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Climate Impact Report

Regional Eye Centre (REC), Honiara, Solomon Islands

THE FRED HOLLOWS FOUNDATION NZ | APRIL 2025

PROJECT DELIVERED FOR

Regional Eye Centre / National Referral Hospital

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1 Executive Summary

The Fred Hollows Foundation NZ (The Foundation) is a non-profit organisation dedicated to ending avoidable blindness in the Pacific. Founded by eye surgeon Fred Hollows, the Foundation operates across three strategic pillars: restoring and preserving sight for people in the Pacific, training the next generation of eye health workers, and supporting the development of locally managed eye health systems. The Foundation currently partners with eight eye clinics across seven countries: Papua New Guinea, Solomon Islands, Vanuatu, Fiji, Tonga, Samoa, and Kiribati.

The Foundation, in partnership with Pacific eye clinics and Ministries of Health has contracted Edge Impact to support the completion of a Climate Impact Assessment (CIA) at three Foundation-supported clinics, aligning with WHO guidelines to assess sites for Climate Resilience and Environmental Sustainability interventions. This report focuses on the assessment of the Regional Eye Centre (REC) in Honiara, Solomon Islands, as part of the "Building Community-Level Climate Resilience in the Pacific" (BCCR) project, supported by the New Zealand Ministry of Foreign Affairs and Trade's (MFAT) Climate Finance for Community Resilience Programme. The aim is to identify climate risks and propose adaptation strategies to strengthen the resilience of healthcare facilities and the communities they serve.

By the end of the century, climate projections for the Solomon Islands indicate a 4°C increase in daily maximum temperatures, a significant rise in the frequency of heatwaves and extremely hot days, more intense and frequent heavy rainfall events, and a sea level rise of up to 73 cm, along with increased impacts from tropical cyclones (CSIRO and SPREP, 2021). These changes pose risks to the Regional Eye Centre (REC) in Honiara, Guadalcanal, and to the outreach services, which both play a key role in providing eye care to the community.

The REC's resilience and sustainability measures strengthen operational reliability, patient care, and cost efficiency in the face of local climate challenges. Solar power, natural ventilation, and rainwater harvesting reduce reliance on external resources, reducing costs and minimising service disruptions. Specifically, the Net Present Value (NPV) of electricity cost savings from the solar PV installations between 2015 and 2040, discounted at 5%, is estimated at $619,777 USD. This also provided an estimated 920 additional medical interventions per year for community members of the Solomon Islands attending the REC. The facility's elevated, relocatable design offers protection against climate risks like flooding and cyclones, and sustainable waste protocols enhance safety for staff and patients. These strategies collectively ensure that the REC can provide consistent, climate-resilient eye care for the community.

The key findings of this assessment provide an understanding of the risks identified in this CIA and opportunities associated with climate change and are used to inform tailored adaptation strategies that prioritise the climate resilience of each asset. The following are the key findings from the CIA for the Regional Eye Centre (REC) in the Solomon Islands:

- Heat Impacts: Rising temperatures will affect the health workforce, patients, and community members, more so than the REC structure itself. The facility's design is currently sufficient, but measures are needed to mitigate future heat-related risks.
- Flooding and Sea Level Rise: The REC's location makes it vulnerable to flooding and sea level rise, potentially disrupting operations and damaging infrastructure. Although the facility has been designed to be relocated in accordance with the MoH strategic planning documentation, it is uncertain how this plan is progressing. As such, the REC remains vulnerable to inundation-related climate hazards.
- Storm and High Wind Impacts: Storms and strong winds pose a risk to outreach activities, limiting accessibility and reducing the effectiveness of eye care services in remote areas.
- Cumulative Climate Change Impacts: The interaction of multiple climate-related factors, such as adverse sea conditions, is one of the highest risks to the REC's operational capacity. This impacts both service delivery and the safety of staff and patients.

Recommended adaptation actions were generated throughout the report. All are collated in Appendix E. Collated recommendations, with key findings including:

- Infrastructure Adaptation: Elevate critical infrastructure, such as electrical components and water tanks, to at least 60 cm above ground level to mitigate flooding and sea level rise risks. Revise outreach checklist criteria to ensure that theatres in outreach centres are equipped with appropriate ventilation systems to accommodate increasingly hotter days.
- Operational and Staff Preparedness: Develop and implement heat protocols in standard operating procedures (SOPs) to minimise exposure risks. Improve staff training on emergency procedures and climate-related hazards to enhance response capabilities. Revise outreach checklist criteria to ensure that outreach centres are equipped with

appropriate ventilation systems to accommodate increasingly hotter days. Collaborate with local healthcare facilities and MoH to advocate for improvements to existing cooling and ventilation. Develop contingency plans to adjust outreach schedules or clinic hours during extreme heat events to minimise exposure and ensure safety.

- Outreach and Community Engagement: Schedule outreach activities during periods of minimal climate disruption, avoiding peak seasons for storms and rough seas. Further explore the use of data insights, including weather patterns and historical attendance records, to optimise the planning of outreach activities. Implement a flexible schedule that can be adjusted and provide staff with short-term weather forecasts and early warning systems for adverse conditions. Collaborate with other health providers and government organisations to strengthen community resilience and improve access to eye care services during adverse conditions.

To ensure the resilience of the REC and its operations, it is recommended that The Foundation implement a phased adaptation strategy. This should prioritise current risks with immediate actions and incorporate long-term infrastructure and operational adjustments based on evolving climate projections. Collaboration with local stakeholders, including government bodies and community organisations, is needed to support these efforts and ensure that the health services provided by the REC continue to operate effectively against future climate challenges.

2 Project overview

2.1 Project context

The Foundation is a non-profit organisation dedicated to reducing avoidable blindness and vision impairment across the Pacific. Through the strengthening of Pacific-led eye health systems and advocating for equitable access to high-quality, affordable eye care, The Foundation's mission supports some of the most climate-vulnerable communities.

With a strong commitment to environmental sustainability, The Foundation has worked with partners to strengthen climate resilience in the design of facilities. The Regional Eye Centre (Solomon Islands) operates on solar power, rainwater harvesting, and an independent sewerage system. The Centre acts as an exemplar of what can be achieved through mitigation and adaptation measures in the face of a changing climate. Other notable facilities include the Vanuatu National Eye Centre, which was upgraded in 2018 with solar power, low-carbon building materials, and cyclone- and earthquake-proofing, as well as the solar-powered Madang Eye Clinic in Papua New Guinea (PNG) in 2023. These developments underscore The Foundation's forward-thinking approach to integrating climate-proofing within infrastructure and operations.

In February 2024, The Foundation secured funding through the New Zealand Ministry of Foreign Affairs and Trade's (MFAT) Climate Finance for Community Resilience Programme to further its climate adaptation work. This funding supports the "Building Community-Level Climate Resilience in the Pacific" (BCCR) Project, which seeks to enhance the resilience of health care facilities and surrounding communities to climate change impacts.

As part of this initiative, The Foundation has partnered with Edge Impact to perform Climate Impact Assessments (CIA) at three Foundation-supported eye clinics in PNG, Solomon Islands, and Vanuatu. These assessments aim to identify climate risks, evaluate on-site mitigation measures, and link these interventions to health and community resilience outcomes. The findings will inform tailored adaptation strategies and be shared with key health and climate stakeholders through a Knowledge Share session, ensuring widespread dissemination and engagement with the results.

2.2 Introduction

This technical report presents the findings of the Climate Impact Assessment for the Regional Eye Centre (REC) in the Solomon Islands, located in Honiara, the capital city on the island of Guadalcanal. The Solomon Islands face considerable climate-related challenges, including rising sea levels, more frequent extreme weather events, and intensifying rainfall patterns, all of which pose risks to critical infrastructure like the REC and its operations.

In this report, we first outline the methodology used to assess the site's climate risks and resilience measures. Next, we provide an overview of the broader climate context for the Solomon Islands, followed by an in-depth analysis of our key findings. Finally, the report offers a series of recommendations aimed at strengthening the resilience of the Regional Eye Centre and the community it serves.

2.2.1 Objectives

- Understand the exposure and vulnerability of the Regional Eye Centre (REC) to the impacts of climate change.
- Assess climate risks at the REC to develop a high-level understanding of how these risks may affect its operations.
- Evaluate the REC and its operations in alignment with World Health Organization (WHO) guidance for climate-resilient and environmentally sustainable healthcare facilities, where applicable.
- Analyse the connections between community health outcomes and climate risk mitigation initiatives.
- Develop a suite of recommendations, including adaptation measures, to enhance the climate resilience of the REC and its operations to improve community outcomes.
- Identify key learning points to be shared with stakeholders in future workshops, contributing to the BCCR Project's objectives.
- Ensure that the communication of findings is aligned with the broader objectives of The Foundation within the BCCR Project.

2.3 Site details and location

The Regional Eye Centre (REC) is situated at the National Referral Hospital in Honiara, Solomon Islands (Figure 1). This facility, commissioned in December 2015, is a key healthcare asset dedicated to providing specialized eye care services. The REC has a gross floor area of 980 square meters and features a concrete and timber pile foundation, timber wall and roof framing, aluminium window systems with louvres, plasterboard linings, long-run metal cladding, and long-run metal roofing. The design of the building incorporates essential elements suited for its medical purpose while reflecting local architectural practices.

Honiara, the capital of the Solomon Islands, is located on the northern coast of Guadalcanal Island and is the country's largest city. The Solomon Islands' climate is tropical, characterized by a wet season from November to April and a dry season from May to October. The REC's construction reflects considerations for local environmental conditions, with its climate-proofing measures likely aligned with the region’s climatic challenges. The REC's position within the National Referral Hospital underscores its critical role in providing advanced eye care services to the local population and surrounding areas.

Figure 1 REC location within the National Referral Hospital (NRH).

2.4 Methodology

Edge Impact employed an adapted risk-based methodology for this climate impact assessment, drawing on its extensive experience with traditional risk-based approaches. This method aligns with the Australian Standard 5334-2013: Climate Change Adaptation for Settlements and Infrastructure and utilises the *WHO guidance for climate resilient and environmentally sustainable health care facilities.* The approach aims to assess climate resilience and environmental sustainability while also capturing social and community outcomes.

The risk and adaptation assessment included the three key tasks outlined below (summarised in Figure 2).

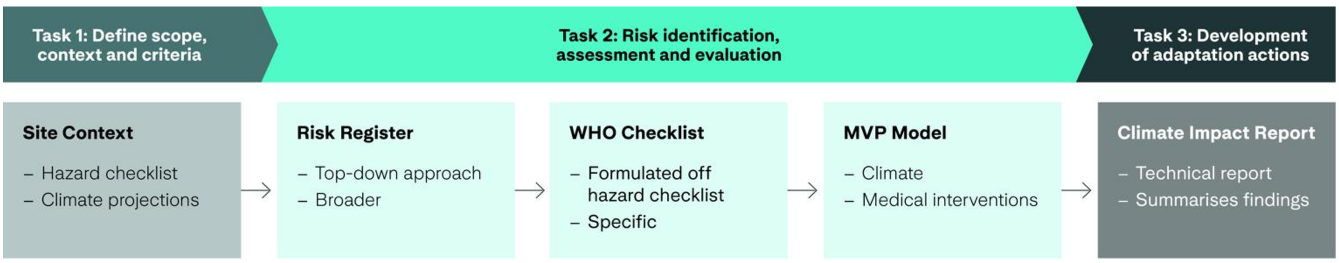

Figure 2 Summary of project approach (adapted from ISO31000:2018).

2.4.1 Task 1 - Define scope, context and criteria

Location-specific climate projections were gathered employing the RCP 8.5 high emissions scenario. This was combined with a review of documentation provided by The Foundation to inform a preliminary risk assessment aligning to The Foundation Risk Management Policy (refer to Appendix A). Preliminary risks were based on a review of key themes identified through an assessment of the *WHO guidance for climate resilient and environmentally sustainable health care facilities*.

2.4.2 Task 2 - Risk identification, assessment and evaluation

From August 18th to August 23rd, 2024, Matthew Peck from Edge Impact conducted a series of stakeholder meetings to identify and evaluate risks related to local climate hazards and their impacts on healthcare facilities. The sessions commenced with an introduction to the project and were tailored based on the stakeholders' understanding of climate and community health outcomes. Risk identification and assessment were customized for each meeting to ensure comprehensive coverage of the key themes identified in Task 1. A climate lens was applied throughout the discussions to capture key insights and potential changes under future climate scenarios. A list of all stakeholders engaged is presented in Appendix B. (Table 5). Following the site assessment, identified risks were evaluated across specified timeframes (2040-2050 and 2070-2090), in alignment with available projection data for the Western Pacific. Additionally, climate hazards returning the highest associated risk ratings were assessed against medical intervention data collected during the site assessment to evaluate the impact of climate on the work conducted by The Foundation across the Solomon Islands. This assessment, referred to as the 'MVP Model' in this report, involved modelling clinic and outreach performance data to identify instances where climate impacts likely reduced performance. Performance data included visits, consultations, doctor screenings, total referrals, and spectacles dispensed.

2.4.3 Task 3 – Development of adaptation actions

A combination of identified risks captured through the risk register and the WHO checklist, and modelled data, were used to identify high priority risk areas that require adaptation actions. Adaptation actions included both design and operational initiatives that aimed to reduce either the likelihood or consequence of risks.

The outcomes of the above tasks were reviewed and incorporated into an assessment tool. The key findings are summarised in this report.

3 Climate change summary: Solomon Islands

3.1 Historic climate

To establish a comprehensive understanding of climate change impacts in the Solomon Islands, it is essential to examine projected climate data alongside shifting trends under a changing climate. This assessment focuses on primary climate elements, including temperature trends, rainfall patterns, and sea-level rise, as well as secondary effects such as relative humidity, flooding, wind patterns, and heatwaves. These elements are categorized to align with *WHO guidance for climate-resilient and environmentally sustainable healthcare facilities*, ensuring that the project objectives are met.

Extreme climate phenomena relevant to this study are detailed in Table 1. Historical climate information was sourced from regional climate databases, including the Pacific Climate Change Data Portal and the *NextGen' Projections for the Western Tropical Pacific: Current and Future Climate for Solomon Islands Technical Report*. This data provides essential insights into past weather events and their potential implications for the REC facility.

Table 1 Key extreme climate phenomena and related risks.

Hazard	Description and potential impacts
Extreme Heat	Hot days and heatwaves in the Western Pacific describe periods of unusually high temperatures that exceed normal seasonal averages. They pose risks to health, agriculture, and infrastructure, and can be intensified by climate change. These events increase the frequency and severity of extreme heat conditions.
Precipitation changes	Changes in rainfall patterns in the Western Pacific refer to shifts in precipitation amounts and distribution over time. These changes can lead to water scarcity, affect agriculture, and disrupt ecosystems, potentially exacerbated by climate change.
Floods	Floods in the Western Pacific are instances of excessive water overflow, often caused by heavy rainfall or river overflow. They can lead to widespread damage, affecting infrastructure, agriculture, and communities. For this assessment, they include the following types: riverine, coastal, and flash, as well as the secondary hazards they contribute to, such as mudslides and erosion.
Storms	Storms in the Western Pacific are severe weather events characterized by strong winds, heavy rainfall, lightning, storm surges and potential flooding. They include tropical cyclones and other intense systems that can cause widespread damage to infrastructure, ecosystems, and communities.
Sea-Level Rise	Sea level rise in the Western Pacific refers to the increase in average ocean levels due to global warming. It threatens low-lying islands and coastal areas with flooding, erosion, and saltwater intrusion. Regional factors can exacerbate these impacts, affecting ecosystems and communities.

Note: Earthquakes, volcanic activity and tsunamis are not covered by this assessment. Although the assessment may be applied to these hazard types, they were not considered for assessment as they did not fit within framework of assessing for climate risk.

3.2 Future climate

3.2.1 'NextGen' Climate Projections

Table 2 below summarises the key projected climate changes under the Representative Concentration Scenario (RCP) 8.5, which represents a high greenhouse gas emissions climate change future (IPCC 2021). The climate projections are based on 'NextGen' projections for the Western Tropical Pacific and looks specifically at current and future climate for the Solomon Islands using the CMIP5 model.

Table 2 Summary of key climate changes projected for the Solomon Islands.

Climate Impact Description		Data					
Icon	Description	Historic	Baseline period (years)	Current (2030)	2040-2050	2070-2090	Trend Summary
	Increased average temperatures	25.9 °C	1991-2020	+0.6	+1.3	+2.1	Projected to increase.
	Increase in daily maximum temperature (Summer)	30.2 °C	1991-2020	+1.5	+2.5	+4	Projected to increase.
	Increased maximum duration and temperature of heatwaves	NA	1986-2005	More heatwaves	More heatwaves	Many more heatwaves	Projected to increase.
	Increase in frequency of very hot days (above 35°C)	NA	NA	More very hot days	More very hot days	More very hot days	Projected to increase.
	More frequent and severe droughts (rainfall average months below 10th percentile)	NA	NA	NA	NA	NA	No projections were found to show drought in future.
	Reduced average annual rainfall	3,000 to 5,000 mm/yr	1986-2005	-2 to +9	-3 to +9	-3 to +14	High variability, projected to increase
	Increased annual rainfall, days of heavier rainfall intensity and potential resultant flooding	NA	NA	Heavier rainfall events	Heavier rainfall events	Much heavier rainfall events	Projected to increase.
	Sea level rise	0 m	1986-2005	+0.13	+0.27	+0.73	Projected to increase.
	Increased intensity of storm events, tropical cyclones, and lightning	200 km/hr cyclone winds	NA	Greater tropical cyclone impacts	Greater tropical cyclone impacts	Greater tropical cyclone impacts	Projected to increase.
	Cumulative climate change impacts	NA. Not data available from NextGen					Projected to increase. As other hazards are projected to increase, cumulative ones are likely to increase

*Climate projections data was sourced from the *'NextGen' Projections for the Western Tropical Pacific: Current and Future Climate for Solomon Islands Technical Report*. Historic climate data was sourced from the *Solomon Islands Climate in Brief*.

3.2.2 AR6 update

The Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (AR6), published in 2021, provides significant updates to the climate projections presented in the Fifth Assessment Report (AR5) from 2014 during the build of the REC. For the Solomon Islands, AR6 highlights several key changes and intensifications in climate impacts.

AR6 forecasts more pronounced warming trends, increased variability in precipitation, and accelerated sea-level rise compared to AR5. This translates into a higher risk of severe flooding, coastal erosion, and intensified extreme weather events, including tropical cyclones. Considering these intensified impacts, AR6 emphasises the urgent need for localised adaptation measures. It advocates for integrating traditional knowledge into climate resilience planning and stresses the importance of robust global and local mitigation efforts to address the escalating challenges faced by the Solomon Islands.

4 Key findings & recommendations

This section summarises the key findings of the climate impact assessment of the REC and its operations.

4.1 Climate Resilience and Capacity-Building Initiatives

This subsection analyses the resilience and sustainability measures in place at the REC with clinic and outreach performance metrics (visits, consultations, screenings, and surgeries).

The resilience and sustainability measures implemented at the REC have significantly improved operational continuity, patient care, and cost efficiency. Key measures include:

- Solar PV and Hot Water Panels: The solar PV system reduces reliance on both grid power and diesel generators, providing a stable power source amidst frequent outages in the Solomon Islands (approximately 949 hours annually). Solar hot water panels further reduce electricity demand for heating, enhancing reliability and lowering operational costs. The Net Present Value (NPV) of electricity cost savings from solar PV installations between 2015 and 2040, discounted at 5%, is estimated at $619,777 USD. Calculations for the NPV of electricity cost savings are provided in Appendix D.
    - The REC operates for approximately 8 hours a day, 5 days a week at the REC (in clinic). This equates to 230 hours of exposure to power supply issues without the Solar PV and hot water panels in place. 230 hours is the equivalent of 28.75 full, 8-hour business days. The REC over the 31 months to July 2024, was able to see 21,148 patients in clinic, 682/month, 157/week or 4/operating hour. Thus, 230 hours multiplied by 4 patients/operating hour means 920 additional medical interventions for community members of the Solomon Islands attending the REC in Honiara per calendar year.[1]
- Natural Ventilation and Adjustable Flaps: Passive ventilation, achieved through louvred walls, adjustable flaps, and cross-ventilating roof design, minimises air conditioning needs. This approach optimises energy use, lowers maintenance costs, and maintains suitable conditions for patients and staff during high temperatures without relying on mechanical cooling.
- Insulated Roofing and Exterior Shading: Light-coloured insulated roofing and exterior shading reduce internal heat gain, decreasing cooling demands and electricity costs. This design is particularly beneficial given the high and variable electricity costs in the region.
- The REC's design incorporates protective measures against significant climate risks, including flooding, storm surge, cyclones, and inundation. The entire facility is elevated, with the main building raised 600mm above ground level and external infrastructure components on platforms currently 300mm above ground. Recommendations have been made to raise external infrastructure to match the height of the main building for additional resilience. Nevertheless, the overall structure is well-equipped to withstand these climate hazards as they currently exist. An essential feature of the REC's design is its relocation ability, a crucial consideration given climate projection data for Honiara. This aligns with the *Solomon Islands' Health Strategic Plan (2022–2031)*, which includes relocating the National Referral Hospital by 2040 to reduce the impact of extreme climate events on health facilities in the area.
- Rainwater Collection: Rainwater harvesting using storage tanks offers a sustainable and efficient solution, reducing dependence on municipal water supplies and enhancing both water security and cost efficiency. Rainwater is naturally softer than the municipal water supplied by Solomon Water, which is 60% spring water and 40% bore water, most of which comes from the Tuvaruhu source. The softness of the water also improves the efficiency of filtration processes, leading to reduced costs in maintenance and repair. By relying solely on rainwater for the Regional Eye Centre (REC), this approach significantly lowers the risk of contamination. Previously, water from alternative sources, including bore water around the NRH, has faced contamination issues, such as E. coli, compromising clean water availability. The rainwater system at the REC addresses these concerns directly, providing a safer, more consistent, and operationally efficient water supply.
- The REC employs advanced waste storage protocols to ensure the safety of both staff and patients, minimising exposure to medical and general waste. Staff follow detailed policies to store waste securely in designated areas at

[1] Statistical assumptions were made in this analysis. Specifically, it was assumed that collecting a representative sample of 40 hours per week (8 hours per day over 5 days) may not fully reflect the actual timing of historical power outages. Unfortunately, historic data on outage timing was not available from Solomon Power.

the rear of the REC. Upon collection, government contractors manage the waste, with medical waste incinerated twice daily via a diesel-burning process before disposal at the Ranadi Landfill site, managed by Honiara City Council, which also serves as the final disposal location for general waste securely collected from the REC. These rigorous waste storage and removal procedures have received high marks against the *WHO Guidance for Climate-Resilient and Environmentally Sustainable Health Care Facilities*, highlighting the REC's commitment to safe and sustainable waste management practices.

Using the National Referral Hospital (NRH) as a baseline, the REC's sustainability measures provide a more stable and cost-effective alternative. In contrast to the REC, NRH depends on Solomon Power and a diesel generator with manual activation during outages (functioning about 95% of the time). Water supply relies on Solomon Water, with limited rainwater supplementation, and the standby borehole is used for storage only due to E. Coli contamination. Waste management involves high diesel consumption for incineration, and the sewage system discharges directly into the sea, posing health and environmental risks.

Overall, the resilience strategies implemented at the REC promote long-term cost savings, operational stability, and environmental objectives, effectively addressing the challenges presented by the local climate and energy conditions. To further assess the impact of these resilience measures on performance metrics, it is recommended to further explore the use of a baseline model for the REC.

4.2 Climate Change Risk Assessment

Priority areas have been developed that focus on key risks (including both high risks), their current controls and proposed intervention actions in relation to specific climate change impacts. Proposed adaptation actions aimed to reduce the residual risk rating and were developed in consultation and should be reviewed for feasibility by both The Foundation team as well as the on-ground The Foundation team and REC staff where appropriate.

The risk assessment process identified a total of 29 risks for the site. Risks were formulated from the WHO checklist, utilising a broader approach to identify the impact area. Risks were identified across a range of asset and operational components relating to different climate variables. Identified risks returning ratings of Very High (25) for future time horizons are included in this Climate Impact Report and are summarised in the Table 3. A risk summary for each climate impact area is outlined in the subsections below.

4.2.1 The impacts of heat

Overall, extreme heat was found to have impacts on the health workforce, patients and community members more so than the REC and its physical structure. Although trends show increases in average temperature, high temperatures are currently experienced at the REC and across the jurisdiction of the operation of the REC within the Solomon Islands. The facility is designed to cope with increases in average temperature. It is recommended physical infrastructure continues to be maintained to a high standard to ensure it can function with increasing temperatures. It is recommended thresholds are built into Standard Operating Procedures (SOPs) by The Foundation, which trigger extreme heat protocols whereby the overall aim is to ensure minimal exposure to the heat threat. Although the REC operates as a stand-alone facility, it is well integrated with the NRH and its systems, including shared resources such as medical labs, radiology, wards, and the operating theatre. Therefore, it is recommended that protocols developed for climate resilience and operations are aligned with NRH procedures while ensuring they are tailored to the specific needs and functions of the REC workforce. This will ensure seamless execution by staff, while maintaining integration with the broader NRH health system.

4.2.2 The impacts of flooding

Flooding has been identified as a major threat to the REC and its operations, with all seven assessed areas projected to face significant risks between 2040 and 2050. These areas consistently returned high consequence ratings, primarily due to the site's location, which exacerbates flood risk. Although the REC is designed to withstand flooding and can be relocated, if necessary, the potential disruption to its operations remains a concern. The entire REC is raised to 60cm above ground level. However, critical energy infrastructure is only raised to 30 cm above ground level, and water tanks remain at ground level. Key recommendations focus on elevating critical infrastructure to at least floor level (60cm above ground level) to reduce the impact of flooding and minimise operational downtime during flood events.

4.2.3 The impacts of sea level rise

Sea level rise poses similar threats to the REC and its operations as flooding, particularly in relation to infrastructure and operational continuity. Four of the five assessed areas were rated above significant, highlighting the serious consequences of potential inundation at the site. While flooding presents more immediate risks, sea level rise is classified as a chronic, long-term concern, with projections showing at least a 27 cm increase above the baseline (69 cm) by 2050. Recommendations are in line with those outlined in Section 4.1.2, emphasising the need to enhance infrastructure resilience to address these risks.

4.2.4 The impacts of storms

Storms and storm-related weather also returned significant risk ratings across all four assessed impact areas for the period 2040-2050. At present, the consequences of storm activity on the REC are relatively low, thanks to its robust design and engineering. However, a key operational challenge arises from high winds during storms, which limit the ability to conduct outreach clinics. Key recommendations focus on strengthening planning and procedures, ensuring that all staff have a comprehensive understanding of protocols to maintain operational continuity during such events.

4.2.5 Cumulative climate change impacts

Cumulative climate change impacts refer to hazards arising from the interaction of two or more climate-related factors. A total of 10 such impacts were identified during the assessment, including risks related to climate health, governance, government response to climate change, inundation, overcast conditions, and general climate-driven asset deterioration. The risk ratings varied significantly, with adverse sea conditions emerging as one of the highest risks to the REC's operational capacity. Proposed interventions were both specific and varied, requiring diverse strategies to enhance the resilience of the REC and its operations.

Table 3: Summary of sources of Very High risk to the REC and its operations. RR – risk rating.

Climate Change Impact	Risk Description	The Foundation Risk	WHO Intervention Sector	The Foundation Impacts	RR Current	RR 2050	RR 2090	Baseline Controls	Proposed Intervention
Flood	Building foundations and structural elements damaged due to prolonged water exposure.	Health and Safety	Infrastructure, technology and products interventions	Prolonged exposure to water may damage the building, leading to unsafe conditions and potential closure.	18 Significant	25 Very High	25 Very High	Regular checks on infrastructure at site are conducted by The Foundation team. Additionally, specialist assessment is conducted on critical building elements: - Gen set monthly inspection & maintenance (contractor). - Sewer system inspection monthly (internally), cleaned and emptied quarterly (contractor). - Water system inspection & maintenance quarterly (contractor).	Follow-up with REC staff to understand protocol of assessing stumps and structural elements for degradation. Engage an engineering assessor on a regular basis (consult with Bossley Architects to see how often this should be done). 70,000L bladder tank is leaning after two earthquakes. At next inspection and maintenance check, ask the contractor to investigate possible solutions to fix this issue (Appendix C. - Figure 6).
Flood	Electrical components damage and power outages due to flooding and water exposure.	Fiduciary / Health & Safety	Energy	Power outages from flooding could halt surgeries and critical operations.	22 High	25 Very High	25 Very High	Electrical components are raised above ground level: - Batteries = 29cm - Generator (Kohler DEC1000) & fuel = 32.5cm - Extra fuel = 14.5cm - Invertors & control panel (internal) = >60cm Electrical components are inspected and maintained quarterly by an external contractor.	Look to raise level of batteries, gen set, fuel and water pump higher than current level – with laundry room advised as being an option with easy maintenance access (Appendix C. - Figure 7). Install cheap elevation platform to raise level to at least 60cm above ground level or in-line with future SLR projections/flood modelling data where available. Work with the climate division within the SIG to understand where these levels are for the REC site.
Cumulative Climate Change Impacts (inundation)	Patient and staff vulnerability resulting from failures in execution of planning and procedures during inundation events.	Health and Safety	Health Workforce Interventions	Physical threat to staff, patients and community members resulting from poorly executed emergency/disaster management plans/procedure. Damage to facility because of delayed or poor communication of key plans and procedures	21 High	21 High	25 Very High	Almost all communications relating to health-related contingency, emergency and disaster management plans are the direct responsibility of NRH as directed by the MoH. Notifications and directives are issued via mobile phones, papers, TV and government intranet and email server linked to all employees. Strong reliance on the NRH	Aim to develop hazard specific emergency/disaster management plans with the NRH. Ensure understanding of communication pathways is clear as well as role execution. Ensure REC staff are actively engaged in this process.

Climate Change Impact	Risk Description	The Foundation Risk	WHO Intervention Sector	The Foundation Impacts	RR Current	RR 2050	RR 2090	Baseline Controls	Proposed Intervention
				during inundation events.				directive, with staff at the REC unsure of what these actual plans and procedures encompass.	
Storm	Building's exterior, including roofs, walls, and windows damage, potentially leading to structural failure due to strong winds and severe storms	Health and Safety	Infrastructure, technology and products interventions	Severe damage could make the building unsafe, requiring repairs or closure.	19 Significant	22 High	25 Very High	The building is rated as cyclone proof. This is considered in the building design and construction (e.g. Colorsteel MAXX Styleline Roof Lining with Cyclone FixingS & Flashings). Note: Architectural documents only show cyclone resistant materials were used in the construction of the roof structures. Engineering knowledge of methods used in other building elements may be needed to determine extent of cyclone proofing. Design drawings confirm specific wind and earthquake loading requirements certified by NZ consulting engineers and was approved by Honiara Engineering Authority.	Conduct a pre-wet/cyclone season audit of the facility. Ensure every structural element is assessed and maintained up to documented standards.
Storm	Electrical components damage and power outages due to strong winds and severe storms	Reputational	Energy	Power outages caused by storms could halt surgeries and emergency care services.	18 Significant	21 High	25 Very High	Gen set is a Kohler DEC1000, this system has an internal 180L fuel tank which is supported by a direct fed 200L auxiliary tank. Consumption @ 100% capacity = 16L/h. Thus, at a 100% capacity the gen-set provides 11.25 hours using the internal tank, plus an additional 12.5 through the direct fed auxiliary tank with an additional 200L of fuel stored on-site. Totalling a capacity of 36.25 hours under 100% load	Introduce training sessions alongside health and safety briefings to ensure more REC staff are aware of key system functionality. Prepare contingency plans for these systems - i.e. outline roles and responsibilities.

Climate Change Impact	Risk Description	The Foundation Risk	WHO Intervention Sector	The Foundation Impacts	RR Current	RR 2050	RR 2090	Baseline Controls	Proposed Intervention
								(approximately 4.5 days of back-up power generation).	
Cumulative Climate Change Impacts	Increased frequency and intensity of adverse sea conditions.	Clinical	Infrastructure, technology and products interventions	Inability to conduct outreach clinics due to accessibility issues for both The Foundation / MoH staff to attend and for community members to attend outreach clinics. Reduction in attendance numbers of scheduled outreach appointments.	24 High	25 Very High	25 Very High	Aim is to attend each of the 9 outer provinces each calendar year. Visitations are condensed during late Autumn, Winter, and early Spring (April to October). The Foundation staff coordinate with the provincial health service providers to ensure outreach clinics are as effective and efficient as possible. Currently there are 8 out of 9 provinces where a nurse is trained by The Foundation/MoH to conduct base assessments for eye health.	Investigate coordination opportunities with other third-party health providers / NGOs. Engage NDMO and the Climate Division of The Ministry of Environment, Climate Change, Disaster Management and Meteorology (MECDM).

4.3 WHO Checklist

This section provides a summary of the results of the modified WHO checklist (Table 4). The low, medium, or high represent the level of completion or integration of each intervention. Low indicates limited progress or lack of data. Medium represents partial implementation or ongoing efforts. High denotes full integration and successful completion of interventions. Approximately 30% of the assessed interventions were marked as high, completed or achieved. About one quarter of the interventions returned scores classified as low, unavailable or unable. This was mainly the result of poor integration into documentation as well as the unique governance structure of the REC within the NRH and broader SIG relating to the impacts of climate change and environmentally sustainable health facilities. The findings are summarised below across the four key intervention sectors as defined by the WHO.

Table 4: Summary of WHO checklist results, low indicating limited progress or lack of data, medium indicating partial implementation or ongoing efforts, and high indicating full integration and successful completion of interventions.

Intervention Sector	Description	Low, unavailable, unable	Medium, in progress, incomplete	High, completed, achieved	TOTALS
Health workforce interventions	Training, capacity building, and management of health staff to ensure they are prepared for climate-related impacts and can maintain healthcare services.	11	11	5	**27**
Water, sanitation and health care waste interventions	Management of water resources, sanitation, and healthcare waste systems to maintain hygiene and operational continuity during climate events.	8	9	11	**28**
Energy	Ensuring a reliable and sustainable energy supply to support healthcare operations, including backup power and energy efficiency measures.	1	4	10	**15**
Infrastructure, technology and products interventions	Physical infrastructure, technology systems, and healthcare products necessary for resilient healthcare service delivery, including building integrity and technological tools.	14	28	15	**57**
TOTALS		**34**	**52**	**41**	<u>127</u>

4.3.1 Health workforce interventions

Assessment against the WHO checklist identified areas for growth around management of the health workforce (5 of 27 checklist items were marked as high, completed, achieved - Table 4). Although the workforce is well trained in understanding how medical operation may be impacted by chronic and acute climate change, their understanding of how to execute these plans is left to a select few. It was evident that contingency planning in this space would be highly beneficial to ensure breadth of understanding. Additionally, enhanced personal development is managed by the MoH, meaning the breadth of the workforces understanding beyond their acquired skillset is lacking. There is a clear opportunity within the REC to discuss this with individual team members to coordinate PD to ensure the diversity of knowledge across climate threats is enhanced. This would likely transcend beyond the REC, enhancing broader community resilience to health-related climate impacts.

Recommendations

- Coordinate MoH staff PD to ensure breadth of additional learning across multiple other areas (e.g. climate and public health relationship, community engagement, etc.).
- Conduct information sessions on key operational systems function. Ensure understanding of these elements is engrained across workforce.

4.3.2 Water, sanitation and health care waste interventions

The REC has various management systems in place for water, sanitation, and health care waste. As a result, only 8 of 28 total assessment items classified in this section were deemed low, unavailable, unable (Table 4). Improvements can be made by understanding how certain hazards such as storms, flood, and sea level rise (SLR) may impact water and waste systems directly. Hazard management plans are executed by the NRH, and the level of understanding of involvement from a REC perspective is minimal. Additionally, assumptions are made that sanitation equipment is functional. For example, water quality testing is currently not conducted. Opportunities exist here to make small, inexpensive adjustments to enhance acute climate hazard preparedness and resilience, as well as ensure sanitation and waste management systems are functional during such events.

Recommendations

- Investigate the need for replacement of UV filter for water quality treatment.
- Invest in water quality testing kit to ensure filtration system is functioning, particularly during a hazard/event.
- Investigate process of NMS during a hazard/event. Ensure waste management plan is in place.

4.3.3 Energy

The energy system at the REC recorded very high scores when assessed against the WHO checklist for climate resilience and environmentally sustainability (Table 4). Overall, the system is climate resilient, however aspects of the system are at threat from SLR and flooding especially. Additionally, micro-blackouts occur regularly (multiple times/week) resulting from extended periods of overcast weather. The backup generator on-site, as well as the stored fuel, ensures there are never any issues with power supply.

Recommendations

- Investigate how the batteries and if possible, the generator can be lifted an additional 30cm above their current levels, so they are approximately 60cm above ground level, matching the floor level of the REC.
    - This is to increase the energy system's resilience against flooding, storm surge and SLR.
- Train additional staff in how the energy system is managed, monitored and maintained to ensure contingency is in place in the event of staff unavailability.
- Investigate energy system(s) at the provincial level. Understand their limitations to chronic and acute climate hazards and how this would impact operation function during outreach clinics.

4.3.4 Infrastructure, technology and products interventions

Approximately half of the assessed interventions within this sector were marked as medium, in progress or incomplete. A large factor here being the specific nature of the WHO checklist. From an infrastructure perspective, it was evident the facility and its operations are broadly climate resilient and environmentally sustainable, returning the majority of the 15 high scores (Table 4). Integration of technological elements could be improved, particularly relating to patient records. Once online, information is secure with servers located in multiple countries. However, accessibility to stored information is limited and translation of technical infrastructure information to the workforce is poor.

Recommendations

- Investigate infrastructure at the provincial level. Understand their limitations to chronic and acute climate hazards and how this would impact operation function during outreach clinics.
- Ensure accurate upkeep of maintenance records to key infrastructure elements.
- Investigate whether an increase in access and understanding to infrastructure and key operational elements is needed for contingency planning purposes.
- Invest in training of staff at REC to reduce reliance on external contractors for equipment assessment and upkeep where possible.

4.4 Modelling of Climate Change Impacts on REC and Outreach Clinics

In the model below, the performance metrics were referred to as "encounters". The analysis focused on correlating clinic and outreach performance metrics (total visits, consultations, screenings, surgeries) with climate data to understand the impact of climate events on clinic and outreach performance. The analysis relied on seasonal trends, historic climate data, and notes from staff during the outreaches. The findings indicate that extreme climate events likely contributed to reduced patient attendance in a number of instances for both the clinic (Figure 3) and the outreaches (Figure 4). However, implemented control measures have contributed to improved performance metrics for the REC, with encounters increasing each year since 2022. The key findings are:

- Heavy rainfall and flooding likely impacted patient attendance and disrupted clinic operations, particularly during the Northwest monsoon season (January to March) and in transition months (December and April). Flooding likely caused road blockages and transportation disruptions, leading to lower patient turnout and cancellations of scheduled surgeries.
- Rough seas and strong winds likely affected inter-island travel, limiting access to outreach clinics in remote areas. The reduced patient numbers during outreach activities in provinces like Kirakira and Tulagi were directly linked to rough sea conditions.
- An increase in delays and logistical challenges during the outreach programs, especially during the Southeast trade wind season (May to October).
- While extreme heat likely did not directly affect attendance, it exacerbated operational challenges, such as equipment overheating, increased humidity and mould growth, and discomfort for patients and staff, particularly in the hotter months. These effects were worse during outreach activities, as the outreach locations typically lacked the air conditioning and ventilation systems available at the clinic.
- The implementation of control measures has improved performance metrics for the REC. This is evident during the Northwest monsoon season (January to March), where drops in encounters seen in February 2022, likely due to climate events, were not occurring in 2023 and 2024, indicating the effectiveness of these interventions.

Recommendations:

- Raise critical infrastructure to mitigate flooding risks and ensure continuity of operations.
- Plan outreach activities in periods of reduced climate impact, avoiding peak monsoon seasons.
- Enhance staff knowledge and preparedness for climate-related disruptions to minimise operational impacts.
- Coordinate with hospital or clinics to ensure outreaches have appropriate ventilation and cooling prior to the outreach occurring.

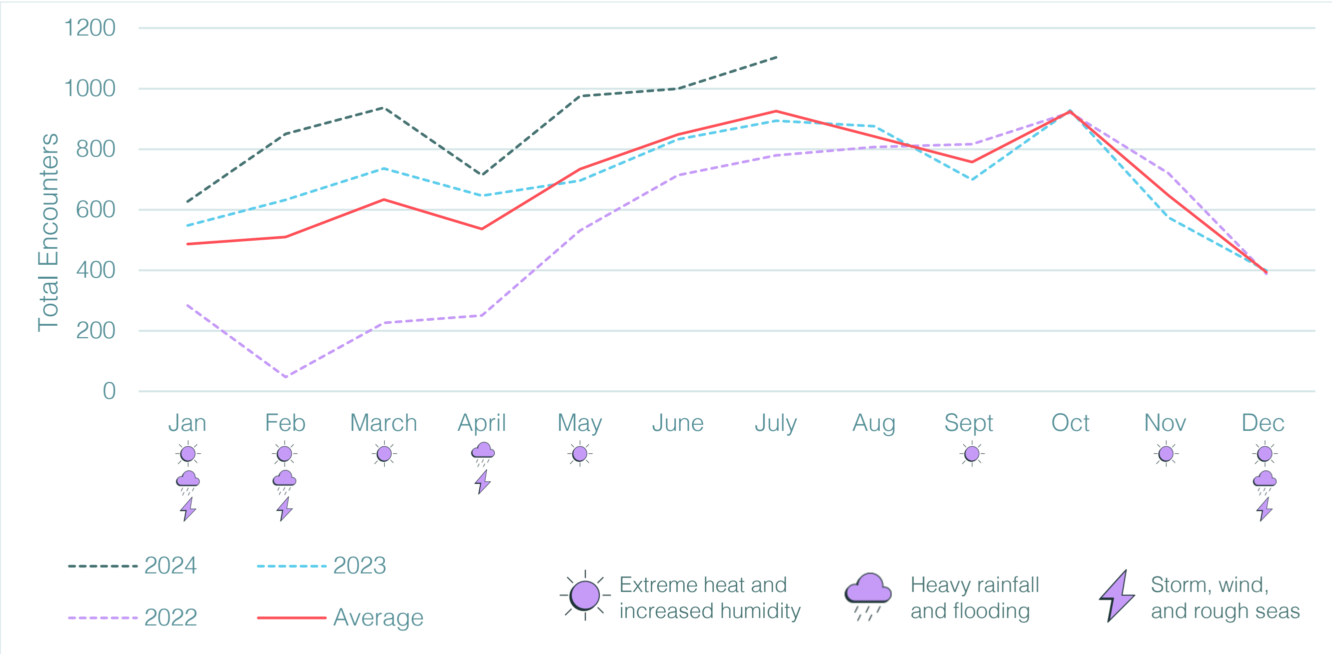

Figure 3 Total encounters and likely climate impacts for the Solomon Islands REC (The Foundation 2024).

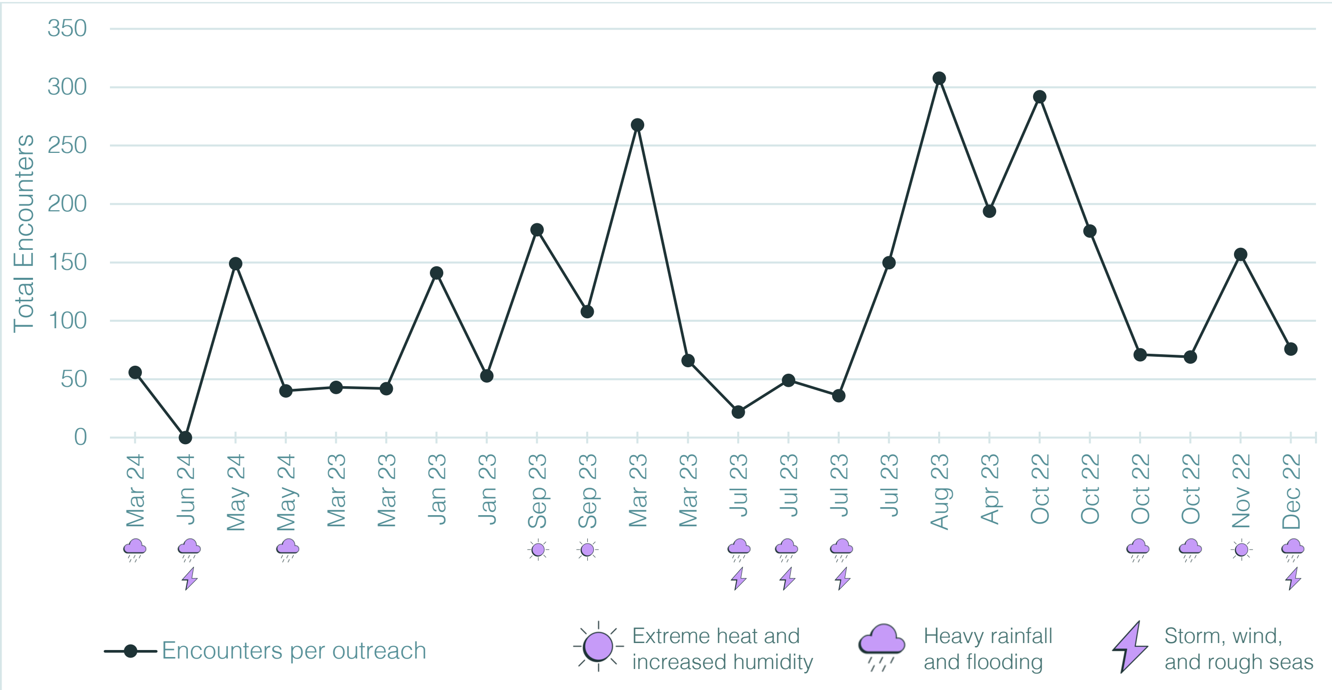

Figure 4 Total encounters and likely climate impacts for Solomon Islands outreaches (The Foundation 2024).

5 Conclusion

This assessment identified a range of significant climate-related risks to the REC site and its operations. It is recommended that these are carefully considered by The Foundation team in conjunction with the broader team at the REC and implemented where appropriate to build resilience to the impacts of climate change. The recommendations provided in the above section (4) relate to adaptation planning strategy, ongoing risk management, as well as addressing broader climate-related risk at the organisational level. This section provides a summary of recommendations as well as guidance on implementation. Further, key insights from the assessment are also described with all key recommendations displayed in Appendix E. Collated recommendations.

5.1 Adaptation implementation

Importantly, the risk ratings developed in this assessment are based on the prescribed climate scenario eventuating in both 2050 and 2090 timeframes and do not necessarily represent current risks. The adaptation actions identified for the very high risks above should be considered for implementation, with a focus on addressing the short-term, current risks as a priority. Importantly, the scale and timing of adaptation implementation requires careful consideration, remaining cognisant that risks have been identified for both current and future time periods.

It is important that the adaptation action hierarchy (refer to Figure 5 below) is considered, recognising that engineering and infrastructure investments to mitigate climate risks may usefully be preceded, in the short term, by management approaches including updated communications and operational guidelines. Importantly, the optimal scale and timing of adaptation measures should also be considered, noting that actions should only be implemented once defined triggers or thresholds are reached. This approach, termed Adaptation Pathways, facilitates a more strategic and cost-effective approach that responds to issues once they become material.

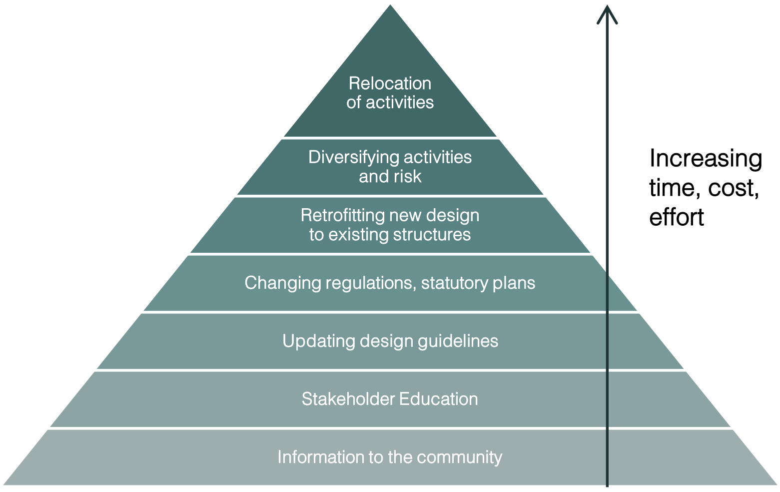

Figure 5: Adaptation planning hierarchy.

5.2 Ongoing climate risk management

The risks identified in this assessment should be included as a climate change specific annexure to the existing risk management framework for the REC to ensure that risks can be monitored and reviewed as the impacts of climate change unfold. It is suggested that climate risks are reviewed on an annual basis by The Foundation team both on-ground and based in NZ to identify any changes in the climate risk profile.

5.3 Key insights and broader community implications

The recommendations presented in Section 4 above address specific climate risks identified through the assessment and align with the *WHO guidelines for climate-resilient and environmentally sustainable healthcare facilities*. The following summary highlights key insights from the risk assessment, WHO checklist, and MVP model, offering a consolidated overview of critical findings.

Recommendation: Strengthen integration and understanding of climate risk planning documentation

- There is a general lack of integration and understanding of key planning documents (e.g., contingency, emergency, and disaster plans) related to mitigating climate risks at the REC. Currently, these documents are primarily developed, updated, and managed by the NRH, with knowledge often concentrated among a few key staff members. While this centralisation can streamline communication, it leaves the REC vulnerable if those staff are unavailable. Additionally, there is a strong dependency on the NRH for these processes. It is recommended that the REC take a more active role in both the continuous improvement and execution of these plans, to enhance resilience and reduce reliance on the NRH. For instance, implementing a comprehensive business continuity document could serve as a unifying framework, aligning these individual plans and ensuring that critical knowledge and procedures are accessible across the REC.

Recommendation: Enhance future climate resilience of the REC

- While the REC is currently resilient to climate change impacts, projections indicate that future climate scenarios will lead to increased risks across all assessed areas. The greatest emerging threats are related to flooding and sea level rise, particularly in relation to infrastructure and energy systems. At present, the most significant operational disruptions are due to cumulative climate impacts, such as overcast weather, but existing systems and protocols have been effective in managing these conditions. To safeguard future resilience, it is critical to proactively strengthen infrastructure and adapt protocols to address the projected increases in climate-related risks.

Recommendation: Enhance community impact through collaboration for outreach clinics

- Opportunities exist to enhance community impact by integrating with other organisations during outreach clinics. Climate shifts are reducing the seasonal window for these clinics, making it imperative to coordinate efforts with partners. Such collaboration can ensure that community members in outer provincial areas not only receive improved health outcomes but also gain a better understanding of how climate and weather changes may affect their health in both the near and distant future.

Recommendation: Continually look to strengthen relationship with SIG and Ministries to ensure continued coordination with NRH

- While there is clear coordination and integration among The Foundation, REC MoH staff, and NRH MoH staff, several stakeholders have expressed concerns regarding the reliability of consistent support from the SIG. Additionally, the pressure to transition to an "online" donor funding system for the REC has been highlighted by various government stakeholders. This shift poses a potential risk in future scenarios, particularly if the Government or key stakeholders associated with the REC undergo significant changes. It is essential to strengthen these partnerships and ensure robust support mechanisms are in place to mitigate these risks.

Recommendation: Coordinate with hospital or clinics to ensure outreach centres have appropriate ventilation and cooling

- Revise outreach checklist criteria to ensure that theatres in outreach centres are equipped with appropriate ventilation systems to accommodate increasingly hotter days. Where necessary, install temporary cooling solutions like portable air conditioning units or fans to maintain a comfortable environment for staff and patients. Collaborate with local healthcare facilities to advocate for improvements to existing infrastructure. Develop contingency plans to adjust outreach schedules or clinic hours during extreme heat events to minimise exposure and ensure safety.

Recommendation: Ensure outreach scheduling aligns with periods of minimal climate disruption

- Plan outreach activities primarily during the dry season (May to October) when the risks of heavy rainfall, flooding, and rough seas are lower, ensuring better accessibility and higher patient turnout. Implement a flexible schedule that can be adjusted and provide staff with short-term weather forecasts and early warning systems for adverse conditions. Prioritise remote area visits during stable weather to maximise patient access and minimise disruptions from rough seas or storms. Collaborate with local communities and stakeholders to align outreach schedules with local climate and/or seasonal pattern knowledge and integrate climate forecasting tools into planning to avoid periods of anticipated severe weather, such as tropical cyclones or heatwaves. Further explore the use of data insights, including weather patterns and historical attendance records, to optimise the planning of outreach activities.

6 References

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Appendix A. Risk Management Framework

The Foundation Risk Management Framework and Overview of Incident Levels and Response

Risk Type	Substantive policy	Procedures	Committee
	Risk Management Policy Code of Conduct	Incident Management Procedures Country Security and Safety Protocols	Risk Management Committee
Risk Type	**Associated policies**	**Procedures**	**Committee**
Clinical	Clinical Governance Policy	Numerous Clinical procedures	Clinical Governance Committee
Fiduciary	Credit & Debit Card Policy Investment Policy Prevention of Wrongdoing and Terrorism Policy Reserves Policy Treasury Policy	Numerous Fiduciary procedures	
Health and Safety	Health & Safety Policy Whistleblower Policy	Health & Safety procedures	Health & Safety Committee
Information Security	Cyber Security Policy Privacy & Information Handling Policy		
Legal/Compliance	Child Safeguarding Policy		
Reputational	Content Gathering and Use Policy External Complaints Policy		
Security	Crisis Management Policy Travel Policy Vehicle Policy	Vehicle Inspection checklist	

The Foundation overall risk rating table

Risk Rating		Consequence				
		Negligible (1)	Minor (2)	Moderate (3)	Major (4)	Catastrophic (5)
Likelihood	Almost Certain (5)	11 Medium	16 Significant	20 High	23 High	25 Very High
	Likely (4)	7 Low	12 Medium	17 Significant	21 High	24 High
	Moderate (3)	4 Low	9 Medium	13 Medium	18 Significant	22 High
	Unlikely (2)	2 Low	5 low	10 Medium	14 Medium	19 Significant
	Rare (1)	1 Low	3 Low	6 Low	8 Low	15 Medium

Appendix B. Engaged Stakeholders

Table 5: Stakeholders engaged through assessment.

Stakeholders			
Person/s	Area / Position	Organisation	Date
Dr. John Szetu	REC - Director	FHF NZ	19/08/2024
Konio Szetu	Cinical Nurse Advisor / Senior OT Nurse	FHF NZ	19/08/2024
Dr. Mathew Bonie	REC - Doctor	FHF NZ / MoH	20/08/2024
Alison Sio	Public Health	Ministry of Health & Medical Services	20/08/2024
Rolly Viga	Public Health	Ministry of Health & Medical Services	20/08/2024
George Baragamu	Disaster Management	National Disaster Management Office	20/08/2024
Thompson Kwanafia	Infrastructure Assessment	Ministry of Health & Medical Services	20/08/2024
Philip Baura	Director of Architecture and Building Management Services	Ministry of Infrastructure Development	20/08/2024
Chris	Directors EA	Ministry of Infrastructure Development	20/08/2024
Layten Jacob	Procurement Manager	Ministry of Health & Medical Services	21/08/2024
OTHERS (x7)	Department leads	Ministry of Health & Medical Services	21/08/2024
Tanya Afu	Project Coordinator	SICAN	21/08/2024
Rodrick Holness	Executive Chair	SICAN	21/08/2024
Lorima Tuke	Project Director - Solkas	Save the Children	21/08/2024
Margaret Biliki	Project Coordinator	Save the Children	21/08/2024
Eunji Lee	Country Coordination Specialist	UN	22/08/2023
Gareth	Climate Justice Lead (Pacific)	Oxfam	22/08/2023
Lloris	Project Coordinator / Manager - Ko Tui program	Oxfam	22/08/2023
Winnifred (Winnie)	Internal Project Coordinator - PACSILI program	Oxfam	22/08/2023
Kathy	Project Lead - Ko Tui program	Oxfam	22/08/2023
John	Regulation - Technical Assessment	Solomon Power	22/08/2023
Josiah	Planning	Solomon Power	22/08/2023
Luca Fontana	Technical Lead	WHO	22/08/2023
Boniswa Dladla	Pacific Coordinator	WHO	22/08/2023
Dr. Carole Poloso	REC - HoD	REC	23/08/2024
	REC - Senior Nurse	REC	23/08/2024
	REC - Senior Nurse	REC	23/08/2024

Appendix C. Site photos

Figure 6: Water tanks located at the rear of the REC.

Figure 7: Battery storage, approximately 30cm above ground level.

Appendix D. Net Present Value (NPV) of cost savings from solar panels

The electricity data used actual data where available. For modelled data the average use in that month was used along with a degradation rate of 0.07% for solar panel efficiency.

The formula used to calculate the Discounted Cost Savings for each year was the Net Present Value (NPV) formula:

$$Discounted\ cost\ savings = \frac{Cost\ savings}{(1 + discount\ rate)^{(year - base\ year)}}$$

Total discounted cost savings (USD) = $619,777

	Year	Electricity Generated (kWh)	Cost Savings ($USD)	Discounted Cost Savings ($USD)
Actual Data	2015	34,245	23,698	23,698
	2016	73,502	50,863	48,441
	2017	68,231	47,216	42,826
	2018	57,125	39,530	34,148
	2019	70,152	48,545	39,938
	2020	54,141	37,466	29,355
	2021	51,719	35,789	26,707
	2022	55,234	38,222	27,164
	2023	62,152	43,009	29,110
	2024	32,040	22,172	14,292
Modelled Data	2025	64,577	44,687	27,434
	2026	64,532	44,656	26,109
	2027	64,486	44,625	24,849
	2028	64,441	44,593	23,649
	2029	64,396	44,562	22,507
	2030	64,351	44,531	21,420
	2031	64,305	44,499	20,386
	2032	64,260	44,468	19,401
	2033	64,215	44,437	18,464
	2034	64,170	44,405	17,573
	2035	64,124	44,374	16,724
	2036	64,079	44,343	15,917
	2037	64,034	44,311	15,148
	2038	63,989	44,280	14,416
	2039	63,943	44,249	13,720
	2040	31,233	21,613	6,383

Appendix E. Collated recommendations

	Section/Sub-Section Number	Section/Sub-Section Name	Recommendation
Sector / Intervention-specific recommendations	4.3.1	Health workforce interventions	Coordinate MoH staff PD to ensure breadth of additional learning across multiple other areas (e.g. climate and public health relationship, community engagement, etc.).
			Conduct information sessions on key operational systems function. Ensure understanding of these elements is engrained across workforce.
	4.3.2	Water, sanitation, healthcare waste interventions	Investigate the need for replacement of UV filter for water quality treatment.
			Invest in water quality testing kit to ensure filtration system is functioning, particularly during a hazard/event.
			Investigate process of NMS during a hazard/event. Ensure waste management plan is in place.
	4.3.3	Energy	Investigate how the batteries and if possible, the generator can be lifted an additional 30cm above their current levels, so they are approximately 60cm above ground level, matching the floor level of the REC. • This is to increase the energy system's resilience against flooding, storm surge and SLR.
			Train additional staff in how the energy system is managed, monitored and maintained to ensure contingency is in place in the event of staff unavailability.
			Investigate energy system(s) at the provincial level. Understand their limitations to chronic and acute climate hazards and how this would impact operation function during outreach clinics.
	4.3.4	Infrastructure, technology and products interventions	Investigate infrastructure at the provincial level. Understand their limitations to chronic and acute climate hazards and how this would impact operation function during outreach clinics.
			Ensure accurate upkeep of maintenance records to key infrastructure elements.
			Investigate whether an increase in access and understanding to infrastructure and key operational elements is needed for contingency planning purposes.
			Invest in training of staff at REC to reduce reliance on external contractors for equipment assessment and upkeep where possible.
Modelling Recommendations	4.4	Modelling of Climate Change Impacts on MPH Eye Clinic and Outreach Clinics	Raise critical infrastructure to mitigate flooding risks and ensure continuity of operations.
			Plan outreach activities in periods of reduced climate impact, avoiding peak monsoon seasons.
			Enhance staff knowledge and preparedness for climate-related disruptions to minimise operational impacts.
			Coordinate with hospital or clinics to ensure outreaches have appropriate ventilation and cooling prior to the outreach occurring.
	5.3		Strengthen integration and understanding of climate risk planning documentation

Overall Recommendations / Key Findings		Key insights and broader community implications	Enhance future climate resilience of the MPH Eye Clinic
			Enhance community impact through collaboration for outreach clinics
			Continually look to strengthen relationship with SIG and Ministries to ensure continued coordination with NRH
			Coordinate with hospital or clinics to ensure outreach centres have appropriate ventilation and cooling
			Ensure outreach scheduling aligns with periods of minimal climate disruption