



Pacific Safety of Navigation Project

Risk assessment for Port Vila harbour, Vanuatu



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Pacific Safety of Navigation Project: Risk assessment for Port Vila harbour, Vanuatu

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Executive summary

Vanuatu is a signatory to the International Convention for the Safety of Life at Sea (SOLAS), of which Chapter V Regulation 13.1 requires the contracting governments to provide “such Aids to Navigation (AtoN) as the volume of traffic justifies and the degree of risk requires.”

In 2017, the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA), with assistance from the Pacific Community (SPC), developed the simplified IALA risk assessment tool (SIRA), a simple qualitative tool to enable smaller states to meet their international obligation of providing AtoN by conducting waterways risk assessments.

In September 2018, the Ministry of Infrastructure and Public Utilities of Vanuatu invited SPC to assist in conducting a risk assessment of Port Vila harbour, the country’s most visited port. The assessment involved a stakeholder meeting as a first step, to gather the views on hazards and risks in the harbour area from those directly involved with or affected by AtoN service provision. The information gained from this meeting allowed the Ports and Marine Department’s AtoN officer and SPC to complete the full risk assessment matrix, based on ten identified possible scenarios. The ten scenarios include two collision scenarios within Port Vila harbour, two grounding scenarios at the entrance to Port Vila harbour, two allision scenarios at the main wharf, two foundering scenarios in the harbour, and two other scenarios.

The ten possible scenarios were then assessed for risk control options. For each scenario, the approximate cost of the incident was identified and a risk score was given, taking into account the probability of the incident happening and its potential impact on the country. The risk scores for the scenarios under the current situation were then compared with the new risk scores if the further risk control options were put in place.

| Scenario | Risk score | Risk control option | New risk score |
|--|------------|--|----------------|
| Collision of a ‘banana boat’/domestic vessel with a large vessel manoeuvring between Port Vila Bay and Pontoon Bay | 6 | The harbour master issues an advice for all marine vessels within the vicinity of the harbour approach not to navigate within established timeframes when vessels >500 tonnes (tankers, container vessels, cruise ships, etc.) are entering or leaving the port. The Office of the Maritime Regulator (OMR) should assist the harbour master in enforcing the advice (with fines if necessary) | 2 |
| Collision of a large vessel manoeuvring to get in or out of Port Vila Bay with anchored vessels in Port Vila Bay | 15 | Enforce mandatory pilotage services when vessels >500 tonnes are entering or leaving Port Vila harbour during bad weather. Also, establish a designated non-anchorage area in Port Vila Bay and move the current anchorage area away from the main shipping route into the harbour, and send a hydrographic (H)-note to the United Kingdom Hydrographic Office | 1 |
| Grounding of a vessel entering or leaving Port Vila harbour on the 9 m shoal/shallow area at Ifira Point | 15 | Dredge the entrance to a suitable depth (to be decided by the stakeholders and the National Maritime Subcommittee of Vanuatu) | 5 |
| Grounding of a vessel entering Port Vila harbour because two | 6 | (1) Put a bigger board at the background to make the daymark more conspicuous | 3 |

| | | | |
|--|----|---|---|
| daymarks on the leading lights are not conspicuous | | | |
| Allision of a vessel with the port shoreline during strong winds | 4 | Amend the Ports Act to state under exactly what weather conditions vessels are allowed to enter Port Vila harbour | 2 |
| Allision of a vessel with main wharf during strong winds | 6 | Amend the Ports Act to state under exactly what weather conditions vessels are allowed to enter Port Vila harbour. In addition, in the case of particularly strong winds and with oil tankers, use two tug boats during berthing operations | 3 |
| Capsizing of overloaded 'banana boats' | 15 | Provide more resources for the enforcement of the small craft rule | 4 |
| Sinking of abandoned ships at anchor | 12 | Amend the OMR Act to include procedures for abandoned vessels | 4 |
| Tangling of anchors in wrecks at Lapetasi Wharf | 12 | (1) Remove the wrecks; or (2) Two tug boats mandatory for every vessel berthing at Lapetasi Wharf | 4 |
| Allision with upgraded Lapetasi Wharf by ships using the current chart | 12 | Hydrographic survey of Lapetasi Wharf area | 4 |

The main outcome of the risk assessment process in Port Vila was ten recommendations which aim to reduce the risks to safety of navigation to an acceptable level for stakeholders. The recommendations and costs of their implementation are as follows.

Recommendation 1

To reduce the risk of collisions of 'banana boats' or other domestic vessels with large vessels manoeuvring between Port Vila Bay and Pontoon Bay, the harbour master should issue an advice for all marine vessels within the vicinity of the harbour approach not to navigate within established timeframes when vessels larger than 500 tonnes (tankers, container vessels, cruise ships, etc.) are entering or leaving the port. The OMR should assist the harbour master in enforcing the advice (with fines if necessary).

Cost

There is no cost associated with this recommendation, however the demand on the OMR's time should be taken into account.

Recommendation 2

To reduce the risk of collision of large vessels manoeuvring in or out of Port Vila Bay with anchored vessels in Port Vila Bay, mandatory pilotage services should be enforced when large vessels are entering or leaving Port Vila harbour during bad weather. It is also recommended to establish a designated non-anchorage area in Port Vila Bay and move the current anchorage areas away from the main route into the wharf; and send a hydrographic (H) note to the United Kingdom Hydrographic Office for amendment to the charts and notice to mariners.

Cost

There is no cost associated with this recommendation.

Recommendation 3

To reduce the risk of grounding on a 9 m shoal near the port-hand buoy at the entrance of Port Vila harbour, it is recommended to dredge the entrance channel to a suitable depth (to be decided by the stakeholders and the National Maritime Subcommittee of Vanuatu).

Cost

Dredging

VUV 113 million

Recommendation 4

To reduce the risk of grounding because two daymarks on the leading lights are not conspicuous against the background, it is recommended that a bigger board be erected to replace the current dayboards on the leading daymarks.

Cost

Dayboard

VUV 1 million

Annual maintenance

VUV 50,000

Recommendation 5

To reduce the risk of cruise ships alliding with the shoreline while trying to berth during strong winds, the Ports Act should be amended to state under exactly what weather conditions vessels are allowed to enter Port Vila harbour.

Cost

There is no cost associated with this recommendation, however the demand on the State Law Office's time should be taken into account.

Recommendation 6

To reduce the risk of vessels alliding with the main wharf while trying to berth during strong wind conditions, the Ports Act should be amended to state under exactly what weather conditions vessels are allowed to enter Port Vila harbour. In addition, in the case of particularly strong winds and with oil tankers, it is recommended to use two tug boats during berthing operations.

Cost

There is no cost associated with this recommendation, however the demand on the State Law Office's time should be taken into account. The cost of an additional tug boat is given in Recommendation 9.

Recommendation 7

To reduce the risk of overloaded 'banana boats' capsizing in the harbour, the the small craft rule should be enforced.

Cost

Resources to enforce the small craft rule, such as additional staff, a small patrol boat and resources to provide safety awareness training in villages around Port Vila.

VUV 3.5 million

Recommendation 8

To reduce the risk of abandoned ships left at anchor in Port Vila harbour foundering during heavy rain, it is recommended that the OMR amends its Act to include procedures to follow in the case of abandoned vessels.

Cost

There is no cost associated with this recommendation, however the demand on the OMR's time should be taken into account.

Recommendation 9

To reduce the risk associated with two wrecks close to Lapetasi Wharf, which may get tangled with anchors causing damage to vessels, crew and the wharf, it is recommended that the wrecks be removed; or to have a mandatory tug boat service for vessels berthing at Lapetasi Wharf.

Cost

Wreck removal

VUV 10 million

One tug boat

VUV 60 million

Annual maintenance

VUV 600,000

Recommendation 10

An extension to Lapetasi wharf was completed in 2018, and a post-construction bathymetry survey is recommended to reflect the new bathymetry alongside the wharf.

Cost

Bathymetry survey

VUV 5 million

As part of the Pacific Safety of Navigation project's work on supporting the Ministry of Infrastructure and Public Utilities, an AtoN programme 5-year budget plan has been drawn up, which includes capital costs and recurring expenditure.



Vanuatu Ports and Marine Department - Ministry for Infrastructure & Public Utilities
AtoN Programme 5-year Budget Plan 2020-2024

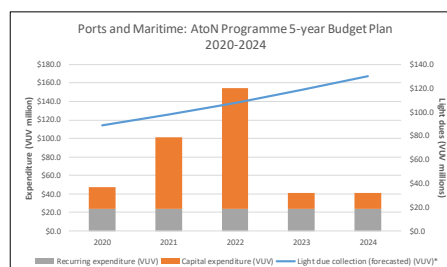
| | Light due collection (forecasted) (VUV)* | Capital expenditure (VUV) | Recurring expenditure (VUV) | Total expenditure (VUV) |
|------|--|---------------------------|-----------------------------|-------------------------|
| 2020 | \$88,717,770 | \$23,244,366 | \$24,088,469 | \$47,332,836 |
| 2021 | \$97,652,745 | \$77,244,366 | \$24,088,469 | \$101,332,836 |
| 2022 | \$107,487,582 | \$130,187,366 | \$24,088,469 | \$154,255,836 |
| 2023 | \$118,312,909 | \$17,244,366 | \$24,088,469 | \$41,332,836 |
| 2024 | \$130,228,479 | \$17,244,366 | \$24,088,469 | \$41,332,836 |
| | \$542,399,484 | \$265,144,831 | \$120,442,347 | \$385,587,178 |

* Light due estimates based on rate of increase of dues between 2014-2018 (Ministry of Finance data)

* Costings of risk control options covered under Port Vila Safety of Navigation Risk Assessment have been factored in:

- In 2020, installation of dayboard behind leading light to allow for better visibility of AtoN
- In 2020, surveying works in area around Lapetasi Wharf to update charts and mitigate risk of allision
- In 2021, procurement of tug boat to mitigate risk of large vessels anchoring too close to wreck
- In 2022, dredging of harbour channel to mitigate the risk of groundings
- In 2020, 2021, 2022, 2023 and 2024, resourcing of OMR to enforce the *small craft rule*

* Maintenance costs for new procured equipment have been factored into the maintenance costs under recurring expenditure



1 Background

In early 2016, with support from the International Foundation for Aids to Navigation (IFAN), the Pacific Community (SPC) started the Pacific Safety of Navigation Project in 13 Pacific Island countries and territories (PICTs)¹. The project aims to improve safety of navigation in the Pacific region through enhanced aids to navigation (AtoN) capacity and systems, and hence support economic development, shipping and trade in the Pacific region through safer maritime routes managed in accordance with international instruments and best practices.

During Phase 1, which ended in July 2018, SPC worked in close collaboration with the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) to conduct technical, legal and economic assessments in the 13 PICTs, to identify needs and gaps in these areas. Another significant output of Phase 1 was the development of a new tool for risk assessment in small island developing states, the simplified IALA risk assessment tool (SIRA). In June 2018, IALA trained personnel in 12 of the 13 PICTs on the use of SIRA to conduct AtoN risk assessments in their countries.

Phase 2 of the project builds on the Phase 1 assessments and tools developed, to further assist in building capacity to develop and maintain AtoN in PICTs. Activities include conducting risk assessments (as required by Regulation 13 of the International Convention for the Safety of Life at Sea – SOLAS); developing safety of navigation policy and a legal framework; improving budgetary management; and supporting regional coordination related to safety of navigation in the Pacific.

In October 2018, the Ports and Marine Department of the Ministry of Infrastructure and Public Utilities in Vanuatu invited SPC to assist in conducting a risk assessment of Port Vila harbour, which is the country's most visited port, by both international and domestic vessels. This report describes the risk assessment, which was carried out using the SIRA methodology.

Vanuatu is a maritime nation, with a large percentage of citizens working in or around the maritime industry. Shipping is critical to the economic and social welfare of the people of Vanuatu, and safe navigation is vital to secure this welfare and to protect the environment.

Vanuatu is a signatory to the International Maritime Organization (IMO) SOLAS Convention. Regulation 13 of Chapter V of the 1974 SOLAS Convention (as amended) states that “each Contracting Government undertakes to provide, as it deems practical and necessary either individually or in co-operation with other Contracting Governments, such aids to navigation as the volume of traffic justifies and the degree of risk requires.”

The SIRA risk control process comprises five steps that follow a standardised management or systems analysis approach:

1. identify hazards
2. assess risks
3. specify risk control options
4. make a decision
5. take action.

SIRA is intended as a basic tool to identify risk control options for potential undesirable incidents that Vanuatu should address as part of its obligation under SOLAS Chapter V Regulations 12 and 13. The assessment and management of risk is fundamental to the provision of effective AtoN services.

¹ Cook Islands, Kiribati, Federated States of Micronesia, Marshall Islands, Nauru, Niue, Palau, Samoa, Solomon Islands, Tonga, Tokelau, Tuvalu and Vanuatu.

The assessment involved a stakeholder meeting as a first step, to gather the views on hazards and risks in the Port Vila harbour area from those directly involved with or affected by AtoN service provision. Information provided by this step was then used by Vanuatu AtoN and SIRA certified officer Mr Robson Tari and SPC to complete a full risk assessment matrix based on 10 identified possible scenarios.

2 Description of the waterway

Port Vila is the major international port in Vanuatu, and was therefore identified by the Ports and Marine Department as a priority for risk assessment. The Port Vila harbour consists of one domestic wharf, one international wharf and one maritime police patrol wharf. There are 18 AtoN around the port.

Vessels that frequent the port include tankers, cargo vessels, cruise liners, military ships, fishing vessels and private craft. The port can accommodate vessels with a maximum draft of 11 m at the international wharf. The domestic wharf has depth ranging from 5 m to 7 m, which accommodates all local domestic vessels.

Visibility can be reduced to 0.1 nautical miles in bad weather, which normally occurs between the months of November and April. There are several hazards such as buoys, wrecks, shoals and a narrow and shallow passage that can pose problems for maritime traffic.

Chart BA 1494 shows Port Vila harbour at a scale of 1:10,000 (Figure 1).

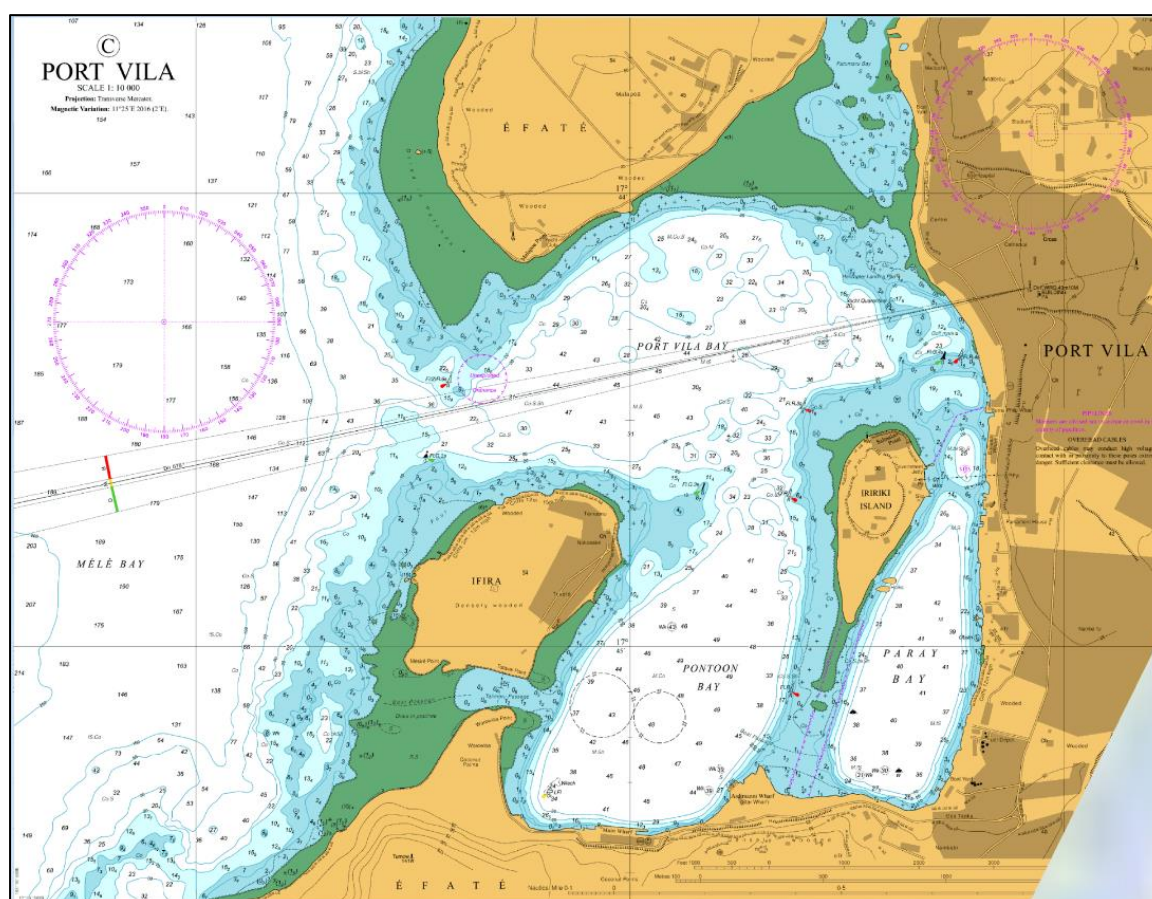


Figure 1. Chart of Port Vila harbour at 1:10,000 scale.

3 Stakeholder meeting

As the first step of the SIRA process, a stakeholder meeting was organised in Port Vila on 10 October 2018, which aimed to gather the points of view of individuals, groups and organisations involved with or affected by AtoN service provision in Port Vila harbour. The stakeholders included the Vanuatu Ports Authority, shipping agents, maritime police, maritime safety administration, fishers and others (Annex A). During the workshop the participants were divided into four groups according to their experience and background. They then helped identify potential hazards and possible scenarios in the Port Vila harbour using the latest chart of the port, other tools such as marine traffic data, and their experience.

4 Hazards and risks

A hazard is something that may cause an undesirable incident. Risk is the chance of injury or loss as defined as a measure of 'probability or likelihood' and 'severity or impact'. Examples of injury or loss include an adverse effect on health, property, the environment or other areas of value.

The purpose of the stakeholder meeting was to generate a prioritised list of hazards specific to the Port Vila harbour. For the risk assessment, SPC and Vanuatu's AtoN officer worked together to discuss the risks associated with the identified hazards and identify risk control options and recommendations.

The list of hazards identified for Port Vila harbour is given in Annex B.

4.1 Types of hazard

Thirty-three hazards were identified that were grouped into the following six categories:

- natural hazards, such as floods, storms, earthquakes, biological hazards and other natural phenomena;
- economic hazards such as inflation, depression, and changes in tax and fee levies;
- technical hazards such as system or equipment failure, fire, explosion, obsolescence, air/water pollution, failure of communications systems and degradation of data quality;
- human factors such as errors or omissions by poorly trained, fatigued or stressed persons, linguistic challenges, violations, sabotage and terrorism;
- operational hazards such as groundings, collisions, striking and other unwanted events; and
- maritime space hazards, such as competing uses for maritime space leading to increasingly crowded waterways.

The above six types of hazard have the capability to generate seven different types of losses:

- health losses including death and injury;
- property losses including real and intellectual property;
- economic losses leading to increased costs or reduction of revenues;
- liability loss resulting when an organisation is sued for an alleged breach of legal duty; such cases must be defended even if no blame is assigned. Liability losses are capable of destroying or crippling an organisation;
- personnel loss when services of a key employee are lost;
- environmental losses (negative impact on land, air, water, flora or fauna); and
- loss of reputation or status.

4.2 Risk factors

Any risk analysis needs to consider the range of factors that contribute to the overall risk exposure. Table 1 lists some of the factors that could be taken into consideration when identifying hazards for waterways and ports.

Table 1. Risk factors relating to marine navigation.

| Ship traffic | Traffic volume | Navigational conditions | Waterway configuration | Short-term consequence | Long-term consequence |
|--|----------------------------|--------------------------------|----------------------------------|----------------------------|-------------------------------|
| Quality of vessels | Deep draught | Night/day operations | Depth/draft/under-keel clearance | Injuries to people | Health and safety impacts |
| Crew competency | Shallow draught | Sea state | Channel width | Oil spill | Lifestyle disruptions |
| Traffic mix | Commercial fishing vessels | Wind conditions | Visibility obstructions | Hazardous material release | Fisheries impacts |
| Traffic density | Recreational boats | Currents (river, tidal, ocean) | Waterway complexity | Property damage | Impacts on endangered species |
| Nature of cargo | High speed craft | Visibility restrictions | Bottom type | Denial of use of waterway | Shoreline damage |
| Participation rate in routing systems, such as VTS | Passenger ships | Ice conditions | Stability (siltation) | | Reef damage |
| | | Background lighting | AtoN mix and configuration | | Economic impacts |
| | | Debris | Quality of hydrographical data | | |

Risk is evaluated to allow attention to be focused on high-risk areas, and to identify and evaluate factors which influence the level of risk. Once all the risks have been assessed, they are then evaluated in terms of the documented needs, issues and concerns of the stakeholders, and the benefits and costs of the activity, to determine the acceptability of the risk.

Zero risk is not often realised, unless the activity generating the risk is abandoned. Rather than striving to reduce the risk to zero, authorities should reduce the risk to 'as low as reasonably practicable' (ALARP; Figure 2).

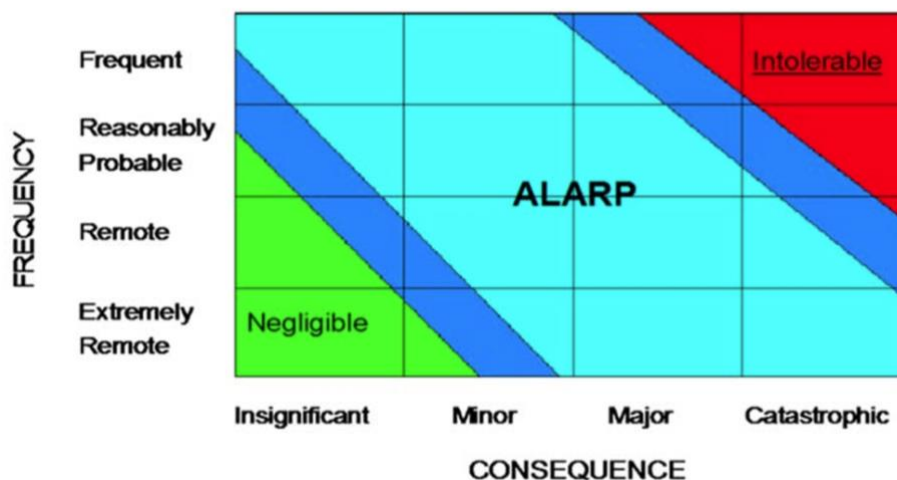


Figure 2. Graphical representation of the levels of risk. The risk level boundaries (negligible/ALARP/intolerable) are purely illustrative.

It is important to remember that, when communicating with stakeholders about risk, perception is usually different to reality. People make judgements of the acceptability of a risk based on their perceptions, rather than on scientific factors such as probability. The public's perception of a risk may be influenced by many things, including age, gender, level of education and previous exposure to information on the hazard. Public perceptions of risk may therefore differ from those of technical experts.

5 Scenarios

During the stakeholder meeting and discussions with the AtoN officer, 33 hazards were identified which could lead to a number of different incidents or scenarios. Each hazard was considered carefully and the scenarios it could cause were identified and recorded. The scenarios were classified into five different categories: collision, grounding, allision, foundering, and other scenarios. Annex C lists the identified scenarios.

5.1 Collision

The probability of collision depends on navigational conditions, waterway configuration, and type and volume of traffic. The basic types of collisions are head-on, overtaking, bend, merging and crossing collisions. An analysis of the routes and their geometry, combined with the volume and mix of traffic for Port Vila harbour, resulted in two probable collision scenarios: a crossing scenario, where small domestic vessels cross in front of large vessels, and in a case of engine failure there can be a crossing collision; and a scenario where large ships manoeuvring in or out of Pontoon Bay during strong winds could collide with anchored vessels in Port Vila Bay.

5.2 Grounding

There were two grounding scenarios identified for the Port Vila harbour. The narrow passage at the entrance to Paray Bay increases the risk of grounding on the hard bottom and is a concern for yachts and local vessels accessing this passage. Grounding is also a concern on the 9 m shoal next to the port-hand buoy at the entrance channel, and along the shallow areas northwest of Pontoon Bay. The probability of grounding depends on many factors, including bathymetry around the port area, the draft of the vessels accessing the port, and meteorological conditions such as prevailing wind speed and direction.

5.3 Allision

The possibility of a vessel striking a fixed human-made object such as a wharf or mooring buoy depends on the position of such structures along the route and the density of traffic. Two different allision scenarios were identified for the Port Vila harbour: allision with the port shoreline, and allision with the wharf. Allisions with the port shoreline at the international wharf are a concern when cruise ships try to berth alongside during strong winds. Allisions with the wharf are also a concern under the same conditions. Miscommunication between tug boat operators and pilots during berthing operations is an additional factor.

5.4 Foundering

Foundering is defined as a vessel sinking that is not the result of an earlier collision; for example, a vessel might founder if its cargo shifts during bad weather. Foundering at Port Vila harbour might occur due to poor ship condition together with lack of experience of the crew operating the vessel. Foundering of ships at anchor during a cyclone due to the ship springing leaks was also identified during the stakeholder consultation. Another foundering scenario was of the local 'banana boats' capsizing due to overloading when travelling between Ifira island and the mainland.

5.5 Other scenarios

There are two wrecks located at 40 m water depth close to the Lapetasi Wharf. Vessels coming in to berth alongside usually drop anchor to manoeuvre into port, and the anchor can get tangled in one of the wrecks which could cause structural failure of the vessel. An additional scenario could involve the allision of ships with Lapetasi Wharf using the current nautical chart, which needs updating since a recent extension of the wharf.

6 Probability and impact

SIRA specifies five levels of probability (Table 2) and five levels of impact that each type of scenario would create (Table 3). Each scenario is allocated a score for both probability and impact, and the risk value is calculated from the product of these scores. In this step of the process, the probability and consequences associated with each scenario were estimated and discussed with the AtoN officer.

Table 2. Levels of probability specified for the simplified IALA risk assessment tool (SIRA).

| Classification | Score | Probability |
|----------------|-------|--|
| Very rare | 1 | Very rare or unlikely, will occur only in exceptional circumstances and not more than once in 20 years |
| Rare | 2 | Rare, may occur every 2-20 years |
| Occasional | 3 | Occasional, may occur every 2 months to 2 years |
| Frequent | 4 | Frequent, may occur once every weekly to every 2months |
| Very frequent | 5 | Very frequent, may occur at least once every week |

Table 3. Levels of impact specified for the simplified IALA risk assessment tool (SIRA).

| Description | Score | Service disruption criteria | Human impact criteria | Financial criteria | Environment criteria |
|---------------|-------|--|--|---|---|
| Insignificant | 1 | No service disruption apart from some delays or nuisance | No injury to humans; possible significant nuisance | Loss, including third-party losses, of less than USD 1000 | No damage |
| Minor | 2 | Some non-permanent loss of services such as closure of a port or waterway for up to 4 hours | Minor injury to one or more individuals, may require hospitalisation | Loss, including third-party losses, of USD 1000–50,000 | Limited short-term damage to the environment |
| Severe | 3 | Sustained disruption to services such as closure of a port or waterway for 4–24 hours | Injuries to several individuals requiring hospitalisation | Loss, including third-party losses, of USD 50,000–5,000,000 | Short-term damage to the environment over a small area |
| Major | 4 | Sustained disruption to services such as closure of a major port or waterway for 1–30 days or permanent or irreversible loss of services | Severe injuries to many individuals or loss of life | Loss, including third-party losses, of USD 5,000,000–50,000,000 | Long-term to irreversible damage to the environment over a limited area |

| | | | | | |
|--------------|---|--|--|--|--|
| Catastrophic | 5 | Sustained disruption to services such as closure of a major port or waterway for months or years | Severe injuries to numerous individuals and/or loss of several lives | Loss, including third-party losses, of over USD 50,000,000 | Irreversible damage to the environment over a large area |
|--------------|---|--|--|--|--|

7 The acceptability of risk

Having determined probability and impact scores by consensus, the risk values are calculated by multiplying these scores, as shown in the matrix in Table 4. To determine whether the risks are acceptable or not, SIRA specifies four colour-banded levels of risk (Table 5). These colours are superimposed on the matrix in Table 4.

Table 4. Risk value matrix.

| | | PROBABILITY / (LIKELIHOOD) | | | | |
|----------------------|-------------------|----------------------------|----------|----------------|--------------|-------------------|
| | | Very Rare (1) | Rare (2) | Occasional (3) | Frequent (4) | Very frequent (5) |
| CONSEQUENCE (IMPACT) | Catastrophic (5) | 5 | 10 | 15 | 20 | 25 |
| | Major (4) | 4 | 8 | 12 | 16 | 20 |
| | Severe (3) | 3 | 6 | 9 | 12 | 15 |
| | Minor (2) | 2 | 4 | 6 | 8 | 10 |
| | Insignificant (1) | 1 | 2 | 3 | 4 | 5 |

Table 5. Categories of risk, and action required.

| Risk Value | Risk Category | Action Required |
|------------|---------------|--|
| 1 – 4 | Green | Low risk not requiring additional risk control options unless they can be implemented at low cost in terms of time, money and effort. |
| 5 – 8 | Yellow | Moderate risk which must be reduced to the “as low as reasonably practicable” (ALARP) level by the implementation of additional control options which are likely to require additional funding. |
| 9-12 | Amber | High risk for which substantial and urgent efforts must be made to reduce it to “ALARP” levels within a defined time period. Significant funding is likely to be required and services may need to be suspended or restricted until risk control options have been actioned. |
| 15-25 | Red | Very high and unacceptable risk for which substantial and immediate improvements are necessary. Major funding may be required and ports and waterways are likely to be forced to close until the risk has been reduced to an acceptable level. |

8 Risk control options

The objective of the risk assessment was to identify risk mitigation options for each undesirable incident that would, if implemented, reduce the risk to a level as low as reasonably practicable (ALARP) and which would be acceptable to stakeholders. Before any risk control decisions were made, they were communicated through the stakeholder consultation process. The risks were

evaluated in terms of the overall needs, issues and concerns of the stakeholders. The mitigation options include:

- new or enforcement of existing rules and procedures;
- improved and charted hydrographical, meteorological and general navigation information;
- enhanced AtoN service provision;
- improved radio communications; and
- improved decision support systems.

Table 6 shows the risk scores for the scenarios under the current situation, and the new risk scores after mitigating the risk. The detailed risk control options for Port Vila harbour are shown in the risk control matrix in Annex D.

Table 6. Risk control options for Port Vila harbour, and changes in risk score.

| Scenario | Risk score | Risk control option | New risk score |
|--|------------|--|----------------|
| Collision of a 'banana boat'/domestic vessel with a large vessel manoeuvring between Port Vila Bay and Pontoon Bay | 6 | The harbour master issues an advice for all marine vessels within the vicinity of the harbour approach not to navigate within established timeframes when vessels >500 tonnes (tankers, container vessels, cruise ships, etc.) are entering or leaving the port. The Office of the Maritime Regulator (OMR) should assist the harbour master in enforcing the advice (with fines if necessary) | 2 |
| Collision of a large vessel manoeuvring to get in or out of Port Vila Bay with anchored vessels in Port Vila Bay | 15 | Enforce mandatory pilotage services when vessels >500 tonnes are entering or leaving Port Vila harbour during bad weather. Also, establish a designated non-anchorage area in Port Vila Bay and move the current anchorage area away from the main shipping route into the harbour, and send a hydrographic (H)-note to the United Kingdom Hydrographic Office | 1 |
| Grounding of a vessel entering or leaving Port Vila harbour on the 9 m shoal/shallow area at Ifira Point | 15 | Dredge the entrance to a suitable depth (to be decided by the stakeholders and the National Maritime Subcommittee of Vanuatu) | 5 |
| Grounding of a vessel entering Port Vila harbour because two daymarks on the leading lights are not conspicuous | 6 | (1) Put a bigger board at the background to make the daymark more conspicuous | 3 |
| Allision of a vessel with the port shoreline during strong winds | 4 | Amend the Ports Act to state under exactly what weather conditions vessels are allowed to enter Port Vila harbour | 2 |
| Allision of a vessel with main wharf during strong winds | 6 | Amend the Ports Act to state under exactly what weather conditions vessels are allowed to enter Port Vila harbour. In addition, in the case of particularly strong winds and with oil tankers, use two tug boats during berthing operations | 3 |
| Capsizing of overloaded 'banana boats' | 15 | Provide more resources for the enforcement of the small craft rule | 4 |
| Sinking of abandoned ships at anchor | 12 | Amend the OMR Act to include procedures for abandoned vessels | 4 |
| Tangling of anchors in wrecks at Lapetasi Wharf | 12 | (1) Remove the wrecks; or (2) Two tug boats mandatory for every vessel berthing at Lapetasi Wharf | 4 |

| | | | |
|--|----|--|---|
| Allision with upgraded Lapetasi Wharf by ships using the current chart | 12 | Hydrographic survey of Lapetasi Wharf area | 4 |
|--|----|--|---|

9 Costing the risk control options

The outcomes of the risk assessment are essentially qualitative and subjective, based on the expert opinions of the stakeholders. The next step is to reach consensus on which risk control options to action. The risk control options are prioritised to facilitate the decision-making process.

Costing of the options is part of the decision-making process. Most of the control options identified require funding. Costs must cover capital, labour and other resources needed for planning and implementation, as well as costs of operation and maintenance throughout the life cycle under consideration. Maintenance is important to ensure that AtoN equipment and systems continue to perform at the levels required for mariners to safely navigate the waterways.

The control measures need to be both effective in reducing risk, but also cost-effective. The cost of the measures should not normally exceed the reduction in the expected value of the loss.

The cost of the options should be evaluated over a time frame equivalent to the economic or useful life of the facilities and assets associated with the option.

10 AtoN programme 5-year budget plan (2020–2024)

Discussions were held with stakeholders on the need for adequate resources for AtoN installation, maintenance and management by the Ports and Marine Department. The current situation regarding funding for AtoN, and current statistics, were presented.

Currently, the Ports and Marine Department does not have a dedicated spending allocation for AtoN. The salary of the AtoN officer is funded from core operational funds, and requests to undertake installation or maintenance of AtoN are made to the common pool of funds allocated for the department as a whole. Within the department, its submission to the national budget is prepared by the Director of Marine with consultations with middle management on any development budget submission.

Vanuatu charges light dues² for foreign vessels that berth, however all dues are collected by the Revenue Section of the Ministry of Finance and Treasury, and not the Department of Transport. It was also noted that light dues are paid into the consolidated government fund with no set ring fencing for AtoN.

Information from the Vanuatu Ministry of Finance and Treasury revealed that in 2017 a total of VUV 73 million was collected in light dues, a 10% increase from VUV 66 million in 2016. Collection in 2018 is set to exceed this with VUV 61 million already collected as of 11 October 2018. In the 2018 national budget, the entire Ports and Marine Department was allocated VUV 74.3 million in operational spending, which means that light dues accrued in a year would approximately cover the department's current operations, but excluding its AtoN budget. Unfortunately, the national budget documents do not provide an allocation breakdown for sections across the department so a descriptive analysis of allocations is not possible.

² Up until 2018, light dues were only legally payable by overseas vessels entering port. The Ports (Dues, Fees and Charges) Regulations have been amended in 2018 to include local vessels. Light dues are payable by all vessels at VUV 7 per gross ton.

To support the Ports and Marine Department's budgetary planning for AtoN, an AtoN programme 5-year budget plan (2020–2024) was drawn up, in consultation with AtoN Officer Mr Robson Tari and Port Operations Manager Mr Charlie Maniel. The budget takes into account planned visits to outer atolls for ongoing AtoN maintenance. It also includes the costed risk control options from the risk assessment above, staggered over the 5-year period to spread the costs. It is suggested that the budget plan be used to assist the Ports and Marine Department in its own budget submission, and in discussions for ring fencing in the national budget.

A summary and detailed tables of the AtoN programme 5-year budget plan are given in Annex E.

11 Recommendations

A key outcome of the risk assessment undertaken in Port Vila is ten recommendations that aim to reduce the risks to safety of navigation to an acceptable level for stakeholders.

Recommendation 1 (addressing collision scenario)

This recommendation addresses potential collisions of 'banana boats' or other domestic vessels with large vessels, such as cruise liners or oil tankers, manoeuvring between Port Vila Bay and Pontoon Bay.

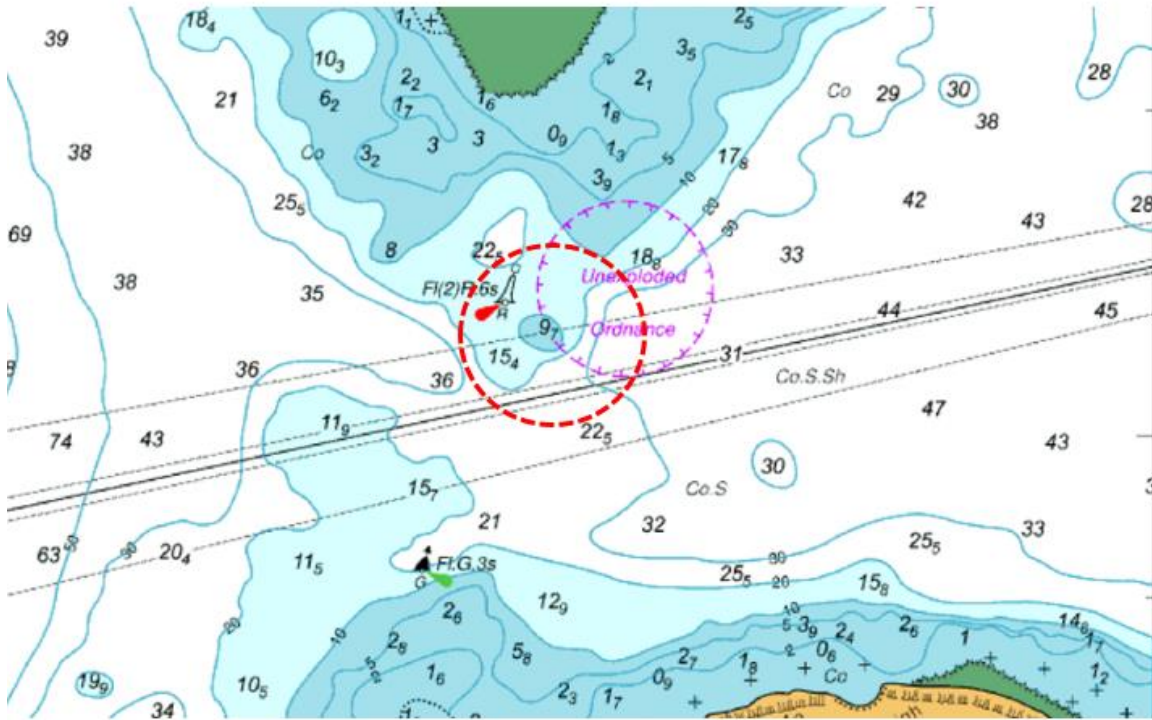
It is recommended that the harbour master issues an advice for all marine vessels within the vicinity of the harbour approach not to navigate within established timeframes when vessels larger than 500 tonnes (tankers, container vessels, cruise ships, etc.) are entering or leaving the port. The OMR should assist the harbour master in enforcing the advice (with fines if necessary).

There is no cost to implement this recommendation, however the demand on the OMR's time should be taken into account.

Recommendation 2 (addressing collision scenario)

This recommendation addresses potential collisions of large vessels manoeuvring to get in or out of Port Vila Bay with anchored vessels in Port Vila Bay.

It is recommended that mandatory pilotage services be enforced when large vessels are entering or leaving Port Vila harbour during bad weather. It is also recommended to establish a designated non-anchorage area in Port Vila Bay and move the current anchorage areas away from the main route into the wharf; and send a hydrographic note to the United Kingdom Hydrographic Office (UKHO) for amendment to the charts and notice to mariners.



The costs to implement this recommendation were provided by the Ports and Marine Department as follows:

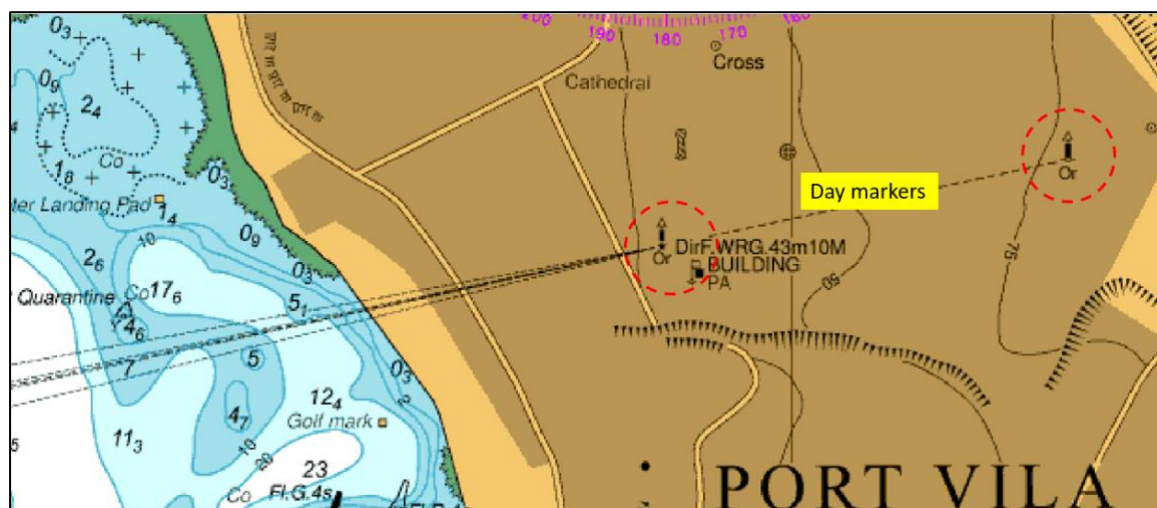
| Recommendation | Amount (VUV) |
|-----------------------------|--------------|
| Dredging (approximate cost) | 113 million |

There will be no maintenance costs once the channel is dredged as there are no issues with siltation in the area.

Recommendation 4 (addressing grounding scenario)

The two daymarks on the leading lights shown in the chart below are not conspicuous against the background. This can pose problems for incoming ships when the lead lights are not working.

It is recommended that a bigger board be erected to replace the current daymarks to make the marks more conspicuous.



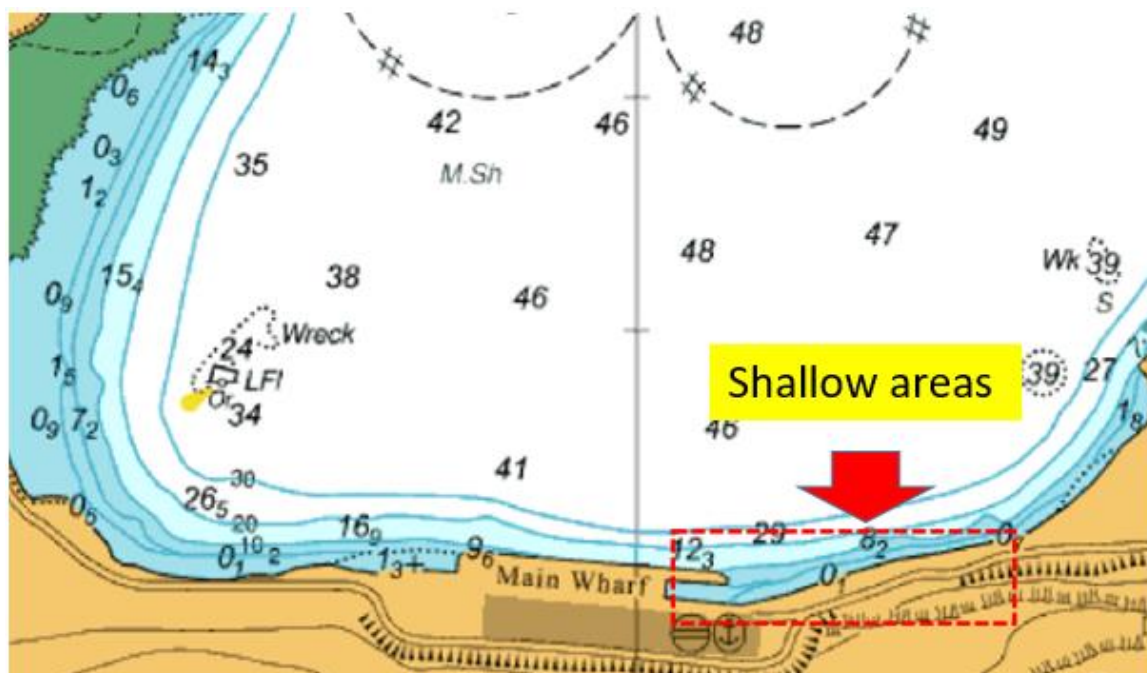
| Recommendation | Amount (VUV) |
|--------------------|--------------|
| Dayboards | 1 million |
| Annual maintenance | 50,000 |

Recommendation 5 (addressing allision scenario)

There are very shallow areas in front of the main wharf. Large cruise ships coming alongside during strong north-westerly winds can allide with the shoreline during berthing. Currently, according to the 2016 Port Act, the harbour master has a generic power “to enter and remain on any vessel”.

It is recommended that the Ports Act be amended to state under exactly what weather conditions vessels are allowed to enter Port Vila harbour.

There is no cost associated with this recommendation, however the demand on the OMR’s time should be taken into account.



Recommendation 6 (addressing allision scenario)

There have been occasions when vessels allide with the main wharf while trying to berth during strong wind conditions. Currently, according to the 2016 Port Act, the harbour master has a generic power “to enter and remain on any vessel”.

It is recommended that the Ports Act be amended to state under exactly what weather conditions vessels are allowed to enter Port Vila harbour. In addition, in the case of particularly strong winds and with oil tankers, it is recommended to use two tug boats during berthing operations.

There is no cost associated with this recommendation, however the demand on the OMR’s time should be taken into account. The cost of an additional tug boat is given in Recommendation 9.

Recommendation 7 (addressing foundering scenario)

There have been occasions when overloaded ‘banana boats’ have capsized in the harbour. This has been mainly due to the lack of a safety culture on the part of the boat operators.

It is recommended that more resources are allocated to the relevant agencies to enforce the small craft rule; this will require resources for additional staff, a small patrol boat and to conduct safety awareness training in villages around Port Vila. The costs to implement this recommendation were provided by the OMR as follows:

| Recommendation | Amount (VUV) |
|--|--------------|
| additional staff, a small patrol boat and to carry out safety awareness training | 3.5 million |

Recommendation 8 (addressing foundering scenario)

There have been occasions when abandoned ships left at anchor in Port Vila harbour have sunk during heavy rain or cyclones. This is mainly due to a lack of safety and security on these vessels, and also mechanical issues on the vessels. Currently, there is no law addressing the issue of abandoned ships, although the OMR and the Ports and Marine Department jointly check abandoned vessels in the harbour and relocate those that pose a risk to a dedicated zone, and contact the shipowners.

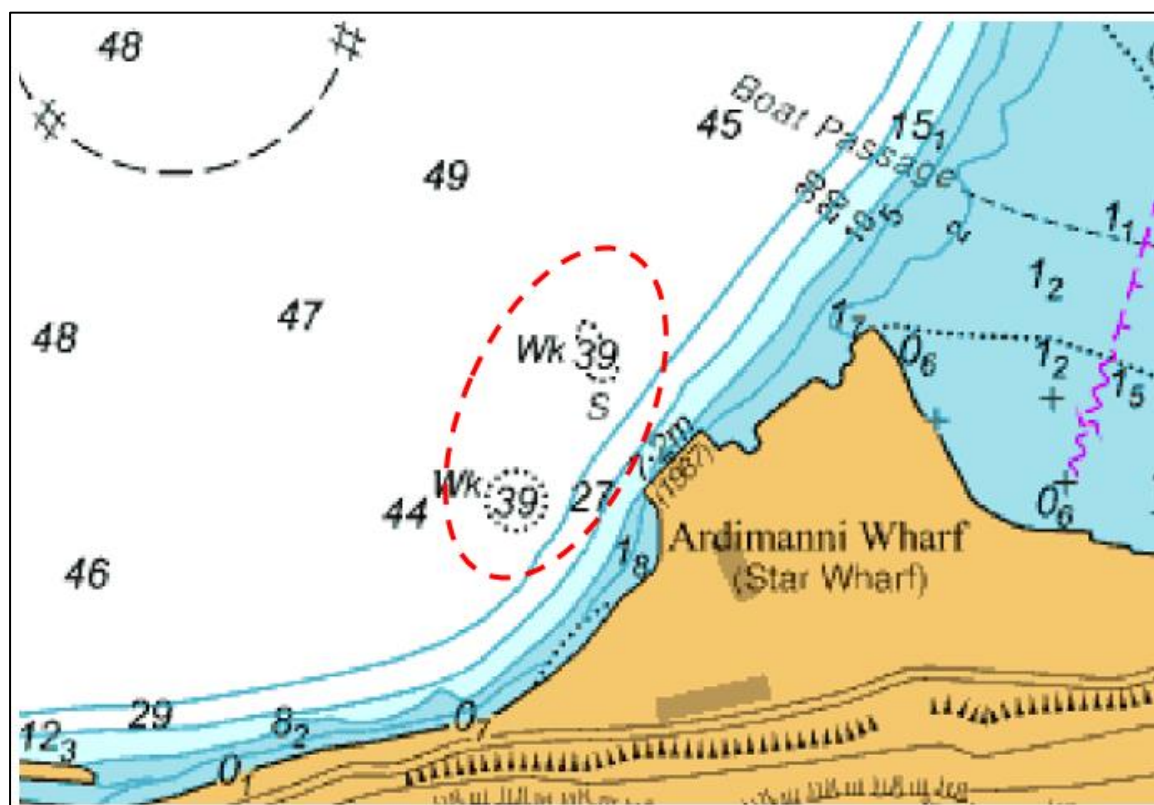
It is recommended that the OMR amend its Act to include procedures to address abandoned vessels.

There is no cost associated with this recommendation, however the demand on the OMR's time should be taken into account.

Recommendation 9 (addressing 'other' scenario)

There are two wrecks close to Lapetasi Wharf as shown on the chart below. These wrecks are a potential danger for ships that drop anchor to berth alongside the wharf, as the anchors can get tangled in the wrecks causing serious damage to the vessel, crew and wharf.

It is recommended that the wrecks be removed, or that there is a mandatory tug boat service for vessels berthing at Lapetasi Wharf to reduce the risk to as low as reasonably practicable.



The costs to implement this recommendation were provided by the Ports and Marine Department as follows:

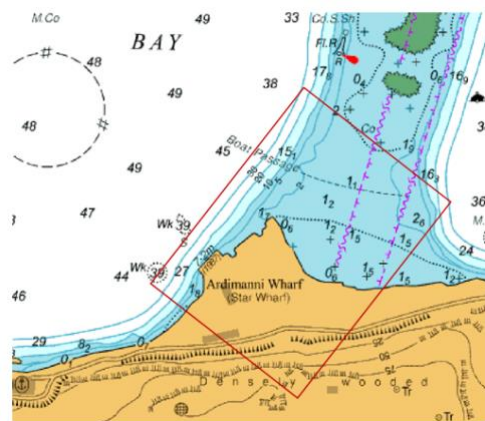
| Recommendation | Amount (VUV) |
|--------------------------------|--------------|
| Remove the wrecks | 10 million |
| Tug boat | 60 million |
| Annual maintenance of tug boat | 4 million |

Recommendation 10 (addressing 'other' scenario)

An extension to the domestic wharf was recently completed. The area adjacent to the wharf needs to be surveyed to reflect the new bathymetry alongside the wharf.

It is recommended that a post-construction bathymetry survey be carried out in accordance with International Hydrographic Organization standards, and charts updated thereafter.

| Recommendation | Amount (VUV) |
|-------------------|--------------|
| Bathymetry survey | 5 million |



Annex A. Stakeholders in the Port Vila harbour risk assessment

| Safety of Navigation Risk Assessment Stakeholders Meeting (Phase II) - Port Vila, Vanuatu, 10th October, 2018 | | | | | | |
|---|-----------------------|-------------------------------------|--------|-----------|------------------|--|
| Organisation | Name | Job title | Gender | Age range | Telephone number | Email address |
| Ports and Marine Department | Charlie Maniel | Manager Operation | M | 25-35 | 7711238 | cmaniel@vanuatu.gov.vu |
| Office of the Maritime Regulator | Jacky Taleo | Maritime Inspector | M | 36-45 | 7772283 | jtaleo@omr.vu |
| Ports and Marine Department | Robson Tari | AtoN Officer | M | 25-35 | 7106829 | trobson@vanuatu.gov.vu |
| Ports and Marine Department | John Nasak | Harbour Master | M | 46-55 | 22339 | hnasak@vanuatu.gov.vu |
| Ocean Logistics Limited | Andrew Bohn | Chief Executive Officer | M | 25-35 | 5551225 | andrew.bohn@ocean-logistics.vu |
| Foreign Affairs Department - Maritime & Ocean Affairs | Roel Tari | Desk Officer | M | 25-35 | 7735034 | troel@vanuatu.gov.vu |
| Department of Environment | Tom Maimai | Compliance Officer | M | 25-35 | 7786310 | tmaimai@vanuatu.gov.vu |
| Biosecurity Vanuatu - Border Control Officer | Dorin Kaitip | Border Control Officer | F | 36-45 | 5304005 | dkaitip@vanuatu.gov.vu |
| Yachting World | Willie Alick | Work Boy | M | | 5362394 | |
| Yachting World | Moses Daniel | Work Boy | M | | 23273 | |
| Customs Border | Anthony Baddley Tarry | Acting Manager | M | 46-55 | 7110905 | tbanthony@vanuatu.gov.vu |
| Star Wharf (Vanuatu Cargo) | Cliff Tabi | Crane Operator | M | 25-35 | 5412366 | |
| Ports and Marine Department | Weio Manderson | Pilot | M | 36-45 | 7712391 | wmanderson@vanuatu.gov.vu |
| Bodiam Marine Aero Survival System (MASSV) | Sheila Simelum | Accounts and Administration Officer | F | 25-35 | 5413328 | sheila@massv.vu |
| LC Tiwi Trader | Johannes Napa | Captain | M | 36-45 | 5407192 | |
| MV Makila | Johnny Tor | Captain | M | 36-45 | 5728560 | |

Annex B. Hazards identified for Port Vila harbour

| | Hazard | Value | Remarks |
|----------------|---|-------|---|
| Natural | Safe minimum depth (m) | 15.5 | Port Vila Bay entrance |
| | Proximity of danger (NM) | 0.1 | |
| | Tide, wind, wave and tidal flow effect | 3.33 | |
| | Minimum visibility (NM) | 0.2 | During heavy rains (can last few hours) |
| | | | Sunset background light might be a problem at departure, and sunrise at arrival |
| | Low sun issues | Y | |
| | Background lighting | Y | |
| | Earthquake and/or tsunami | Y | |
| Economic | Legal action problems | Y | |
| | Insufficient AtoN funding issues | Y | |
| Technical | Shipborne navaid failure | Y | Domestic vessels |
| | Quality and validity of charted information | Y | Charts out of date |
| | Loss of vessel control | Y | Domestic vessels |
| | Loss of communications | Y | |
| | Loss of connectivity | Y | |
| | AtoN failures | Y | |
| | Loss of PNT (sun activity/jamming or spoofi | Y | |
| | Sub-standard ships | Y | Domestic vessels |
| Human | Crew competency | Y | |
| | Fatigue | Y | Domestic vessels |
| | Safety culture | Y | |
| | Influence of alcohol and/or drugs | Y | |
| | Availability and competency of pilotage | 4 | |
| | Political issues? | Y | |
| | Culture or language issues | Y | Domestic vessels |
| | Crew medical issues | Y | Domestic vessels |
| Operational | Crew distractions | y | Smart phones |
| | Impact of small vessels | Y | |
| | Seasonal activities | y | Only few months a year |
| | Poor passage planning | y | Domestic vessels |
| | Poor promulgation of MSI | Y | |
| Maritime space | Poor response to marking new danger | Y | |
| | The existence of wrecks and new dangers | Y | |
| | Crowded waterway issues | Y | |

Annex C. Possible scenarios identified for Port Vila harbour

| Scenarios | | Remarks |
|-------------------|------------------------------|--|
| Collision | Crossing | With small domestic boats, due to technical issues |
| | Manoeuvring | In the Port Vila Bay, because of the strong winds, cruise ships going out (e.g. M/V Southern Moana was at anchor and cruise ship almost hit its starboard) |
| Grounding | Grounding on rock | Few areas in Port Vila have shallow waters, such as the 9 m shoal at the entrance, Paray Bay passage and NW of Pontoon Bay |
| Allision | Aids to navigation | Due to lack of safety culture |
| | | Due to crew distraction |
| | Port shoreline | In case of strong winds, big ships could hit the shoreline at the edge of the main wharf |
| | Wharf | In case of strong wind, tug/pilot operations can cause injuries to people and infrastructure |
| Foundering | Capsizing | Overloaded banana boats going to and from Ifira island - lack of safety culture |
| | Sinking | Technical problems while at anchorage (engine not working, bilge pump not working, etc.), mostly sinking during cyclone season |
| Others | Structural failure of vessel | Next to the Lapatasia Wharf, there are 2 wrecks located in around 40 m water depth; with incoming ships dropping anchor to manoeuvre into port, the anchor can tangle in the wreck and can cause structural failure of vessels |
| | Allision with Lapetasi wharf | Allision with upgraded Lapetasi wharf by ships using the current chart |

Annex D. Risk assessment matrix for Port Vila harbour

| Port Vila - Vanuatu | | | | | | | | | | | | | | | |
|---|---|--|---|--|--|-------------------|------------|-------------------------|---|---|-----------------------|----------------|------------------------------------|---|-------|
| Scenario | Description of incident | Root cause (hazard) | Consequences (short term and long term) | Existing risk control measures | Probability score | Consequence score | Risk score | Cost of incident (vatu) | Further risk control options | New probability score | New consequence score | New risk score | Cost of risk control option (vatu) | Remarks | |
| 1. COLLISION | | | | | | | | | | | | | | | |
| 1.1 | Collision - small domestic boats and large vessels | Collision of a 'banana boat'/domestic vessel with any kind of large vessel manoeuvring between Port Vila Bay and Pontoon Bay | Human factors - lack of safety culture | Sinking of small domestic boat and loss of life; legal issues for the bigger vessels | OMR implements domestic boat safety regulation and advises for safe navigation in the harbour. The harbour master talks with banana boat taxi association to advise to keep clear on the main route to the wharf | 3 | 2 | 6 | 1.4 million (average cost of a banana boat) plus loss of life ~ 20 million* | Harbour master issues an advice for all marine vessels within the vicinity of the harbour approach not to navigate within established timeframes when vessels >500 tonnes (tankers, container vessels, cruise ships, etc.) are entering or leaving the port. OMR to assist harbour master in enforcing the advice (with fines if necessary) | 1 | 2 | 2 | None | ALARP |
| 1.2 | Collision - large ships and anchored vessels | Collison of large vessels manoeuvring in or out of Port Vila Bay with anchored vessels in Port Vila Bay | Natural - strong winds | Damage to the environment, to the vessels and potentially to humans (for example, in the case of a tanker, could set on fire and cause loss of life) | Pilotage services mandatory for large vessels going in and out of Port Vila | 3 | 5 | 15 | 8097 million | Mandatory pilotage services to be enforced when vessels > 500 tonnes leave Port Vila harbour. Establish a designated non-anchorage area in Port Vila Bay and move the current anchorage area away from the main shipping route into the harbour; and to send an H-note to primary charting authority | 1 | 5 | 5 | None | ALARP |
| 2. GROUNDING | | | | | | | | | | | | | | | |
| 2.1 | Grounding on rock - any kind of vessel | Grounding of a vessel entering Port Vila around the channel entrance | Two daymarks on the leading lights are not conspicuous against the background | Damage to vessels, the environment, loss of life | Dayboards are painted regularly | 2 | 3 | 6 | 359.6 million | Option 1: Put a bigger board at the background to make the daymark more conspicuous.Option 2: Put in place a more substantial structure that can stand strong winds during cyclone to prevent damage to the port entrance lights | 1 | 3 | 3 | 1 million | ALARP |
| 2.2 | Grounding on rock - large vessels (cruise ships, container vessels and tankers) | Grounding of a vessel entering or leaving Port Vila on the 9 m shoal/shallow area at Ifira point | Existence of a 9 m shoal and a shallow area at the entrance of Port Vila Bay | Damage to the environment, obstruction of the passage and therefore economic impact on local economy, loss of life | When approaching the entrance, it is mandatory for vessels to slow down to 6 knots to decrease the squat. Channel markers are in place and working | 3 | 5 | 15 | 1307.6 million | Dredge the entrance to a suitable depth (to be decided by the stakeholders and the National Maritime Subcommittee of Vanuatu) | 1 | 5 | 5 | 113 million | ALARP |
| 3. ALLISION | | | | | | | | | | | | | | | |
| 3.1 | Allision with shoreline (in front of the main wharf) - cruise ships | Cruise ship hits the shoreline in front of the main wharf entrance | Natural - strong NW winds | Damages to the vessels' structure and to the shoreline | According to paragraph 7 of the Ports Act, the harbor master has the power to "to enter and remain on any vessel". Usually above 25 knots vessels are not allowed to enter the Port Vila harbour | 2 | 2 | 4 | 1307.6 million | The Ports Act to be amended to state under exactly what weather conditions vessels are allowed to enter Port Vila harbour | 1 | 2 | 2 | None | ALARP |
| 3.2 | Allision with main wharf - cruise ships | Cruise ship hits the main wharf | Natural - strong NW winds | Damage to the wharf and potentially damage to the tug boat and crew | According to paragraph 7 of the Ports Act, the harbor master has the power to "to enter and remain on any vessel". Usually above 25 knots vessels are not allowed to enter the Port Vila harbour | 2 | 3 | 6 | 2 million | The Ports Act to be amended to state under exactly what weather conditions vessels are allowed to enter Port Vila harbour. Provide two tug boats both in case of strong winds and for oil tankers | 1 | 3 | 3 | None (refer to 5.1) | ALARP |
| 4. FOUNDERING | | | | | | | | | | | | | | | |
| 4.1 | Capsizing of banana boats | Overloaded banana boats capsize in the harbour | Lack of safety culture | Loss of lives, lost of property (boat and engine), damaged reputation for the industry | Small craft rule drafted by OMR for small boats of less than 10 m, which prescribes safety equipment to be carried onboard, maximum number of passengers and | 3 | 5 | 15 | 1.4 million (average cost of a banana boat) plus loss of life ~ 20 million* | OMR needs more resources to enforce the small craft rule, such as additional staff, a small patrol boat and safety awareness training in villages around Port Vila | 1 | 5 | 5 | 3.5 million (annually) | ALARP |
| 4.2 | Sinking of abandoned vessels at anchor | Abandoned vessels sink due to rain and cyclone | No watchman and vessel failure | Loss of property, damage to environment, danger to navigation | OMR and Ports and Marine Department jointly check abandoned vessels in the harbour. Risky boats are | 3 | 4 | 12 | 52 million | OMR to amend the OMR Act to include procedures in case of abandoned vessels | 1 | 4 | 4 | None | ALARP |
| 5. OTHER | | | | | | | | | | | | | | | |
| 5.1 | Tangling of anchors in wrecks at Lapetasi Wharf | Vessel approaching berth at Lapetasi Wharf drops achor and the anchor is tangled in wrecks | Lack of tug boat, strong winds | Damage to the vessel and potentially damage to the wharf | None | 3 | 4 | 12 | 53 million | Option 1: remove the wrecks. Option 2: two tug boats mandatory for every vessel berthing at Lapetasi Wharf | 1 | 4 | 4 | Option 1: 10 million. Option 2: 60 million (purchase of an additional | ALARP |
| 5.2 | Allision with Lapetasi wharf | Allision with upgraded Lapetasi wharf by ships using the current chart | Lack of post-construction survey of Lapetasi Wharf and updated chart | Damage to the vessel's structure and the new wharf | Pilotage services mandatory and only certain types of ships access the Lapetasi Wharf | 3 | 4 | 12 | 1307.6 million + damage to the wharf TBC | Survey of the Lapetasi wharf area | 1 | 4 | 4 | 5 million | ALARP |
| * The costs of incidents are approximate and are taken from the Aids to Navigation Economic Assesement prepared by the Pacific Safety of Navigation project phase 1 | | | | | | | | | | | | | | | |
| * 70 X GDP per capita as per international road assessment programme crude estimation | | | | | | | | | | | | | | | |

Annex E. Vanuatu Ports and Marine Department – Ministry of Infrastructure and Public Utilities AtoN programme 5-year budget 2020–2024



Vanuatu Ports and Marine Department - Ministry for Infrastructure & Public Utilities AtoN Programme 5-year Budget Plan 2020-2024

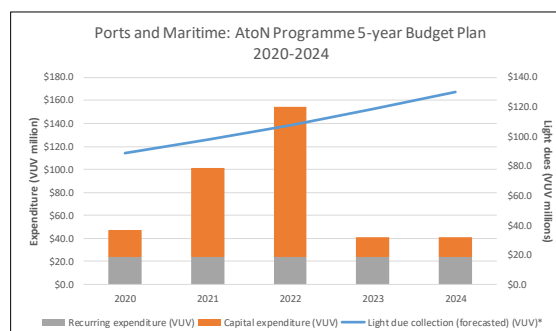
| | Light due collection (forecasted) (VUV)* | Capital expenditure (VUV) | Recurring expenditure (VUV) | Total expenditure (VUV) |
|------|--|---------------------------|-----------------------------|-------------------------|
| 2020 | \$88,717,770 | \$23,244,366 | \$24,088,469 | \$47,332,836 |
| 2021 | \$97,652,745 | \$77,244,366 | \$24,088,469 | \$101,332,836 |
| 2022 | \$107,487,582 | \$130,167,366 | \$24,088,469 | \$154,255,836 |
| 2023 | \$118,312,909 | \$17,244,366 | \$24,088,469 | \$41,332,836 |
| 2024 | \$130,228,479 | \$17,244,366 | \$24,088,469 | \$41,332,836 |
| | \$542,399,484 | \$265,144,831 | \$120,442,347 | \$385,587,178 |

* Light due estimates based on rate of increase of dues between 2014-2018 (Ministry of Finance data)

* Costings of risk control options covered under Port Vila Safety of Navigation Risk Assessment have been factored in:

- In 2020, installation of dayboard behind leading light to allow for better visibility of AtoN
- In 2020, surveying works in area around Lapetasi Wharf to update charts and mitigate risk of allision
- In 2021, procurement of tug boat to mitigate risk of large vessels anchoring too close to wreck
- In 2022, dredging of harbour channel to mitigate the risk of groundings
- In 2020, 2021, 2022, 2023 and 2024, resourcing of OMR to enforce the *small craft rule*

* Maintenance costs for new procured equipment have been factored into the maintenance costs under recurring expenditure



2020

| | | Estimated cost (VUV) | Estimated cost (VUV) | Notes |
|------------------------------|---|----------------------|----------------------|---|
| Capital expenditure | | | | |
| Survey works | | | | |
| | Survey of Lapetasi wharf | 5,000,000 | | As part of Port Vila SoN risk assessment recommendations, the surveying of Lapetasi wharf to update charts will help mitigate the risk of allision at the wharf |
| AtoN upgrade | | | | |
| | Installation of daymarks | 1,000,000 | | As part of Port Vila SoN risk assessment recommendations, installation of daymark board on leading lights will allow for better visibility for vessels entering the harbour |
| Procurement | | | | |
| | Procure: Navigational buoys | 12,000,000 | | Proposed purchase of 10 new buoys for installments and spares |
| | Procure: Marine Lanterns | 5,000,000 | | Proposed purchase of 10 new buoys for installments and spares |
| | Freight | 244,366 | | Estimated cost of freight |
| Total capital exp | | | 23,244,366 | |
| Recurring expenditure | | | | |
| Enforcement | | | | |
| | Resourcing of OMR enforcement | 3,500,000 | | As part of Port Vila SoN risk assessment recommendations, the resourcing of OMR to enforce the small boat rules is important to build boat safety culture and in turn mitigate the risk of banana boats foundering |
| Labour costs | | | | |
| | Staff salaries | 2,080,000 | | Recruitment of two new AtoN technicians to assist AtoN Officer; one to be based in Santo and one in Port Vila |
| | Travel allowances | 300,000 | | Travel allowances for department staff on scheduled maintenance and awareness visits. Six trips scheduled every year. Two staff to travel to Tafea province, Central Islands and Sanma province every six months - VUV 5000 per day, 5 days per trip |
| | Accountable advance | 600,000 | | VUV 100,000 cash advance per trip |
| Maintenance supplies | | | | |
| | Paint, etc. | 1,403,666 | | Following painting needs: Anti-rust Undercoat Ocean guard white Ocean guard red Ocean guard green Ocean guard yellow Ocean guard black Thinner Rollers and paint brushes |
| | Contractors | 840,000 | | Hire of community contractors in Aore East, Pago point, Erromango, Uribive, Craig Cove, Lemon Bay; Epi, and Lamap for upkeep of AtoN towers (7). Estimated cost VUV 120,000 per AtoN tower, per year |
| Travel costs | | | | |
| | Boat travel | 1,080,000 | | Four boat trips scheduled per year as part of maintenance and awareness visits: - Trips through islands to Tafea Province every six months: Erromango-Tanna (VUV 40,000) - Trip through central Islands every six months: Efate-Emae-Epi-Ambyram-Malakula-Efate (VUV 500,000) |
| | Airfares | 240,000 | | Six trips scheduled per year as part of maintenance and awareness visits (two staff): - Port Vila-Erromango every six months (VUV 20,000 per staff) - Tanna-Anityum every six months (VUV 15,000 per staff) - Anityum-Port Vila every six months (VUV 25,000 per staff) |
| | Vehicle hire and fuel | 60,000 | | Vehicle hire during maintenance and awareness visits in Erromango, Tanna and Anityum. Estimated at VUV 20,000 per island |
| Other | | | | |
| | Land acquisition negotiations and payment | 10,000,000 | | Land acquisition costs budgeted for: Erromango, Lolowai, Anaitum, Port Narvin and Graig Cove |
| | Contingency | 3,984,803 | | 10% of all other costs |
| Total recurring exp | | | 24,088,469 | |
| Value added tax | | | | |
| TOTAL | | | 47,332,836 | |

2021

| | | Estimated cost (VUV) | Estimated cost (VUV) | Notes |
|------------------------------|---|----------------------|----------------------|---|
| Capital expenditure | | | | |
| Procurement | | | | |
| | Procure: Tug boat | 60,000,000 | | As part of Port Vila SoN risk assessment recommendations, an additional tug boat to ensure mandatory two tug boat pulls that will mitigate risk of large vessels anchoring too close to wreck |
| | Procure: Navigational buoys | 12,000,000 | | Proposed purchase of 10 new buoys for installments and spares |
| | Procure: Marine lanterns | 5,000,000 | | Proposed purchase of 10 new buoys for installments and spares |
| | Freight | 244,366 | | Estimated cost of freight |
| Total capital exp | | | 77,244,366 | |
| Recurring expenditure | | | | |
| Enforcement | | | | |
| | Resourcing of OMR enforcement | 3,500,000 | | As part of Port Vila SoN risk assessment recommendations, the resourcing of OMR to enforce the small boat rules is important to build boat safety culture and in turn mitigate the risk of banana boats foundering |
| Labour costs | | | | |
| | Staff salaries | 2,080,000 | | Recruitment of two new AtoN technicians to assist AtoN Officer; one to be based in Santo and one in Port Vila |
| | Travel allowances | 300,000 | | Travel allowances for department staff on scheduled maintenance and awareness visits. Six trips scheduled every year. Two staff to travel to Tafea province, Central Islands and Sanma province every six months - VUV 5000 per day, 5 days per trip |
| | Accountable advance | 600,000 | | VUV 100,000 cash advance per trip |
| Maintenance supplies | | | | |
| | Paint, etc. | 1,403,666 | | Following painting needs: Anti-rust Undercoat Ocean guard white Ocean guard red Ocean guard green Ocean guard yellow Ocean guard black Thinner Rollers and paint brushes |
| | Contractors | 840,000 | | Hire of community contractors in Aore East, Pago point, Erromango, Uribive, Craig Cove, Lemon Bay; Epi, and Lamap for upkeep of AtoN towers (7). Estimated cost VUV 120,000 per AtoN tower, per year |
| Travel costs | | | | |
| | Boat travel | 1,080,000 | | Four boat trips scheduled per year as part of maintenance and awareness visits: - Trips through islands to Tafea Province every six months: Erromango-Tanna (VUV 40,000) - Trip through central Islands every six months: Efate-Emae-Epi-Ambyram-Malakula-Efate (VUV 500,000) |
| | Airfares | 240,000 | | Six trips scheduled per year as part of maintenance and awareness visits (two staff): - Port Vila-Erromango every six months (VUV 20,000 per staff) - Tanna-Anityum every six months (VUV 15,000 per staff) - Anityum-Port Vila every six months (VUV 25,000 per staff) |
| | Vehicle hire and fuel | 60,000 | | Vehicle hire during maintenance and awareness visits in Erromango, Tanna and Anityum. Estimated at VUV 20,000 per island |
| Other | | | | |
| | Land acquisition negotiations and payment | 10,000,000 | | Land acquisition costs budgeted for: Erromango, Lolowai, Anaitum, Port Narvin and Graig Cove |
| | Contingency | 9,384,803 | 26 | 10% of all other costs |
| Total recurring exp | | | 29,488,469 | |
| Value added tax | | | | |
| TOTAL | | | 106,732,836 | |

2022

| | | Estimated cost (VUV) | Estimated cost (VUV) | Notes |
|------------------------------|---|-------------------------|-------------------------|---|
| Capital expenditure | | | | |
| Dredging | | | | |
| | Dredging of channel | 112,923,000 | | As part of Port Vila SoN risk assessment recommendations, dredging of Port Vila harbour entrance will help mitigate risk of groundings |
| Procurement | | | | |
| | Procure: Navigational buoys | 12,000,000 | | Proposed purchase of 10 new buoys for installments and spares |
| | Procure: Marine lanterns | 5,000,000 | | Proposed purchase of 10 new buoys for installments and spares |
| | Freight | 244,366 | | Estimated cost of freight |
| Total capital exp | | | 130,167,366 | |
| Recurring expenditure | | | | |
| Enforcement | | | | |
| | Resourcing of OMR enforcement | 3,500,000 | | As part of Port Vila SoN risk assessment recommendations, the resourcing of OMR to enforce the small boat rules is important to build boat safety culture and in turn mitigate the risk of banana boats foundering |
| Labour costs | | | | |
| | Staff salaries | 2,080,000 | | Recruitment of two new AtoN technicians to assist AtoN Officer; one to be based in Santo and one in Port Vila |
| | Travel allowances | 300,000 | | Travel allowances for department staff on scheduled maintenance and awareness visits. Six trips scheduled every year. Two staff to travel to Tafea province, Central Islands and Sanma province every six months - VUV 5000 per day, 5 days per trip |
| | Accountable advance | 600,000 | | VUV 100,000 cash advance per trip |
| Maintenance supplies | | | | |
| | Paint, etc. | 1,403,666 | | Following painting needs: Anti-rust Undercoat Ocean guard white Ocean guard red Ocean guard green Ocean guard yellow Ocean guard black Thinner Rollers and paint brushes |
| | Contractors | 840,000 | | Hire of community contractors in Aore East, Pago point, Erromango, Uribive, Craig Cove, Lemon Bay; Epi, and Lamap for upkeep of AtoN towers (7). Estimated cost VUV 120,000 per AtoN tower, per year |
| Travel costs | | | | |
| | Boat travel | 1,080,000 | | Four boat trips scheduled per year as part of maintenance and awareness visits: - Trips through islands to Tafea Province every six months: Erromango-Tanna (VUV 40,000) - Trip through central Islands every six months: Efate-Emae-Epi-Ambyram-Malakula-Efate (VUV 500,000) |
| | Airfares | 240,000 | | Six trips scheduled per year as part of maintenance and awareness visits (two staff): - Port Vila-Erromango every six months (VUV 20,000 per staff) - Tanna-Anityum every six months (VUV 15,000 per staff) - Anityum-Port Vila every six months (VUV 25,000 per staff) |
| | Vehicle hire and fuel | 60,000 | | Vehicle hire during maintenance and awareness visits in Erromango, Tanna and Anityum. Estimated at VUV 20,000 per island |
| Tug boat maintenance | | | | |
| | Tug boat maintenance cost | 4,000,000 | | As part of Port Vila SoN risk assessment recommendations, maintenance cost on the additional tug boat |
| Other | | | | |
| | Land acquisition negotiations and payment | 10,000,000 | | Land acquisition costs budgeted for: Erromango, Lolowai, Anaitum, Port Narvin and Craig Cove |
| | Contingency | 15,077,103 | | 10% of all other costs |
| Total recurring exp | | | 39,180,769 | |
| Value added tax | | | | |
| TOTAL | | | 169,348,136 | |

2023

| | | Estimated cost (VUV) | Estimated cost (VUV) | Notes |
|------------------------------|---|----------------------|----------------------|---|
| Capital expenditure | | | | |
| Procurement | | | | |
| | Procure: Navigational buoys | 12,000,000 | | Proposed purchase of 10 new buoys for installments and spares |
| | Procure: Marine lanterns | 5,000,000 | | Proposed purchase of 10 new buoys for installments and spares |
| | Freight | 244,366 | | Estimated cost of freight |
| Total capital exp | | | 17,244,366 | |
| Recurring expenditure | | | | |
| Enforcement | | | | |
| | Resourcing of OMR enforcement | 3,500,000 | | As part of Port Vila SoN risk assessment recommendations, the resourcing of OMR to enforce the small boat rules is important to build boat safety culture and in turn mitigate the risk of banana boats foundering |
| Labour costs | | | | |
| | Staff salaries | 2,080,000 | | Recruitment of two new AtoN technicians to assist AtoN Officer; one to be based in Santo and one in Port Vila |
| | Travel allowances | 300,000 | | Travel allowances for department staff on scheduled maintenance and awareness visits. Six trips scheduled every year. Two staff to travel to Tafea province, Central Islands and Sanma province every six months - VUV 5000 per day, 5 days per trip |
| | Accountable advance | 600,000 | | VUV 100,000 cash advance per trip |
| Maintenance supplies | | | | |
| | Paint, etc. | 1,403,666 | | Following painting needs: Anti-rust Undercoat Ocean guard white Ocean guard red Ocean guard green Ocean guard yellow Ocean guard black Thinner Rollers and paint brushes |
| | Contractors | 840,000 | | Hire of community contractors in Aore East, Pago point, Erromango, Uribive, Craig Cove, Lemon Bay; Epi, and Lamap for upkeep of AtoN towers (7). Estimated cost VUV 120,000 per AtoN tower, per year |
| Travel costs | | | | |
| | Boat travel | 1,080,000 | | Four boat trips scheduled per year as part of maintenance and awareness visits: - Trips through islands to Tafea Province every six months: Erromango-Tanna (VUV 40,000) - Trip through central Islands every six months: Efate-Emae-Epi-Ambyram-Malakula-Efate (VUV 500,000) |
| | Airfares | 240,000 | | Six trips scheduled per year as part of maintenance and awareness visits (two staff): - Port Vila-Erromango every six months (VUV 20,000 per staff) - Tanna-Anityum every six months (VUV 15,000 per staff) - Anityum-Port Vila every six months (VUV 25,000 per staff) |
| | Vehicle hire and fuel | 60,000 | | Vehicle hire during maintenance and awareness visits in Erromango, Tanna and Anityum. Estimated at VUV 20,000 per island |
| Other | | | | |
| | Land acquisition negotiations and payment | 10,000,000 | | Land acquisition costs budgeted for: Erromango, Lolowai, Anaitum, Port Narvin and Graig Cove |
| | Contingency | 3,384,803 | | 10% of all other costs |
| Total recurring exp | | | 23,488,469 | |
| Value added tax | | | | |
| TOTAL | | | 40,732,836 | |

2024

| | | Estimated cost (VUV) | Estimated cost (VUV) | Notes |
|------------------------------|---|----------------------|----------------------|---|
| Capital expenditure | | | | |
| Procurement | | | | |
| | Procure: Navigational buoys | 12,000,000 | | Proposed purchase of 10 new buoys for installments and spares |
| | Procure: Marine lanterns | 5,000,000 | | Proposed purchase of 10 new buoys for installments and spares |
| | Freight | 244,366 | | Estimated cost of freight |
| Total capital exp | | | 17,244,366 | |
| Recurring expenditure | | | | |
| Enforcement | | | | |
| | Resourcing of OMR enforcement | 3,500,000 | | As part of Port Vila SoN risk assessment recommendations, the resourcing of OMR to enforce the small boat rules is important to build boat safety culture and in turn mitigate the risk of banana boats foundering |
| Labour costs | | | | |
| | Staff salaries | 2,080,000 | | Recruitment of two new AtoN technicians to assist AtoN Officer; one to be based in Santo and one in Port Vila |
| | Travel allowances | 300,000 | | Travel allowances for department staff on scheduled maintenance and awareness visits. Six trips scheduled every year. Two staff to travel to Tafea province, Central Islands and Sanma province every six months - VUV 5000 per day, 5 days per trip |
| | Accountable advance | 600,000 | | VUV 100,000 cash advance per trip |
| Maintenance supplies | | | | |
| | Paint, etc. | 1,403,666 | | Following painting needs: Anti-rust Undercoat Ocean guard white Ocean guard red Ocean guard green Ocean guard yellow Ocean guard black Thinner Rollers and paint brushes |
| | Contractors | 840,000 | | Hire of community contractors in Aore East, Pago point, Erromango, Uribive, Craig Cove, Lemon Bay; Epi, and Lamap for upkeep of AtoN towers (7). Estimated cost VUV 120,000 per AtoN tower, per year |
| Travel costs | | | | |
| | Boat travel | 1,080,000 | | Four boat trips scheduled per year as part of maintenance and awareness visits: - Trips through islands to Tafea Province every six months: Erromango-Tanna (VUV 40,000) - Trip through central Islands every six months: Efate-Emae-Epi-Ambyram-Malakula-Efate (VUV 500,000) |
| | Airfares | 240,000 | | Six trips scheduled per year as part of maintenance and awareness visits (two staff): - Port Vila-Erromango every six months (VUV 20,000 per staff) - Tanna-Anityum every six months (VUV 15,000 per staff) - Anityum-Port Vila every six months (VUV 25,000 per staff) |
| | Vehicle hire and fuel | 60,000 | | Vehicle hire during maintenance and awareness visits in Erromango, Tanna and Anityum. Estimated at VUV 20,000 per island |
| Other | | | | |
| | Land acquisition negotiations and payment | 10,000,000 | | Land acquisition costs budgeted for: Erromango, Lolowai, Anaitum, Port Narvin and Graig Cove |
| | Contingency | 3,384,803 | | 10% of all other costs |
| Total recurring exp | | | 23,488,469 | |
| Value added tax | | | | |
| TOTAL | | | 40,732,836 | |

