorbents to clean up flammable liquid spills.

Have recommended personal protective equipment available and train staff in its use.

7.2.4 Vessel Haul-Out, Repair And Maintenance

Many of the activities and practices that take place at the slipway have the potential to cause environmental harm by polluting the environment. Potential negative environmental impacts include contamination of stormwater, groundwater, soil, air and the sea.

Mitigation measures

Vessel work area:

- The entire vessel work area will be located at the appropriate height above the high water mark to minimise the potential of waste materials entering the sea.
- The entire work platform is sloped and bunded to contain all waste and wash water as well as the slipway shed to ensure that all material washed, blasted or scraped off vessels can be captured.
- All vessel repair and maintenance activities will take place within the Slipway shed to ensure that the wash-down wastewater and other facility liquid wastes can be contained.
- The vessel work area will be regularly swept, cleaned and maintained to prevent foreshore pollution and damage to the marine environment.
- No hull cleaning activities will take place where the washdown waters and other wastes could be washed into the sea.
- Bilge water will not be pumped into sea if it contains visible signs of oil, hydrocarbons or other wastes including sanitary and detergent wastes.
- A daily checklist will be prepared for key work areas to confirm cleanliness and appropriate storage, work and management procedures.
- Adequate signage will be erected to highlight good environmental management practices.

Vessel work area waste management:

- A 3-stage settling tank system will be fitted with all washdown water pumped through. This will remove solids, but not always discolouration.

- No oil separator will be fitted to pumping from the bunded area. In the advent of an oil spill, pumping will be stopped and cleaned up in the normal manner.
- Boat repair and maintenance activities will not occur at times of bad weather where the waste management system may be rendered inoperable or ineffective.
- Before slipping and during boat cleaning activities, the waste management system will be regularly inspected and cleared of trapped solids.

7.3 Vessel Repair And Maintenance Activities

The Slipway operational activities would be varied according to the needs of each boat slipped. Therefore each activity is identified below with the appropriate mitigation measures to ensure compliance

7.3.1 Surface Preparation and cleaning

Vessel surface preparation and cleaning generally entails removing old paint, rust, grease, dirt and biological hull foulants. Methods used for cleaning and preparing vessel surfaces include manual scrubbing and scraping, pressure water blasting, abrasive blasting and in-water hull cleaning.

Potential environmental risks associated with surface cleaning activities include the release of:

- Toxic chemicals in the form of large quantities of paint flakes containing antifoulants and heavy metals such as copper, tin, lead and zinc;
- Large volumes of polluted waste water from pressure water blasting;
- Toxic abrasive blasting wastes including blasting material mixed with paint flakes and metal dust;
- Exotic and invasive marine species; and
- Coloured wastewater contributing towards increased estuarine/coastal marine surface water turbidity.

7.3.1.1 Removal of Antifouling Paint

Antifouling coatings are applied with the aim of either inhibiting the settlement or the attachment of marine biota to vessel hulls. Marine biota settlement is inhibited through the application of paints containing toxic chemicals, such as tributyltin or copper, which are leached into the water column. Inhibiting the attachment of marine biota is achieved by coating vessel hulls with silicon or other chemicals containing non-stick surface bound properties.

Conventional antifouling paints contain biocides that are harmful to marine life. The removal of antifouling paints, particularly those containing TBT, results in paint debris, sludge, dust and other particles that may contribute towards water, soil and/or air pollution in the absence of appropriate environmental management measures.

Mitigation Measures

The following measures apply to the general removal of antifouling paint.

- All antifouling contaminated waste materials will be collected in the bunded sump and 3 stage settling tanks for disposal according to toxic waste disposal guidelines to be prepared by the MNRE
- Before removing antifouling paint, the Slipway facility operators should be aware of the formulation and type of antifouling paint to be removed, as the paint wastes may be considered hazardous. Where not sure of the formulation

and type of paint to be removed, arrange for the paint to be sampled and tested at an approved chemical laboratory to determine its formulation.

- Old antifouling coatings must not be burnt off as this may generate highly toxic fumes, smoke and gases.

7.3.1.2 Removal of Biological Hull Foulants and Marine Biota

Marine pests may be present on the hull of vessels, as microscopic cells in ballast tanks or in the internal plumbing of vessels. Vessels that have been in international waters risk introducing exotic marine organisms into the marine environment, while all facilities risk spreading marine pests throughout the country.

Mitigation Measures

The following measures apply to the general removal of biological hull foulants and marine biota.

- Do not clean vessel hulls in the water.
- Biological hull foulants and marine biota should only be removed within the Slipway facility where it can capture and contain the hull cleaning washwater and solids (including encrusting animals, barnacles and weeds) removed from the hull, ensuring that they do not pass into the sea.
- The Slipway 3 stage waste treatment system will collect all vessel washdown water and filter before discharging it to ocean
- Clean and check seawater systems on boats as some marine pests can survive in the internal plumbing of vessels. To ensure that it's free from pests this water should also be filtered to capture all solids over 60 microns in diameter.
- Report all new sightings of exotic marine organisms to the MNRE Invasive Species Unit and the marine Division of the MAF.

7.3.1.3 Manual and Mechanical Scraping, scrubbing and cleaning

Hull and deck sanding and scraping produces a range of solid wastes, including paint chips and dust that can pollute and contaminate air, soil, surface waters and bottom sediments. Conducting these activities outdoors increases the potential for pollutants to be dispersed into the environment by wind, rain or runoff. The accumulation of paint chips and other residues in yard soils and sediments can also lead to contamination.

Mitigation Measures.

- The Slipway Management Plan will include the washdown of the entire working area and filter through the 3-stage settling tanks, to ensure all scrapings are contained.
- Shipyard maintenance generally consists of high pressure fresh water blasting to remove marine growth, loose paint, and to remove salt prior to painting, all of which will be pumped through the 3-stage tank system.
- Used wash water can be reused for working platform wash down purposes, but only fresh water will be used for preparation of surfaces to be painted.

7.3.1.4 Pressure Water Blasting

The use of water-based pressure cleaners to clean the exterior of boats has the potential to create an environmental nuisance and cause environmental harm. High-pressure water blasting (up to 20 000 psi) also presents containment

problems caused by the wide dispersion of biological and physical materials removed from the vessel hull during the cleaning process.

Pollutants and contaminants originating from pressure water blasting activities include:

- Chemicals and additives, including detergents, solvents, caustic or acids, used in the cleaning solution;
- Materials removed from the cleaning surface including biological hull foulants, antifouling paint sludge, dirt, oil and grease; and
- Compounds produced as a result of reactions between the cleaning solution and the materials removed from the boats.

Mitigation measures

- The entire working area will be sealed and angled to enable wash water to drain into sumps. All marine growth, paint flakes etc., will be collected and filtered through settling traps at the completion of pressure waterblastings. The entire area will be washed down and also processed through settling traps prior to discharge. This entire process will be undertaken in a fully enclosed area, and the process will not be visible from surrounding land users.
- All washdown water will be collected and the settling traps will be large enough to accommodate continuous operation of a pressure cleaner.
- Use high temperature water rather than chemicals for cleaning activities.
- Treated waste water should not be disposed off at sea, but collected and disposed at a location approved by the MNRE.
- Solid residues produced as a result of the cleaning process should be stored on site in a sealed container and transported to the Tafaigata Landfill or for appropriate disposal site identified by the MNRE.

7.3.1.5 Abrasive Blast Cleaning

Abrasive blast cleaning involves cleaning surfaces by using compressed air or water to propel hard granular particulate matter through a nozzle against the vessel hull and/or other surfaces. Typical blast materials include siliceous sand, garnet, copper or zinc slag and steel grit or shot.

Abrasive blast cleaning practices result in emissions, which may cause air pollution, soil and water contamination.

Mitigation measures

- There are many types of blasting available, e.g. vacuum blasting, wet abrasive blasting, UHP blasting and the desired process will be up to the contractor but with the requirement that all debris is contained, and cleaned up upon completion and disposed of in an appropriate way in accordance with guidelines provided by MNRE.
- All abrasive blasting will be undertaken using garnet in an undercover slipway shed containing all dust and debris.

7.3.1.6 In-Water Hull Cleaning

The practice of in-water hull cleaning is aimed at ensuring that boats maintain their hull speed and fuel efficiency. Diver cleaning, using manual or power tools, is the most common form of in-water hull cleaning with other methods, including mechanised cleaning, using cleaning devices operated with or without a diver.

Mitigation measures

- In-water hull cleaning should be avoided due to the impact on the Marine Protected Area

7.3.2 Surface Coating

Manual Surface Coating

Painting vessel hulls and applying topside coatings may result in the concentrated release of harmful vapours and liquids. Wastes generated by painting activities are considered hazardous where they contain solvents and/or heavy metals.

Spray Painting

Spray painting involves the application of liquid and solid formulations that consist of paints, powder coatings, surface preparation products, removers, finishers, solvents and thinners. Spray painting methods include the use of conventional air spray, airless atomisation and air assisted airless atomisation.

Mitigation Measures

- All painting (both manual and spray painting), should be carried out in good practice, ensuring no paint drift leaves the site
- All the painting will be done within the slipway where waste will be bunded and treated in the 3 stage treatment system.
- Manual painting, using brushes and rollers, is recommended over spray painting methods.
- TBT can only be applied where a permit has been issued by MNRE that specifically authorises its application for a particular vessel.
- Before applying antifouling paints, consider using alternative technologies, particularly those that rely on the coating's physical properties rather than its toxicity to prevent fouling.
- Never mix or prepare antifouling paints on sites that are subject to tidal influences. Mix paints in drip trays under cover and in a sealed, bunded and well ventilated paint bay.

7.3.3 Fibreglassing

Fibreglassing activities are a source of hazardous volatile emissions to the environment. Acetone (a solvent used to clean tools and other surfaces contaminated with resin and styrene (the volatile component of the polyester resin) are the largest contributors of volatile emissions caused by fibreglassing activities. Fibreglass trimming, grinding, sanding and drilling activities may also give rise to air pollution in the form of dust and other particulate emissions.

Mitigation measures

- All spray emissions will be contained and controlled in the slipway shed with the doors closed while using mechanical ventilation equipment.

7.3.4 Welding and metal fabrication

Welding activities may contribute towards air pollution and cause metal contamination of soil, stormwater and the sea through the generation of airborne dusts and the emission of fumes and smoke.

Mitigation Measures

- Conduct welding and thermal cutting activities in the slipway shed as much as possible.
- If only in occasions when the welding and thermal cutting cannot be done within the slipway shed, they should be done at locations where it will meet the same discharge containment requirements for the whole slipway.
- Do not let dust and grinding wastes accumulate where they may be washed into stormwater drains or the sea.
- All dusts and other grinding wastes should be securely wrapped prior to disposal and filings should be swept or vacuumed and disposed of in an industrial bin.

7.3.5 Engine Maintenance and Repair

Engine maintenance and repair activities can cause human hazards, endanger the environment and can result in spills and leaks that are costly to clean up, can degrade water quality and threaten aquatic plant and animal life.

Mitigation measures

General engine maintenance:

- Use a drip tray or groundsheet under the engine to collect oil, grease, solvents or detergents.
- When cleaning the drip tray or groundsheet, use methods that do not result in soil or water contamination.

Cleaning engine parts:

- Ensure that parts cleaning and degreasing takes place in a properly designated wash bath or over catch pans located in a covered, sealed and bunded area that is graded to a collection pit or sump.
- Where possible, clean engine parts with a brush rather than with solvents or aqueous degreasers such as alkaline or caustic soda.
- Use water-based or biodegradable strippers, cleaners or degreasers wherever possible.

Replacing engine parts and oils:

- Deposit old or damaged batteries, intended for recycling, in spill trays located under cover in designated areas that are concreted and bunded.
- Collect and package mercury switches, thermostats and fluorescent tubes for disposal as controlled wastes at approved landfill facilities.
- Drain oil filters before disposal and never place any containers or vessels containing residual oil, fuel or other fluids in industrial waste bins unless they have been drained and wiped clean.
- Never pump bilge water into the sea or onto soil if it contains high concentrations of hydrocarbons or other wastes including sanitary and detergent wastes.
- Collect all waste grease, sump oil, contaminated bilge water and waste oil filters for recycling or disposal.

7.3.6 Waste Management

SPA as the owners of the Slipway should aim to minimise all wastes produced from on-site activities and manage controlled wastes in a manner that ensures they are not released into the environment. To avoid any pollutants being discharged into the Marine Protected Area the following waste management principals should be put in place:

1. Waste avoidance;
2. Waste reuse, recirculation, recycle and/or reclaim to extend the life of the material resources;
3. Waste treatment to reduce potentially degrading environmental impacts; and finally
4. Waste disposal at an approved waste disposal facility.

GENERAL WASTES

General wastes are defined as waste other than controlled waste. Typical general waste types, associated with boat repair and maintenance facilities, include various forms of uncontaminated debris and litter such as discarded cardboard, paper, plastics, bags and cartons, aluminium cans and glass drinking bottles and clean empty steel cans and drums.

These wastes are all unsightly and potentially dangerous to people and animals. Dangers to birds and animals include the potential for ingestion of debris mistaken for food and/or death from entanglement. Human dangers include injury from stepping on discarded items. Other general waste impacts include odour problems, blocking stormwater and other water intakes and drains and reduced visual appeal of our shorelines and waterways.

CONTROLLED WASTES

Controlled wastes are wastes with the potential to have a significant adverse impact on the environment, including impacts on ambient coastal marine, estuarine or fresh water quality. Controlled wastes include wastes that are capable of leaching, are ecotoxic, toxic, corrosive, poisonous, flammable and/or explosive.

Slipway generated controlled wastes may include:

- Wastes resulting from the surface treatment of metals;
- Wastes containing detergents, degreasers, brush cleaning fluids, solvents and acidic or alkaline solutions;
- Waste oil, grease, oily water and water contaminated by hydrocarbons;
- Paint, paint scrapings and other wastes (abrasive blast media, washdown water and sludge) containing metals (copper, lead, zinc, tin) and metalloids;
- Wastes containing pesticides and organics, including Tributyltin; and
- Soil or water contaminated by the any of the above wastes.

Mitigation Measures

- SPA and UNIMAR will consult with the Waste Management and Toxics Units of the MNRE to ensure the most appropriate on-site waste management system for the collection, treatment and disposal of solid and liquid waste that may be contaminated.

Solid Waste

- Solid wastes should be separated as soon as they are generated
- Waste separation for recycling or disposal purposes should be encouraged by locating clearly labelled and lidded waste containers (wheelie or other bins), for each type of solid waste that is generated, as close as is safe and convenient to the waste generation process.
- Prevent landfill and groundwater contamination by ensuring that all containers containing waste oils, solvents and

other chemicals or potential contaminants (paint, paint thinners or acids) are empty and have been dried out before disposing of them in waste containers.

- Where waste is stored on-site prior to disposal, ensure that sufficient rubbish bins and other solid waste containers are available and locate them in a waste storage area under cover to prevent contamination of stormwater runoff.
- Where contaminated soil (or other particulates) is stored on-site, ensure that it is stored on a bunded impervious surface and that it is covered to prevent airborne migration of dust.
- Antifouling paint residues, sludge and other antifouling paint contaminated wastes, including organic material, contain toxic biocides and should be managed as controlled wastes. These wastes must be appropriately contained and packaged and should not be stored without prior approval from the MNRE.
- All controlled wastes that are collected on-site, including contaminated soils, abrasive blast wastes and sludge/slurry, are to be removed based on guidelines to be developed by MNRE.

Liquid Waste

- All boat repair and maintenance activities will take place in the Slipway shed to ensure that all wash-down wastewater and other facility liquid effluent and arisings are contained.
- The 3 stage waste treatment system will capable of collecting and holding all slipway and hardstand generated wastewater and stormwater runoff.
- The liquid waste treatment systems should aim to remove suspended solids, toxic substances, turbidity and discolouration through the use of MNRE approved guidelines.
- The waste treatment systems should be maintained regularly and all accumulated sludge and other solids should be disposed of according to the regulatory requirements for controlled wastes.
- The waste treatment systems should be designed to enable the accumulated sump and settling tank sludge/slurry to be removed.

STORMWATER MANAGEMENT

Coastal marine surface water quality can be contaminated by pollutants contained in stormwater runoff originating from slipway and other wharf-based activities. These pollutants may include sediment, nutrients, oils, grease, hydrocarbons, metals, chemicals, particulates and solvents. The highest concentration of surface pollutants occurs in the runoff associated with the first 25mm of rainfall.

Mitigation measures

- The 3 stage waste treatment system will be able to collect all the stormwater runoff within the slipway shed and areas of work to stop any pollution runoff into the sea.
- Regularly clean and maintain work areas and ensure that no particles or waste water from cleaning or maintenance work falls or drains into stormwater.
- All wastes will be stored undercover to prevent contaminants being washed to stormwater by rain.

7.3.7 Air Quality Management

Activities associated with slipway may affect local air quality and cause air pollution through the generation of dust, fumes, gases, smoke and other emissions.

Dust and abrasive material should be controlled to minimise particle movement off-site, while odour and volatile emissions should be reduced to prevent environmental nuisance.

Mitigation Measures

- All activities that have the potential to generate large volumes of dust and particulate emissions will be down within the Slipway shed.
- Avoid burning off of hulls as this produces toxic gases.
- Never burn oily/greasy rags and paper, oil-soaked sawdust, plastics or rubber. Wrap and place these waste materials in an industrial bin.
- Regularly collect floor sweepings, dust, powder waste or absorbent clean up materials and place them in a sealed bag before disposing of them in a covered waste bin.
- Maintain air pollution control equipment and immediately replace or repair any emission control equipment that is blocked, frayed, leaking or not functioning within specifications.
- Control any exhaust emissions to prevent nuisance or objectionable odours/fumes off-site.

8. ENVIRONMENTAL MANAGEMENT PLAN

The following Environmental Management Plan (EMP) is intended for use by different stakeholder for varying purposes with the ultimate goal of minimizing the environmental impacts of the development to the surrounding physical and social environment, while maximizing the economic benefits to the country and the district.

The different roles of the relevant agencies are provided in the EMP matrix for clarity, but briefly, PUMA as the overall EIA regulating Agency will be responsible for the regular checks on the SPA as the developer to ensure compliance with the EMP. SPA as the developer will be required to fully comply with the EMP and put it into practice once the EIA has been endorsed.

Due to the limited baseline available at the start of the project and the potential impacts to the Aleipata MPA from the development, it is further proposed that the following monitoring programme is to be funded by SPA for annual reviews by the Aleipata MPA District Committee and SPA on the impacts of the wharf and slipway upon the marine resources of the MPA.

1. A sediment-sampling program to determine the environmental quality of the harbour sediments. Results of the sampling should be made available to the Aleipata MPA for review
2. Fund the community-based reef monitoring programme for No-Take Zones in the Aleipata MPA biannually as a monitoring measure to assess any potential impacts from the Wharf activities on the marine environment.

Environmental Impacts	**Mitigation Measures**	Responsible Agency	Monitoring Agency
Construction Phase			
Dredging and reclamation	A sediment-sampling program should be conducted prior to dredging to determine the environmental quality of the harbour sediments. Work should be scheduled to avoid periods of heavy rainfall, or heavy swells. Solid waste should be put in the appropriate solid waste bins for disposal. All machinery should be inspected for leakage of lubricants or fuel and must be in good working order prior to dredge work each day. Any accidental spills or leaks will be promptly contained, cleaned up, and reported according to the Oil Spill Contingency Plan. All fuel handling and storage should be done in a way that minimizes the risk of fuel, lubricant or hydrocarbon release. Oil spill clean-up equipment is to be on-site and made accessible to all contractors and/or employees during dredging and reclamation works.	*SPA*	*SPA*
Marine Ecosystem	All machinery will be inspected for leakage of lubricants or fuel and must be in good working order. Work will be scheduled to avoid periods of heavy precipitation. Erosion control structures are to be used, if necessary, to prevent erosion and silty runoff during the dredging and spoil disposal program. Dredging should only be carried out during low wind/wave conditions.	*SPA*	*SPA*
Material storage and transportation	All fine earth materials must be enclosed during transportation to the site to prevent spillage and dusting. As far as possible, transport of construction materials should be schedule for off-peak traffic hours. This will reduce the risk of traffic congestion and of road accidents on the main south coast road to the site. Appropriate traffic warning signs, informing road users of a construction site entrance ahead and instructing then to reduce speed, should be placed along the main road to the Aleipata wharf. Flagmen should be employed to control traffic and assist construction vehicles as they attempt to enter and exit the project site.. The stockpiling of construction materials should be properly controlled and managed. Fine materials should be stockpiled on the mainland and not on the wharf. Hazardous chemicals (e.g. fuels) should be properly stored in appropriate containers and these should be safely locked away. Conspicuous warning signs (e.g. 'No smoking') should also be posted around hazardous waste storage and handling facilities.	*Contractor*	*SPA*
Waste Management	A site waste management plan should be prepared by the contractor prior to commencement of construction. This should include designation of appropriate waste storage areas, collection and removal schedule, identification of approved disposal site, and a system for supervision and monitoring. Preparation and implementation of the plan must be made the responsibility of the building contractor. Special attention should be given to minimizing and reducing the quantities of solid waste produced during site preparation and construction. Vegetation and combustible waste must no be burned on the site. Unusable construction waste such as damaged pipes and other construction material must be disposed of at an approved dumpsite. Proper solid waste receptacles and storage containers should be provided in sufficient numbers, particularly for the disposal of lunch and drink boxes, so as to prevent littering of the site. Arrangement should be made for the regular collection of litter and for its disposal only at the Tafaigata Landfill.	*Contractor*	*SPA*

Construction Site	Design a construction plan prior to construction that clearly identifies the working areas, storage areas, waste disposal areas, and sanitary facilities as well as waste collection schedules to coincide with the construction plan. Put up a temporary fence around the construction site to minimize dust pollution onto the surrounding environment	*SPA / Contractor*	*SPA*
Employment	Wages for local workers should not be lower than the national wage scale for the specific skills. Working conditions for the workers should abide by the Ministry of Labour Commerce and Industry's labour requirements.	*SPA*	*SPA*

Operation Phase			
Facility Management	• Compile a list of facility rules and environmental management conditions • Maintain a slipping register containing the details of all vessels slipped and of the work done on each vessel. • Keep a record of all anti-fouling work done and record the following information for all vessels slipped: - Type of anti-fouling system used; - Dates of application of anti-fouling system; - Name of anti-fouling system manufacturer; - Name and colour of anti-fouling system; - Type, name and colour of sealer coat, if applied; and - Date of application of sealer coat. • Maintain a list of all liquids and powder products kept on the premises together with up to date copies of all Material Safety Data Sheets (MSDSs). • Establish a daily checklist to ensure that key work areas are kept clean and that appropriate storage, work and management procedures are being adhered to. • Use the Environmental Management Plan as Operational Best Practice to develop a procedures manual for common activities carried out at the facility.	***SPA***	*Aleipata MPA Committee*
Environmental Safety and Emergency Response	• Develop a facility contingency plan that outlines environmental safety provisions and emergency response procedures in the event of fire hazards, chemical and other spills, damage to equipment and personal injury. • Review the contents of the plan with relevant facility staff at least once a year. • Keep spill clean-up equipment, absorbent materials, and materials for neutralising or decontaminating spills on the premises and train staff in the use of these materials. • Attempt to contain spills where possible and if it is safe to do so. • Clean up spills or leaks immediately (if this can be done in a safe manner) and do not hose the substances onto soil or into sea. • Do not reuse contaminated clean-up materials. • Spill equipment for combating oil and diesel spills includes booms (mechanical barriers for containing liquids), sorbents (materials for recovering liquids through absorption or adsorption), special non-toxic dispersants and materials to block stormwater and other drainage areas. • Avoid the use of sawdust or other readily combustible absorbents to clean up flammable liquid spills. • Have recommended personal protective equipment available and train staff in its use.	***SPA***	*Aleipata MPA Committee*
Materials Use and Storage	• Chemicals and any hazardous and dangerous liquid materials should be stored in sealed containers in a secure covered area with a bunded impervious surface to contain leaks or spills. • Storage areas should be located away from through traffic, stormwater drains, pipes or any areas prone to flooding. • Storage areas must be adequately ventilated according to the nature of the stored substances and their use. • Display signage to identify chemical hazards and restrict access to the storage area. • Segregate and store as little as possible of the chemicals, hazardous and dangerous liquid materials used on site. • Incompatible chemicals, such as flammable liquids and toxic substances, should be stored separately. Methyl	***SPA***	*Aleipata MPA Committee*

	Ethyl Ketone Peroxide is often used as a fibreglassing catalyst and should not be stored anywhere near flammable liquids or other dangerous goods. • All storage containers and smaller decanting containers should be tightly sealed and clearly labelled. • Replace the lids on containers of solvent, resin, fibreglassing initiator and accelerator promptly after use. This reduces evaporation and material loss and prevents contamination by dust. • Volatile liquids (solvents) must be kept cool and stored in a covered container to prevent evaporation and they should be pumped or fitted with taps to avoid the need to pour the liquid and hence minimise the potential for spills. • Trays should be positioned under chemical container taps to catch spills or drips. The tray material must be compatible with the stored chemical. • Keep Material Safety Data Sheets for all liquids and powder products used or stored on site. In case of an emergency, the MSDS is the most effective means of assessing risk. • Ensure that all personnel responsible for handling chemicals are aware of the potential hazards of the materials they handle. • Provide required personal protective equipment (refer to MSDS) and train staff in the use of the equipment.		

Vessel Haul-out, Repair Maintenance	• The entire vessel work area will be located at the appropriate height above the high water mark to minimise the potential of waste materials entering the sea. • The entire work platform is sloped and bunded to contain all waste and wash water as well as the slipway shed to ensure that all material washed, blasted or scraped off vessels can be captured. • All vessel repair and maintenance activities will take place within the Slipway shed to ensure that the wash-down wastewater and other facility liquid wastes can be contained. • The vessel work area will be regularly swept, cleaned and maintained to prevent foreshore pollution and damage to the marine environment. • No hull cleaning activities will take place where the washdown waters and other wastes could be washed into the sea. • Bilge water will not be pumped into sea if it contains visible signs of oil, hydrocarbons or other wastes including sanitary and detergent wastes. • A daily checklist will be prepared for key work areas to confirm cleanliness and appropriate storage, work and management procedures. • Adequate signage will be erected to highlight good environmental management practices. • A 3-stage settling tank system will be fitted with all washdown water pumped through. This will remove solids, but not always discolouration. • No oil separator will be fitted to pumping from the bunded area. In the advent of an oil spill, pumping will be stopped and cleaned up in the normal manner. • Boat repair and maintenance activities will not occur at times of bad weather where the waste management system may be rendered inoperable or ineffective. • Before slipping and during boat cleaning activities, the waste management system will be regularly inspected and cleared of trapped solids.	***SPA***	*Aleipata MPA Committee*
Vessel Repair and Maintenance Activities			
Anitfouling removal	• The following measures apply to the general removal of antifouling paint. • All antifouling contaminated waste materials will be collected in the bunded sump and 3 stage settling tanks for disposal according to toxic waste disposal guidelines to be prepared by the MNRE • Before removing antifouling paint, the Slipway facility operators should be aware of the formulation and type of antifouling paint to be removed, as the paint wastes may be considered hazardous. Where not sure of the formulation and type of paint to be removed, arrange for the paint to be sampled and tested at an approved chemical laboratory to determine its formulation. • Old antifouling coatings must not be burnt off as this may generate highly toxic fumes, smoke and gases.	SPA/contractors	*SPA*
Removal of Biological Hull Foulants and Marine Biota	• Do not clean vessel hulls in the water. • Biological hull foulants and marine biota should only be removed within the Slipway facility where it can capture and contain the hull cleaning washwater and solids (including encrusting animals, barnacles and weeds) removed from the hull, ensuring that they do not pass into the sea. • The Slipway waste treatment system will collect all vessel washdown water and filter before discharging it to ocean	SPA/contractors	*SPA*

	• Clean and check seawater systems on boats as some marine pests can survive in the internal plumbing of vessels. To ensure that it's free from pests this water should also be filtered to capture all solids over 60 microns in diameter. • Report all new sightings of exotic marine organisms to the MNRE Invasive Species Unit and the marine Division of the MAF.		
Scraping, scrubbing and cleaning	• The Slipway Management Plan will include the washdown of the entire working area and filter through the 3-stage settling tanks, to ensure all scrapings are contained. • Shipyard maintenance generally consists of high pressure fresh water blasting to remove marine growth, loose paint, and to remove salt prior to painting, all of which will be pumped through the 3-stage tank system. • Used wash water can be reused for working platform wash down purposes, but only fresh water will be used for preparation of surfaces to be painted.	SPA/contractors	*SPA*
Pressure Water Blasting	• The entire working area will be sealed and angled to enable wash water to drain into sumps. All marine growth, paint flakes etc., will be collected and filtered through settling traps at the completion of pressure waterblastings. The entire area will be washed down and also processed through settling traps prior to discharge. This entire process will be undertaken in a fully enclosed area, and the process will not be visible from surrounding land users. • All washdown water will be collected and the settling traps will be large enough to accommodate continuous operation of a pressure cleaner. • Use high temperature water rather than chemicals for cleaning activities. • Treated waste water should not be disposed off at sea, but collected and disposed at a location approved by the MNRE. • Solid residues produced as a result of the cleaning process should be stored on site in a sealed container and transported to the Tafaigata Landfill or for appropriate disposal site identified by the MNRE.	SPA/contractors	*SPA*
Abrasive Cleaning	• There are many types of blasting available, e.g. vacuum blasting, wet abrasive blasting, UHP blasting and the desired process will be up to the contractor but with the requirement that all debris is contained, and cleaned up upon completion and disposed of in an appropriate way in accordance with guidelines provided by MNRE. • All abrasive blasting will be undertaken using garnet in an undercover slipway shed containing all dust and debris.	SPA/contractors	*SPA*
Surface Coating	• All painting (both manual and spray painting), should be carried out in good practice, ensuring no paint drift leaves the site • All the painting will be done within the slipway where waste will be bunded and treated in the 3 stage treatment system. • Manual painting, using brushes and rollers, is recommended over spray painting methods. • TBT can only be applied where a permit has been issued by MNRE that specifically authorises its application for a particular vessel. • Before applying antifouling paints, consider using alternative technologies, particularly those that rely on the coating's physical properties rather than its toxicity to prevent fouling. • Never mix or prepare antifouling paints on sites that are subject to tidal influences. Mix paints in drip trays under cover and in a sealed, bunded and well ventilated paint bay.	SPA/contractors	*SPA*

Fibregalssing	• All spray emissions will be contained and controlled in the slipway shed with the doors closed while using mechanical ventilation equipment.	SPA/contractors	*SPA*
Welding and Metal Fabrication	• Conduct welding and thermal cutting activities in the slipway shed as much as possible. • If only in occasions when the welding and thermal cutting cannot be done within the slipway shed, they should be done at locations where it will meet the same discharge containment requirements for the whole slipway. • Do not let dust and grinding wastes accumulate where they may be washed into stormwater drains or the sea. • All dusts and other grinding wastes should be securely wrapped prior to disposal and filings should be swept or vacuumed and disposed of in an industrial bin.	SPA/contractors	*SPA*
Engine Maintenance and Repair	• Use a drip tray or groundsheet under the engine to collect oil, grease, solvents or detergents. • When cleaning the drip tray or groundsheet, use methods that do not result in soil or water contamination. • Ensure that parts cleaning and degreasing takes place in a properly designated wash bath or over catch pans located in a covered, sealed and bunded area that is graded to a collection pit or sump. • Where possible, clean engine parts with a brush rather than with solvents or aqueous degreasers such as alkaline or caustic soda. • Use water-based or biodegradable strippers, cleaners or degreasers wherever possible. • Deposit old or damaged batteries, intended for recycling, in spill trays located under cover in designated areas that are concreted and bunded. • Collect and package mercury switches, thermostats and fluorescent tubes for disposal as controlled wastes at approved landfill facilities. • Drain oil filters before disposal and never place any containers or vessels containing residual oil, fuel or other fluids in industrial waste bins unless they have been drained and wiped clean. • Never pump bilge water into the sea or onto soil if it contains high concentrations of hydrocarbons or other wastes including sanitary and detergent wastes. • Collect all waste grease, sump oil, contaminated bilge water and waste oil filters for recycling or disposal.	SPA/contractors	*SPA*
Stormwater management	• The 3 stage waste treatment system will be able to collect all the stormwater runoff within the slipway shed and areas of work to stop any pollution runoff into the sea. • Regularly clean and maintain work areas and ensure that no particles or waste water from cleaning or maintenance work falls or drains into stormwater. • All wastes will be stored undercover to prevent contaminants being washed to stormwater by rain.	SPA/contractors	Waste Management Unit (MNRE) Aleipata MPA Committee

Waste Management	• SPA and UNIMAR will consult with the Waste Management and Toxics Units of the MNRE to ensure the most appropriate on-site waste management system for the collection, treatment and disposal of solid and liquid waste that may be contaminated. ***Solid Waste*** • Solid wastes should be separated as soon as they are generated • Waste separation for recycling or disposal purposes should be encouraged by locating clearly labelled and lidded waste containers (wheelie or other bins), for each type of solid waste that is generated, as close as is safe and convenient to the waste generation process. • Prevent landfill and groundwater contamination by ensuring that all containers containing waste oils, solvents and other chemicals or potential contaminants (paint, paint thinners or acids) are empty and have been dried out before disposing of them in waste containers. • Where waste is stored on-site prior to disposal, ensure that sufficient rubbish bins and other solid waste containers are available and locate them in a waste storage area under cover to prevent contamination of stormwater runoff. • Where contaminated soil (or other particulates) is stored on-site, ensure that it is stored on a bunded impervious surface and that it is covered to prevent airborne migration of dust. • Antifouling paint residues, sludge and other antifouling paint contaminated wastes, including organic material, contain toxic biocides and should be managed as controlled wastes. These wastes must be appropriately contained and packaged and should not be stored without prior approval from the MNRE. • All controlled wastes that are collected on-site, including contaminated soils, abrasive blast wastes and sludge/slurry, are to be removed based on guidelines to be developed by MNRE. ***Liquid Waste*** • All boat repair and maintenance activities will take place in the Slipway shed to ensure that all wash-down wastewater and other facility liquid effluent and arisings are contained. • The 3 stage waste treatment system will capable of collecting and holding all slipway and hardstand generated wastewater and stormwater runoff. • The liquid waste treatment systems should aim to remove suspended solids, toxic substances; turbidity and discolouration through the use of MNRE approved guidelines. • The waste treatment systems should be maintained regularly and all accumulated sludge and other solids should be disposed of according to the regulatory requirements for controlled wastes. • The waste treatment systems should be designed to enable the accumulated sump and settling tank sludge/slurry to be removed.	SPA	Waste Management Unit (MNRE) Aleipata MPA Committee

9. CONCLUSIONS

The EIA concludes that the proposed wharf extension and slipway at the Aleipata wharf will generate economic benefits for the SPA and local boat operating companies such as the SSC and local fishing fleet. Furthermore, the supporting industry providing services for the slipped boats will also provide needed income for the country. Thirdly the promise of increase tourism services from the cruise ships will generate additional income to the district and the national economy.

The EIA further concludes that the development will generate social benefits such as the provision of employment for people of the district through the provision of employment. Some social issues might also eventuate such as the disruption of cultural values through the increase traffic of workers, and visitors to the district. Such social issues will need strong commitment from the Alii and Faipule of Aleipata district working in collaboration with SPA to stop it.

On the environmental implications, the Aleipata district is already established as a Marine Protected Area. The marine biodiversity assessments undertaken as part of the MPA establishment showed a thriving marine environment with a rapid recovery from the damaged caused by the Cyclones of the early 1990's. Programmes under the MPA Management Plan have also been put in place for the long term sustainability of the MPA which includes the establishment of No-Take-Zones, the establishment of regulations for the harvesting of marine resources, and regulations for any developments that might impact the MPA. A trust fund has also been established to finance the management of the MPA. It is concluded by the EIA that the proposed development will have both short term and long term implications on the marine environment of Aleipata. As such, mitigation measures proposed is envisioned to stop or minimize any potential impacts to from the wharf development activities. Any slip in the proper operation of the Slipway and wharf will have detrimental impacts on the marine resources which the district is highly dependent upon for livelihood.

The EIA provides an overall conclusion that the development is economically and socially beneficial to the district and country as a whole, while the potential environmental impacts can be minimized to reduce risks to the environment for present and future generations of the Aleipata district.

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Annex: 5: Photographs of the Development Site

Mainland

South Facing

West facing

East Facing