

## 2. Methodology

### 2.1 INTRODUCTION

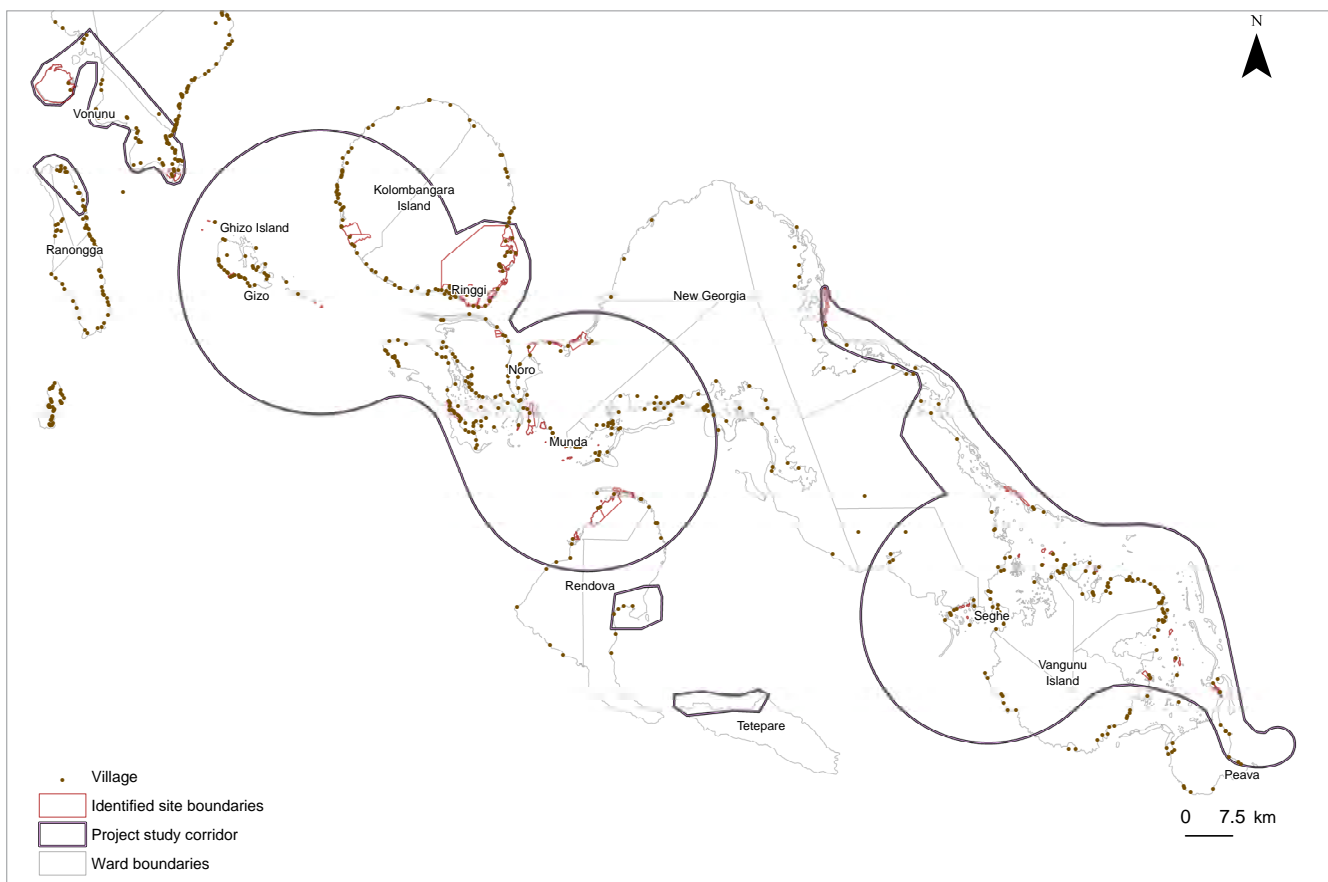
A landscape-level assessment is a geographically based assessment of a defined landscape area—in this case, the study corridor with 70 sites identified by IFC. It includes identifying components of the landscape, its characterization and mapping to differentiate distinct areas based on relevant criteria, and its evaluation ranking or prioritizing areas that require high protection or management. Such an assessment provides a high-level indication of wider landscape matters that can be used to inform site selection for development. Further detailed investigation of a chosen site can then be undertaken.

This section summarizes the methodology applied to the ESDS, with a focus on the risk-assessment approach applied for the contextual, corridor, and identified-site assessments. The risk-assessment approach forms the basis of assessment for the ESDS. It should be noted that the ESDS considers:

- Potential E&S risks on tourism development
- Potential E&S risks from tourism
- Recommended actions to avoid, minimize, mitigate, and manage the identified E&S risks and opportunities arising from tourism development

Map 4 displays the study corridor in Western Province, comprising the primary focus areas for this study and the identified sites within the corridor.

**Map 4: Identified-Site Boundaries in the Study Corridor<sup>(13)</sup>**



<sup>13</sup> This study did not survey the interior of the islands and used secondary data.

## 2.2 GENERAL METHODOLOGY AND APPROACH

An overview of the wider project methodology as well as supporting-data collection and analysis is provided in appendix A. This section provides a brief summary of the ESDS's general approach:

### Desktop Review of Existing Information and GIS Data

The team undertook a desktop review of the legal and political framework of the country as well as a review of background research on its E&S conditions, focusing on the study corridor. This included gathering available GIS data, previous environmental and ecological assessments, and social research and reporting.

### Inception Plan

The study reviewed available data and identified information gaps to devise an inception plan that included an indicative approach to site visits in the study corridor and further research, stakeholder consultation, and on-site assessment to gather the required data.

### Stakeholder Engagement Plan

Key stakeholders were identified for consultation and their inputs were incorporated into developing the risk assessment criteria with a focus on fulfilling the recommendations of the study.

### Field Assessments

This included in-field site surveys and stakeholder consultations to gather more E&S data to supplement desktop investigations.

### Analysis of the Findings

Review of the gathered data—in line with IFC PS and other guidance—was undertaken to identify the key risks and impacts requiring consideration at the contextual, corridor, and identified-site levels.

### Risk Assessment

The assessment characterized key E&S risks and impacts that were identified and developed measurement criteria for them. Measurement of mapped and collected data against the relevant risk assessment criteria produced ratings (high, moderate, or low) for areas along the study corridor and a prioritized rating for each identified site.

### Stakeholder Consultations

The study findings were discussed with key stakeholders to refine the weighting of key risks to align with stakeholder values and gain feedback on potential risk-mitigation options.

### Recommended Actions

Identified actions to address and manage high-level risks and impacts at the contextual, corridor, and identified-site levels to enable the development of sustainable tourism.

#### 2.2.1 STAKEHOLDER CONSULTATION

Stakeholder inputs to identify potential risks and opportunities for the ESDS were sought through the following activities:

- Prior to the study's commencement, IFC had undertaken site investigation and consultation with more than 90+ stakeholders for the purpose of developing the *WPTINA* report 2018.
- In February 2020, the study team visited 65 of the 70 identified sites to conduct brief semi-structured interviews with government officials, community members, and site owners/caretakers, using a purposive sampling method. In addition to these stakeholders, consultation was also undertaken with tourism industry representatives, service providers, international donors, NGOs, and CSOs. A full list of those who participated in the consultation were acknowledged in this report (see Acknowledgments).
- A second round of stakeholder consultation was proposed to test the study findings and inform the preparation of the final report. However, due to COVID-19 travel restrictions, alternatives formats to completing the consultation were undertaken, including leveraging local support, phone consultation, and virtual presentations.

Stakeholder inputs from the above activities are referred to as "consultation" throughout the report.

## 2.3 RISK-ASSESSMENT METHODOLOGY

### 2.3.1 GUIDANCE USED FOR RISK ASSESSMENT

There is limited published guidance on landscape-level assessments for evaluating risks to social and natural environments; however, it has similarities with the methodologies of a Cumulative Impact Assessment (CIA) and Strategic Environmental Assessment (SEA). This study borrows from CIA/SEA approaches that have been refined for conducting risk assessments of the tourism sector, the study corridor, and identified sites. The methodology, outlined in Figure 1, is also guided by the approach used for ESAs and the IFC PS. Appendix A explains how the key E&S risks were characterized (indicators) and the measurement criteria were established. The Risk Summary Matrix in section 2.4 explains how recommended mitigations have been displayed and residual risks (and consideration of opportunities) have been considered.

### 2.3.2 RISK-ASSESSMENT LEVELS

The risks have been assessed at three main levels (see Figure 1 and Table 1 in Executive Summary):

- Contextual risks
- Corridor risks
- Identified-site risks

The contextual risks captured in this study relate to high or moderate risks that will likely escalate if not properly mitigated. Corridor-level risks have been given an assessment rating of low, moderate, or high. Risks at identified sites have been given a wider assessment rating scale of 1-3 (low), 4-6 (moderate), and 7-10 (high).

At both the corridor and identified-site levels, moderate and high risk-rating areas will require more costs and time from investors to ensure their developments are in line with national applicable laws and international good practice. All sites will likely require further assessments before development. The current risk rating is linked with the baseline condition recorded when this study was undertaken and is subject to change. Developers should reconfirm the ratings before proceeding with development.

### 2.3.3 CONSIDERATION OF CONTEXTUAL RISKS AND MEASUREMENT OF CORRIDOR AND IDENTIFIED-SITE RISKS

#### Contextual Risks

The IFC's 2012 Policy on Environmental and Social Sustainability requires that, as part of the categorization process, IFC considers "inherent E&S risks related to a particular sector as well as the context of a business activity's setting." Contextual risks—from a private sector's E&S perspective—are defined as external risks at a country, sector, or subnational level that project developers do not control but can negatively impact a project's or private sector client's ability to meet IFC's E&S requirements.

The study team used IFC's country-level, contextual-risk framework, to screen the risks applicable to tourism development in Western Province. Using its expert judgment and data collected, the team addressed each contextual risk's level of influence on tourism development and designed tailored recommendations. A thorough review of the available data was undertaken to understand the province's E&S situation. Data applicable to contextual risks were collected and validated during site visits. As a starting point, contextual risks are captured in security and conflict, social cohesion,<sup>(14)</sup> labor and workforce, food security, health epidemics/pandemics, political risk and governance, access to land and natural resources, natural hazards, biodiversity/ecosystem services, and reprisals.

#### Corridor Risk Measurement

These relate to general E&S risks that may manifest across the corridor and can be differentiated at a wider scale. Measurement of corridor-level risks is primarily based on secondary data, with limited supplementation of site-based findings if they present a pattern across areas of the corridor. Data that has been interrogated at the corridor level includes key biodiversity areas, protected areas (marine and terrestrial), undisturbed forest areas, land tenure, UXO presence, socio-demographic information from census data, and infrastructure location (existing and planned).

14 Gender and gender-based violence are assessed under the risk headings of social cohesion and labor and workforce.

To confirm the corridor-level risks, a list of indicators was developed. The associated data was then interrogated to confirm which could be measured and assessed in more detail within areas of the corridor. Specific criteria were used to assess key risks, which were then mapped spatially using GIS. The mapped risks allow areas of the corridor to be highlighted as susceptible to higher E&S impacts and this can guide investors in their decision-making.

Some of the corridor-wide E&S risks can be further interrogated at the identified-site level where further empirical data has been collected.

Reliable data with finer detail differentiating areas of Western Province was combined with on-site observations and reviews of recent aerial photos to map key E&S indicators wherever possible across the study corridor. Using the same approach, further review was undertaken at the site level, supplementing indicators that were not measurable across the entire corridor. The process of mapping indicators helped highlight the key risks present at each level. Once key risks were determined, measurement criteria were attributed to each risk at the corridor (see Table 2) and identified-site (see Table 4) levels.

Derivation of the risk indicators required considerable effort to curate and assess the veracity of the data as well as categorizing into an appropriate form to allow application of a risk-assessment context. This included consultation with Solomon Islands government ministries and NGOs as well as access to international partnership databases, such as the Integrated Biodiversity Assessment Tool (IBAT) and the IUCN Red List, and other available research and online spatial data portals. The subsequent data-gap analysis identified a paucity of site-specific data across the study corridor.

## **Environmental Indicators**

Locational data and even basic data on ecosystems and biodiversity values were, at best, available only for Western Province, but most often biodiversity information could only be interrogated at a country level.

However, the essential habitat factors important to maintenance of ecosystem processes and functionality—and of fauna and flora generally (including species of conservation significance)—is well documented in scientific literature and online databases referenced in this report. Subsequently, the type, location, and the condition and integrity of the ecosystem was used as a reliable surrogate for assessing the potential risk to biodiversity values, and these risk bands were mapped for both marine and terrestrial ecosystems.

Essential habitat factors (as identified above) are a key ecological concept and include environmental features that are considered critical to the survival of populations of threatened fauna and flora and/or maintenance of natural ecosystem processes. The condition and integrity of these factors are a key to determining the likely presence of important species. For this study, “condition” refers to the abundance and distribution of natural vegetation types or marine community types, whereas “integrity” indicates the likely long-term viability or sustainability of ecological processes. The study considers the extent to which these processes have been affected by past or present land uses, the ability of the community (vegetation types) subject to these processes to rebound (or be rehabilitated), and a timeframe for any restorative process. Typically, timber harvesting (logging), impacts of tropical storms, large-scale clearing, and infrastructure development are the most obvious visual evidence of these indicators at a study corridor and site-level scale of resolution.

The environmental indicators were mapped at a study-corridor level, acknowledging that some indicators could only be mapped at an identified-site level. In the absence of site-specific data, the field survey team had general pro forma for the collection of data reflecting the indicators used of the study corridor. The field study aimed to verify secondary environmental data, such as the level of disturbance, extent of overfishing, potentially vulnerable ecosystems, status of logging, and cyclone recovery regrowth, albeit at a finer scale of resolution.

**Table 2: Environmental and Social Assessment Criteria at the Corridor Level**

Key Corridor Risks	Measurement Criteria and Data Source	Assessment Criteria		
		Low Risk	Moderate Risk	High Risk
<b>Terrestrial biodiversity impacts</b>	<ul style="list-style-type: none"> <li>IUCN/IBAT databases where relevant</li> <li>Logging concession maps (Ministry of Forestry &amp; Research)</li> <li>Published research and studies</li> </ul>	<ul style="list-style-type: none"> <li>Highly disturbed/modified environment</li> <li>Represents low ecological value</li> <li>Examples include active coconut plantations, residential/or housing areas, and agricultural land</li> </ul>	<ul style="list-style-type: none"> <li>Moderately disturbed environment</li> <li>Examples include former, abandoned coconut plantations with heavy secondary growth forest, or former logged areas with strong secondary growth</li> <li>Relatively healthy reef ecosystem with some sign of human impact</li> <li>Endangered or threatened species may be present</li> </ul>	<ul style="list-style-type: none"> <li>Relatively undisturbed environment, such as primary forest</li> <li>Healthy and intact ecosystems with limited impact from human activities</li> <li>Endangered or threatened species likely to be present</li> </ul>
<b>Marine biodiversity impacts</b>	<ul style="list-style-type: none"> <li>Presence of informal marine management areas, such as Community-based Management Areas (CBMA)</li> <li>IUCN/IBAT databases where relevant</li> </ul>	<ul style="list-style-type: none"> <li>Marine areas close to urban centers</li> <li>Ecosystem health compromised through pollution, and overfishing</li> <li>Shallow reef areas with no adjacent deep water</li> <li>Visually stressed marine environment</li> <li>Low ecological diversity and health</li> </ul>	<ul style="list-style-type: none"> <li>Marine ecosystems that are relatively intact</li> <li>Some evidence of human impact</li> <li>Areas &lt;5 km from nearest village</li> <li>Moderate extent of reef, mangroves, or sea grass with visible indicators or stress or impact</li> <li>Areas where adjacent land use, such as logging, will likely impact marine ecosystem health</li> </ul>	<ul style="list-style-type: none"> <li>Extensive seagrass beds in good health</li> <li>Well established and healthy mangrove areas</li> <li>Healthy and reef ecosystems with wide fish diversity and little impact from fishing</li> <li>Extensive reef systems with documented rich biodiversity</li> <li>Rare or endangered species likely to be present</li> <li>Sea turtle feeding or nesting areas</li> <li>Sea bird roosting or nesting areas</li> </ul>
<b>Social impacts</b>	<ul style="list-style-type: none"> <li>Land tenure/ access to land-use rights</li> <li>Access to infrastructure; GIS measurement for distance from airport and medical facilities</li> <li>Exposure to potential UXO areas</li> </ul>	<ul style="list-style-type: none"> <li>Registered land</li> <li>Less than 15 km from airport</li> <li>Less than 10 km from medical facility</li> <li>No potential exposure to UXO</li> </ul>	<ul style="list-style-type: none"> <li>Surveyed land but not registered</li> <li>15-30 km from airport</li> <li>10-15 km from medical facility</li> <li>Potential exposure to UXO</li> </ul>	<ul style="list-style-type: none"> <li>On customary land</li> <li>30-50 km away from airport</li> <li>Over 15 km from medical facility</li> <li>Potential exposure to UXO</li> </ul>

Note 1: Other social indicators discussed in the contextual and corridor-level analysis were difficult to measure and map across the corridor because of a lack of data, or they provided limited insight on differences across the corridor due to the uniformity of the data.

Note 2: Exposure to natural hazards and sea-level rise was not possible to accurately map at the corridor level because of limited available data. Both coastal vulnerability and sea-level rise were mapped at the identified-site level through empirical observations during site visits.

This allowed the team to refine risk assessment at both the study-corridor and identified-site levels. The resulting environmental indicators adopted for the study are summarized below and presented in more detail in Table 2 and Table 4.

- **Conservation areas:** Location/status of locally, nationally, or internationally recognized areas of conservation significance, including Marine Protected Areas, Community-Based Management Areas, and Locally Managed Marine Areas.
- **Location of fauna/flora of conservation significance:** This indicator is a standard international best practice when considering the potential risk of a project for a particular area.
- **Terrestrial habitat condition and integrity:** In the absence of species-specific location data, essential habitat factors and their condition and integrity were adopted as a surrogate measure to indicate likely areas of resource utilization by species of conservation significance.
- **Terrestrial landforms and types:** Landforms and types of the terrestrial environment were used as an indicator of potential risk at a study-corridor level. This included, for example, slopes above 30 percent, cliff areas, floodplains, and associated drainage depressions (freshwater swamps). At a site level, these factors were more finely delineated and verified during the field inspections.
- **Marine ecosystems:** They encompass a variety of habitats and types, including coral reefs, seagrass meadows, abyssal trenches, mangroves, and intertidal systems. Direct information on the condition and integrity of various marine ecosystems was not available as mappable digital data. Since each system's vulnerability to development varies, their individual degree of vulnerability, as established through the scientific literature referenced in this report, was used as indicator of potential environmental risk at a study-corridor level, with field verification at a site level.
- **Coral reefs:** The type and location of a coral-reef system determines, to a large degree, its level of vulnerability. Barrier reefs and ribbon reefs, owing to their distance from land and configuration, are less vulnerable to impacts from onshore pollution, particularly sediment from logging and clearing operations as well as nutrients from villages and towns, than atoll or fringing reef systems.

More remote reef systems from densely settled areas are also less likely to be overfished owing to limitations on accessing these reefs by small village boats.

External data, including digital databases, GIS mapping, and published reports, were used to establish the locations and risk bands (low, moderate, or high) for the environmental indicators at a study-corridor scale of resolution. Some of the data, while mapped, represented such small areas (such as freshwater wetlands) that they could not be seen at a study-corridor level. Reconnaissance-level environmental data of most identified sites were obtained through field inspections. While the field inspections were unable to include surveys for threatened species because of time limitations, they did provide information on the environmental condition and integrity. Subsequently, potential environmental risks at a site level were refined and considered in the final risk assessment of each site in this report.

### Social Indicators

National census data and information on social indicators is well documented and considered in various literature. However, localized data within the study corridor and identified sites is reasonably sparse and/or dated. Mapping details of social infrastructure and planned infrastructure has been piecemeal; social information is most reliable at the contextual level, with some data and site observations to support a general understanding of social risks at the corridor and identified-site levels.

Census data (most recently published in 2009) and reports give a clear picture of the social makeup of Western Province on specific areas in line with developing nation status reports.

The most recent full census in 2009 and follow-up focused studies, such as the 2014-2016 "Solomon Islands Education Management Information Systems," provide insight into the socio-economic factors of Western Province; this has been supplemented by anecdotal data on social infrastructure to paint a more detailed picture of today's situation for communities and tourism operators in Western Province.

Given the province's social context, understanding the vulnerability of communities to development is key to determining social risks. An awareness of existing social infrastructure and support for local communities can guide investors in addressing their needs in tourism planning.



Only a limited number of social indicators could be mapped at a study-corridor level because of data gaps; as such, these gaps were focused at the identified-site level. The social indicators considered for this study at both levels are summarized below:

- **Land use:** Settlements, area under cultivation (such as gardens, coconut plantations, forestry plantations, and logging areas), reefs, mangroves, and seagrass
- **Demographic profile:** Population density
- **Social vulnerabilities:** Subsistence living, education levels, health status of the community (for example, malnutrition and disease profiling), use of sanitation, and access to power
- **Land tenure/land-use rights:** Customary land, land under indigenous administration, and registered land (perpetual lease or fixed-term lease)
- **UXO hazards:** Presence of UXO
- **Social infrastructure:** Medical and health services, emergency response, transport (roads, airports, jetties, and ferry docks), potable water supply, markets for food and daily supplies, waste-management and water-treatment facilities, power, and telecommunications
- **Planned development:** Physical infrastructure projects
- **Tourism facilities and activities:** Existing accommodation and tourism operators

These indicators were examined against data and information availability, reliability of the data sources, and the ability to measure and map them at the corridor and site level. Many of the social indicators did not present sufficient data to be mapped and measured or were considered irrelevant following a background analysis. Indicators used to measure social risks are presented in Table 2 and Table 4.

### Natural-Hazard Indicators

Natural-hazard indicators considered in this study include tsunami-prone areas, earthquake-prone areas, landslide-prone areas, cyclone and storm-prone areas, and sea-level-rise-prone areas. The assessment, however, focused more on earthquakes and tsunamis at the identified-site level, as there was limited information available on other natural hazards within the study corridor.

### Identified-Site Risks

Scaling to the individual identified sites, risk assessments are largely based on on-site observations and discussions with local stakeholders and supplemented with reliable and accurate secondary information where available. The identified sites are given risk ratings on a linear scale of 1 to 10, with 1 as low and 10 as high.

### Identified-Site Risk Weighting

The following weightings were developed in consultation with stakeholders to support the multi-criteria analysis. The agreed weighting used is outlined in Table 3.

**Table 3: Risk Weighting at the Identified-Site Level**

Risk Theme	Overall Importance Weighting	Key Risks	Initial Importance Weighting for Risk Attribute
<i>Natural hazards</i>	20%	Coastal vulnerability	50%
		Sea-level rise	50%
<i>Social risks</i>	40%	Presence of people	30%
		Presence of sources of livelihood	30%
		Remoteness of site/access to infrastructure	20%
		Presence of cultural heritage	20%
<i>Environmental risks</i>	40%	Terrestrial biodiversity value	50%
		Marine biodiversity value	50%

These weightings are applied to the ratings of the specific risks measured to provide an overall aggregate, which is then used to rate an identified-site risk profile low, moderate, or high.

The findings of the identified-site analysis are provided in section 4.4.

**Table 4: Environmental and Social Assessment Criteria at Identified Sites<sup>(15)</sup>**

Key Site Risks	Measurement Criteria and Data Source	Assessment Criteria (Score)		
		Low Risk (1-3)	Moderate Risk (4-6)	High Risk (7-10)
<b>Coastal vulnerability</b>	<ul style="list-style-type: none"> <li>Site observations</li> <li>Evidence of erosion from site observations</li> <li>Percentage of site within 50 m of shallow-to-medium-depth reef</li> <li>IUCN/IBAT reef mapping</li> <li>Aerial photos</li> </ul>	<ul style="list-style-type: none"> <li>Sheltered locations within a lagoon or island group and unlikely to be affected by storm surges</li> <li>No evidence of erosion</li> <li>60% or more of site perimeter surrounded by shallow or medium-depth reef</li> </ul>	<ul style="list-style-type: none"> <li>Somewhat sheltered from storm surges; exposed location within lagoon environment</li> <li>No evidence of erosion</li> <li>30% to 60% of site perimeter surrounded by shallow or medium-depth reef</li> </ul>	<ul style="list-style-type: none"> <li>Reef fringe islands, exposed to weather events, and low elevation above sea level</li> <li>Evidence of erosion</li> <li>Less than 30% of site perimeter surrounded by shallow or medium-depth reef</li> </ul>
<b>Sea-level rise</b>	<ul style="list-style-type: none"> <li>Semi-quantitative: Percentage of site over 1 m above sea level based on site observations</li> <li>Aerial photos</li> </ul>	<ul style="list-style-type: none"> <li>70% or more of site area over 1 m above sea level</li> </ul>	<ul style="list-style-type: none"> <li>30% to 70% of site area over 1 m above sea level</li> </ul>	<ul style="list-style-type: none"> <li>30% to 70% of site area less than 1 m above sea level</li> </ul>
<b>Presence of people</b>	<ul style="list-style-type: none"> <li>Buildings or houses on site based on site observation and aerial photos (Area of site=houses per hectare on site)</li> <li>Where possible, non-residential buildings have been excluded and noted separately</li> <li>Buildings included are of reasonable size to be considered for residential-dwelling purposes (outhouses and small utility buildings are excluded)</li> <li>Head counts of site occupants were not undertaken</li> </ul>	<ul style="list-style-type: none"> <li>No known communities, families, or individuals occupying or using the land parcel for living purposes</li> <li>Confirmed caretakers living on site who may have associated gardens and livestock are given a rating of 1 and not included in the household count</li> </ul>	<ul style="list-style-type: none"> <li>1-3 buildings or houses per hectare occupying the land parcel</li> </ul>	<ul style="list-style-type: none"> <li>3+ buildings or houses per hectare of the land parcel</li> </ul>
<b>Presence of Livelihood</b>	<ul style="list-style-type: none"> <li>Presence of gardens or crops based on site observations and review of aerial photos of used or fallow cropping and gardens</li> <li>Estimate area size based on aerial and Land Use PacGeo layer</li> </ul>	<ul style="list-style-type: none"> <li>No crops or gardens on site</li> </ul>	<ul style="list-style-type: none"> <li>Fallow cropping, plantation, or gardening land occupying less than 30% of site</li> </ul>	<ul style="list-style-type: none"> <li>Crops/gardens present on site and occupying 30% of site or more</li> <li>Presence of villages</li> </ul>

15 Since all sites are located on registered land, land tenure is not considered as a variable for risk rating at the identified-site level.



Key Site Risks	Measurement Criteria and Data Source	Assessment Criteria (Score)		
<b>Proximity to existing infrastructure</b>	<ul style="list-style-type: none"> <li>Measurement from known points</li> </ul>	<ul style="list-style-type: none"> <li>0-15 km from an airport</li> <li>0-10 km from a health clinic</li> </ul>	<ul style="list-style-type: none"> <li>15-30 km from an airport</li> <li>10-15 km from a health clinic</li> </ul>	<ul style="list-style-type: none"> <li>30-50 km from an airport</li> <li>15-20 km from a health clinic</li> </ul>
<b>Presence of Cultural heritage</b>	<ul style="list-style-type: none"> <li>Data from site visits/ area of site that are used for family graves, WWII relic or battle sites, cultural sites, <i>tabu</i> or <i>kastom</i> sites (sites of cultural significance), and animist sites considered important by the local community</li> <li>Includes traditional resource- collection areas, such as forest products, shells for jewelry, and collecting building or weaving materials</li> <li>Site used for recreational/ traditional purposes by local communities</li> </ul>	<ul style="list-style-type: none"> <li>No historical or cultural sites confirmed</li> </ul>	<ul style="list-style-type: none"> <li>Less than one site identified on the site</li> </ul>	<ul style="list-style-type: none"> <li>More than one site identified</li> </ul>
<b>Terrestrial biodiversity</b>	<ul style="list-style-type: none"> <li>Site observations</li> <li>IUCN/IBAT databases where relevant</li> <li>Information based on discussions with communities</li> </ul>	<ul style="list-style-type: none"> <li>Highly disturbed or modified environment with low ecological value</li> <li>Examples include active coconut plantations, residential/or housing areas, and agricultural land</li> </ul>	<ul style="list-style-type: none"> <li>Moderately disturbed environment</li> <li>Examples include former or abandoned coconut plantations with heavy secondary growth forest, or former logged areas with strong secondary growth present</li> <li>Relatively healthy reef ecosystem with some sign of human impact</li> <li>Endangered or threatened species may be present</li> </ul>	<ul style="list-style-type: none"> <li>Relatively undisturbed environment, such as primary forest, and healthy and intact reef ecosystems with relatively limited impact from human activities</li> <li>Endangered or threatened species likely to be present</li> </ul>
<b>Marine biodiversity</b>	<ul style="list-style-type: none"> <li>Site observations of reef directly adjacent to site</li> <li>Presence of informal marine management areas, such as community-based marine protected areas</li> <li>Information based on discussions with communities</li> <li>IUCN/IBAT databases where relevant</li> </ul>	<ul style="list-style-type: none"> <li>Marine areas close to urban centers</li> <li>Ecosystem health compromised through pollution and overfishing</li> <li>Shallow reef areas with no adjacent deep water</li> <li>Visually stressed marine environment with low ecological diversity and health</li> </ul>	<ul style="list-style-type: none"> <li>Marine ecosystems that are relatively intact</li> <li>Some evidence of human impact</li> <li>Areas less than 5 km from nearest village</li> <li>Moderate extent of reef, mangroves, or seagrass with visible indicators/ stress/impact</li> <li>Areas where adjacent land use, such as logging, will likely affect marine ecosystem health</li> </ul>	<ul style="list-style-type: none"> <li>Extensive seagrass beds in good health</li> <li>Well-established and healthy mangrove areas</li> <li>Healthy and reef ecosystems with wide fish diversity and little impact from fishing</li> <li>Extensive reef systems with documented rich biodiversity</li> <li>Rare or endangered species likely to be present</li> <li>Sea turtle feeding or nesting areas</li> <li>Seabird roosting or nesting areas</li> </ul>

## 2.4 DATA LIMITATIONS

Given this was a landscape level study, primary data and/or field inspections were not undertaken and were qualitative. Detailed quantitative environmental investigations were not undertaken on site.

The risk mapping is indicative only and based on available data at the time of assessment. Conditions are likely to change over time. Any investors or potential developers should undertake their own due diligence to verify the information presented in this report at the time of the investment and development.

### Secondary Data

There is broad and varied data and information available online and from other public sources, but much of it is more than a decade old. The majority of the biodiversity data is either too broad (covering the entire Western province) or too site specific (not relevant to the province), thereby providing limited relevance for the study.

Verification of the secondary data in the field and through discussions with communities, government agencies, and NGOs has demonstrated that about half of the data was inaccurate or outdated. This means, for the purpose this study, greater reliance has been placed on the primary data and/or field observations and discussions for the site-specific assessments.

### Primary Data

Field inspections of selected sites and the tourism corridor in Western Province were undertaken in February 2020. They aimed to verify and validate the secondary data as well as gather additional information about each site and surrounding environs.

The primary data collection included:

- Visual inspections of terrestrial and marine ecosystems, including documenting site ecological observations as detailed in Table 19
- Observations of biophysical features, including surface-water features, springs, topography, geology, and natural outstanding features
- Observations of social characteristics of the site and communities in the area; social indicators considered for assessment are detailed in Table 20
- Discussions with site users and owners, nearby communities, and tourism operators
- General observations about the environmental integrity<sup>(16)</sup>

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16 Field observations and discussions were frequently contrary to the secondary data collected.