Naha Birthing and Urban Health Centre

Honiara, Solomon Islands

PUBLIC ENVIRONMENT REPORT

Ministry of Health and Medical Services

Australian Aid | SOLOMON ISLANDS INFRASTRUCTURE PROGRAM

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SICED

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Acronyms

ACOM	Anglican Church of Melanesia
ARI	Acute Respiratory Infection
ASL	Above Sea Level
BCA	Building Code Australia
BOM	Bureau of Meteorology
BUHC	Birthing and Urban Health Centre
CBD	Convention on Biological Diversity
CBSI	Central Bank of Solomon Islands
CEMP	Construction Environment Management Plan
CHS	Community High Schools
COD	Chemical Oxygen Demand
CSIRO	Commonwealth Scientific Research Organization
DCGA	Democratic Coalition for Government Advancement
DDA	Disability Discrimination Act
DDC	Didao Development Corporation
DFAT	Department of Foreign Affairs and Trade (Aust.)
DO	Dissolved Oxygen
ECD	Environment and Conservation Division
EEZ	Exclusive Economic Zone
EIA	Environment Impact Assessment
EMP	Environment Management Plan
ESA	Environment Sensitive Areas
FAD	Fish Aggregation Devices
FFA	Forum Fisheries Agency
GDP	Gross Domestic Product
GHG	Green House Gases
GPPOL	Guadalcanal Plains Palm Oil Limited
GPS	Global Positioning System
GRM	Grievance Redress Mechanism
HCC	Honiara City Council
IPCC	International Panel on Climate Change
IUCN	International Union for the Conservation of Nature
KG VI	King George Sixth School
LDC	Least Developed Country
MECDM	Ministry of Environment, Climate Change, Disaster Management and Meteorology
MFMR	Ministry of Fisheries and Marine Resources
MHMS	Ministry of Health and Medical Services
NASA	National Aeronautic and Space Administration
NCD	Non-Communicable Diseases
NDS	National development Strategy
NEOC	National Emergency Operations Committee
NGO	Non -Government Organizations
NPF	National Provident Fund
OHS	Occupational Health and Safety
PACCSAP	Pacific-Australia Climate Change Science and Adaptation
PCCSP	Pacific Climate Change Science Program
PER	Public Environment Report
RSIPF	Royal Solomon Islands Police Force
SDA	Seventh Day Adventists
SIMS	Solomon Islands Meteorological Service
SINSO	Solomon Islands National Statistics Office
SINU	Solomon Islands National University
SIWA	Solomon Islands Water Authority
SOE	State of Environment
SPC	Secretariat of the Pacific Community
SPCZ	South Pacific Convergence Zone
SPREP	Secretariat of the Pacific Regional Environment Programme
SSEC	South Seas Evangelical Church
TDS	Total Dissolved Solids
UN	United Nations
USP	University of the South Pacific
WHO	World Health Organization
WWII	World War Two

1. NON-TECHNICAL SUMMARY

The Naha Birthing and Urban Health Centre (BUHC) development project is located in the residential suburb of Naha 1 in East Honiara. The site is within the city boundary and is therefore within the administrative and political jurisdiction of the Honiara City Council. The projects' location is within the same land block as the existing Naha Urban Clinic operated by the Honiara City Council. As the site hosts the existing Naha urban clinic, all essential services are already connected to the site. These include access roads, water and sanitation, electricity and communication lines and towers. The project proponent and developer is the Ministry of Health and Medical Services.

The project development site is on alienated land registered under the control of the Commissioner of Lands. The project will involve the construction of a medical health infrastructure, of which there are two components: a Birthing Clinic and an Urban Health Centre. It is thus referred to as the Naha Birthing and Urban Health centre. The facility is a higher- level facility that will provide both contemporary and high-quality birthing and primary health care facilities.

In terms of the development phases, the main activity components are generally as follows:

Preconstruction	Construction	Operation
Plans and designs. Geo-tech investigations Site Surveys Development Approval (*HCC*) Building Permit (*HCC*) UXO Survey Community awareness and consultations Technical evaluations/redesigns Public Environment Report (*for DC*) Detailed EMP or CEMP Demolition of the original structures	Foundation works (*meeting earthquake resistance*); Civil Engineering works (*for in ground drainage, sewer and ground condition improvement);* Civil Engineering works (*for embankment stabilization and treatment*); Construction of Main Structures (*meeting Earthquake resistance and cyclone resistance*); Upgrading of External Road (*including off site stormwater control and discharge*); Construction and installation of Roofing and rainwater collection discharge. Installation of Internal fit out (*with Furniture, Fittings and Equipment – including medical);* Installation of Medical Gas distribution network.	Normal Operation and management of BUHC Ongoing implementation of EMP Continuous monitoring following established monitoring regime.

	External works (*for roads, landscaping and boundary treatment*)	

The BUHC has been designed according to Australian Standards (BCA) and SI Building Regulations. It is also in compliance with disability requirements. Construction started in 2019 but ceased due to structural issues and necessitated a redesign phase. Work has therefore started again after the facilities were redesigned.

The facility consists of two single storey buildings with under crofts. The total area of the site is 6545m². The BUHC with a security hut and the existing clinic will take up a space of 1145m² which is 22.1% of the area of the site. The remaining areas are open areas and consist of the landscaped and non- landscaped area and takes up the space of 5100m², which is 77.9% of the site area. The birthing clinic is about 52.6m x 13.2m whilst the urban clinic is about 36.2m x 16.2m. The BUHC will be constructed through a composition of local materials (blocks and concretes) and imported modern materials.

a. Purpose and extent of PER

The purpose of this PER, as usual in all environmental assessment related work, is to assess the existing conditions of the site in terms of environmental, economic and social issues as far as possible. This involves the collection of baseline information covering those main areas. The baseline information collected then enables the examination of the potential impacts of the project on the environment including social and economic impacts. This also involves the assessment of potential natural and human generated impacts to the project. The next step is to devise effective mitigation measures to mitigate the identified potential impacts. Following that, an environmental management plan is formulated to detail how to manage the potential impacts throughout the various phases of the project development. A detailed environment management plan should then establish a monitoring regime detailing what and how to monitor the various issues affecting the project including potential impacts and mitigation measures.

Whilst all issues and potential impacts in this PER exercise, were assessed at project site levels, assessments efforts were also made at the national and provincial levels where possible. This is mostly determined by existing information, field assessments and the expert opinion and knowledge of the assessors.

b. Activities carried out during the PER exercise

All activities carried out under this assessment are according to the PER Minimum Requirements as issued by the MECDM and as included in the SI EIA Guideline 2016. The activities of the assessment hence comprised of efforts to collect information, analyze whatever that needs further analysis and synthesizing that information to inform views and conclusions that are used to formulate this assessment report. The 'on-the-ground' activities therefore involved field assessments and reconnaissance in the project site and the project development area, a desk top study using a wide range of existing reports and or documents from as many sources as possible, and interviews and consultations with groups and individuals as possible. A major effort was carried out to collect soil and water quality baseline information. In terms of existing reports and documents used, these are from strategies and plans, internet searches for websites containing

databases and relevant information, research and survey reports relevant to the project site, use of existing maps and provincial and national policies and legislation.

c. Alternatives and justification for choice of project

In terms of alternative design, this project has undergone an evaluation of an earlier design and has been redesigned taking into account technical and cultural issues. Since its redesigned status involves a high level facility, there will be some requirement for high technology input especially for the facility to host high level medical equipment within the facility. A 'no project 'alternative will keep the site for future medical facilities or provide opportunities for non-medical entities or even individuals to grab the site for not developing it. For the time being it is the best choice for the MHMS as the land is available.

This assessment exercise considers the following as justifications for the choice of this project on the project site:

a. The location is centrally located in Honiara (*position of site in Honiara*)
b. The location is in a densely populated area of the city (*Location in terms of population*)
c. Access to the location is excellent (good road network and connections) – *Public access.*
d. Essential physical infrastructures and services exist and serve the location – (*Presence of essential infrastructure and services)*
e. The existence of the current urban clinic establishes the location as a medical health precinct. – *HCC Zoning requirements*
f. Land is already available and is free (*land availability)*
g. The land area available for this location is large enough and perfect for the project compared to other existing urban clinic areas. *(Size of land available)*
h. Community views may be seen as supportive or accommodating *(Community perceptions and attitude), and*
i. (Site is preferred by donor) – *Donor preference.*

d. Environment affected by the project

The project site has been developed as a residential suburb for many years since the early years of Honiara being made the capital and as such, has been disturbed and degraded from its former natural status. The site is now just residential buildings and roads and an urban vegetation that has reforested the whole of Honiara from its grassland hills. Therefore, the BUHC development is not considered to have much significant impact to the environment, except during the construction period when certain environmental parameters can be elevated. These include surface water run-off, air pollution from increasing dust particles and vehicular emissions; noise from increasing traffic and construction activities; and public safety due to increasing traffic. Surface water run-off is considered a specific concern that is significant for the project and attention is required on the issue. Wildlife is insignificant to be of much concern. Impacts to the project from natural disasters are real and need real management and attention. These are from impacts of cyclones, freak weather incidences, earthquakes, volcanic eruption, and increasing heat due to climate change.

e. *Significant environmental and social impact*

This assessment is of the view that there is not much significant environment impact to the environment from the development project. Even though there will be some impacts such as on air, water, and soil quality, level of noise, and public safety. Surface water run-off is one issue that may be significant and the proposed mitigation measures should address the concerns. In terms of social impacts, increasing population in and around the facility could be significant, especially at the operational phase. The impacts of natural or even manmade disasters are and could be significant as already referred to above. These are from cyclones, earthquakes, increasing heat, and health pandemics. All of these can occur through the phases of the project development.

f. *Public consultation process undertaken*

Most consultations on this project have been undertaken with specific stakeholders that are required to make decisions that are relevant with various administrative, management and technical aspects of the project. Relevant consultations have been undertaken by the developer, the Project Managers (SIIP) and the consultant for this PER.

Due to the circumstances existing in urban areas as in Honiara, large public consultations had been reduced to specialized and relevant groups or stakeholders. The nature, size, type and location of the project had dictated the nature of consultations for the assessment. Since the general view is that the project will not have significant direct negative effects and impacts to the natural environment, the general population, or the surrounding communities; large and excessive public consultation for the project had been scaled down to specific representative groups.

g. *Economic assessment of the environmental and social impacts and their management*

Most of the mitigation measures taken to mitigate against potential significant environment impacts are mostly integrated into the cost of constructing the project. These may refer to relevant designs to mitigate against certain issues or potential impacts. Some are management measures taken to minimize potential impacts of certain issues. Where there are no costs indicated for identified issues, the detailed EMP should be used to provide such information. The major environmental impacts for this project are from natural disaster risks but do cover other issues such as surface water run-off, occupational health and public safety. Some mitigation measures on environmental impacts are recurring and will incur recurrent costs in the operation phase of the project. While social issues exist in the project development area, this project has been considered to cause insignificant negative social impacts. The major social impact of the project is in terms of positive health benefits which is considered significant. The management of the identified impacts and other issues are outlined in the EMP framework provided.

h. *The recommendations from the PER.*

The BUHC is a high-level facility consisting of the birthing clinic and the urban health centre. As it is located in an altered and disturbed environment that has now been developed as a residential suburb and is completely surrounded with the same type of populated residential suburbs, its potential negative impacts to the immediate environment are generally minimal. The proposed development project deserves to be considered positively for the specific project site and for the purposes it is planned, for its operation. As this assessment has addressed essential issues required for such assessment which is considered fitting for the type, scale and nature of the project, and the project site, and, that an EMP outline has been established to mitigate and manage all identified potential impacts, it is thus recommended:

That the Director of Environment and or the Consent Authority consider this PER with the proponent's development application and grant a Development Consent for the project to proceed as proposed and planned.

2. DETAILS OF THE PROJECT DEVELOPER

Name of Applicant:	Ministry of Health & Medical Services
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Contact Person:	Mrs Pauline McNeil
Official Designation:	Permanent Secretary
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3. DETAILS OF THE EIA CONSULTANTS

This assessment report has been prepared by a local EIA approved practitioner, Mr Moses Biliki. The consultant has been an approved EIA practitioner as required under the Environment Act 1998 and has been producing environment assessment reports under a business name and as an individual for many years. The consultant is a former public servant and founding Director of the Environment and Conservation Division and has been involved in environmental management issues since his time within the government and as a local private environment and development consultant. His consultancy works have been with communities, the Solomon Islands Government and national agencies, SOEs, NGOs, private sector, UN and multilateral agencies. Contact details are given below:

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For this PER, the consultant is assisted in the assessment task by Mr George Horoasia, a staff of the Faculty of Agriculture, Forestry and Fisheries at the Solomon Islands National University (SINU).

4. SUMMARY DESCRIPTION OF THE PRESCRIBED DEVELOPMENT

4.1 Project Identification

This development project is the Naha Birthing and Urban Health Centre (BUHC). It will involve the development of two significant medical health facilities; a birthing clinic and an urban health centre. The two facilities will be constructed in the existing area of the Naha urban clinic (parcel 191-039-0452 / Lot 505) which is located within the Naha suburb of East Honiara. The location is within the Honiara city boundary and is hence within the political and administrative jurisdiction of the Honiara City Council (HCC). The block of land is government owned and registered under the Commissioner of Lands. (See figure1)

Figure 1 Project location at Naha 1 and surrounding areas within Honiara
Map source – Google Earth - 2023

4.2 Project Category

Under the Environment Act 1998, Schedule 2 on Prescribed Developments, this development project is covered under section 9 – Public works, including (b) infrastructure developments.

The project is being managed on behalf of the Developer - the MHMS - by the Solomon Island Infrastructure Program. Following consultations on the project by the project managers on behalf of the Developer, the MECDM had further advised on August 2022, that due to the nature and size of the development project,

an environment assessment be carried out to ascertain potential impacts and be submitted in the form of a Public Environment Report. In terms of the environmental consideration, this development is at a level requiring the level of a Public Environment Report as defined in the Act and Regulations.

4.3 Brief description of the nature, size and location of the project

The BUHC is located within the current Naha Urban Clinic area within the Naha 1 suburb in East Honiara. The land parcel number is 191-039-0452 / Lot 505 and the Perpetual Estate is in the name of the Commissioner of Lands, with no Fixed Term Estate or any other encumbrance on the title. The SIG implementing ministry or developer of the project is the MHMS. The project is fully funded by the Australian government through the DFAT and implemented through the Solomon Islands Infrastructure Project (SIIP) which is managed by DT Global. The project has a total cost estimate of about AUD16.1 million.

The BUHC has been designed according to Australian Standards, - the Building Code of Australia (BCA) and SI Building Regulations. Its design is in compliance with Disability requirements - DDA (Disability Discrimination Act 1992), its medical service rooms are designed with reference to the PNG Health Facility Design Guidelines (2020) but tailored to meet Solomon Island Cultural approaches (especially birthing). Construction started on a previous design in 2019 but ceased due to structural issues and necessitated a redesign phase. Site works have been suspended until the facilities were redesigned and a further tender process will be undertaken.

The project is a medical and health facility that comprises two components:

a. Birthing Clinic, and,

b. Urban Health Centre.

Combined together, the project is referred to as the Naha Birthing and Urban Health Centre (BUHC). It is necessary to emphasise that the facility is a higher-level facility that will provide both contemporary and high-quality birthing and primary health care facilities. The main components are summarized below.

Birthing Clinic
Urban Health Clinic
Pedestrian ramp
Access Roads
Safe vehicle access including emergency access.
Undercover drop off and waiting areas
Storm water drainage
Fire warning and fighting facilities.
Security fence/office
Security guard house
Security gate
Generator Back up
Landscaped courtyard
Toilets and showers
Tank Water storage facilities
Refrigerated shipping container storage area.
Ambulances parking area
Waste Management area
Car park

The BUHC consists of two single storey buildings with under crofts that will take up a total ground space of 1145m ² which is 22.1% of the total area of the project site. The remaining 77.9% of the total area are open areas consisting of landscaped and non-landscaped areas. The whole site therefore still has significant open space areas.

4.4 Area affected by the project

In the figure below, the areas affected by the project are shown. The inner yellow circle indicates what is considered under this assessment as the principal area of physical and socio-economic influence under this project. Apart from the potential impacts of the project to these areas or vice versa, the whole population of this inner areas will be the main user of the project facility and the most to benefit due to its proximity and excellent access issues. Nevertheless, the project being located in Honiara, will also serve the rest of the capital, as communities of Honiara will seek to use and benefit from the health facility. Hence the red line boundary indicates the broader Honiara territory in general who would benefit from the facility mostly in terms of use or in terms of relevant socio-economic issues.

4.5 Justification and need for the project

The Solomon Islands fast growing population is putting increasing pressure on all forms of socio-economic services in the country, including health services. The national governments that have come into power have thus prioritized the health sector and have allocated whatever available resources to continue to provide essential health services in the effort to try and keep up with the health demands of the country's fast- growing population. Various legislation, policies and programmes have been developed and implemented over the years to serve this purpose and to maintain a healthy population which is necessary for attaining the country's development aspirations. The national agency responsible for the health sector, is the Ministry of Health and Medical Services (MHMS).

Apart from the political statements of the DCGA government, the overall national plan guiding the development agenda in the country at present is the National Development Strategy (NDS) 2016–2035. This NDS includes strategies and programmes covering the health sector. This project serves to implement those relevant strategies and programmes in the NDS. At the sector level, the MHMS, has continued to develop and implement its health specific policies and plans over the past few decades. The most recent of these are the National Health Strategic Plan 2016 – 2020, with its vision for a healthy, happy, and productive people of Solomon Islands; and the recently launched successor, the National Health Strategic Plan 2022 - 2031 with its vision to do better and to focus on building a health system that is 'fit for the future' and provide equitable access to health services for all. The plan's vision is hence for "*a healthy future for all Solomon Islanders."*[1] Under the objectives and programmes of the previous strategic plans, the MHMS, has developed a more targeted sector policy, the Role Delineation Policy. This seems to be the sectors flagship policy and focuses on infrastructure, human resources and equipment.

Under the effort and urge to implement the above policies, the Ministry of Health and Medical Services (MHMS) has embarked upon a significant reform agenda to help improve coverage and access to health care services. Functioning infrastructure is key to the effective provisions of public, primary and curative health services to the population of the Solomon Islands. The MHMS' Role Delineation Policy (RDP) defines the services to be delivered at each level facility in the health care system and details the infrastructure, equipment, and staffing requirements. The implementation of the MHMS' RDP requires significant infrastructure development across the Solomon Islands geographical extent in the short to long term.[2]

The Naha Birthing Clinic and Urban Health Centre (BUHC) therefore, remains at the forefront of the infrastructure reform agenda for the MHMS, and upon completion of construction, will provide both contemporary and high-quality birthing and primary health care facilities that will immediately reduce the pressure on the current obstetrics and other primary health care services being currently provided by the National Referral Hospital (NRH) in Honiara[3]. The fact that the NRH currently experiences up to 100 birth deliveries per week justifies that additional facilities are needed to ease such pressure situations.

The site location for the Naha BUHC has been established to serve a significant number of the population of Honiara. The location has also been chosen due to the availability of space for the BUHC in an existing urban clinic location within an easily accessible site or area. The completed facility will be managed by the Honiara City Council Medical Services division through support by the MHMS. In late 2021, the MHMS agreed the management of the project's delivery through DFAT's new Solomon Island Infrastructure Program.

The redesigned facility project has already received both Development Approval and Building Approval from Honiara City Council in April 2022, following the submission of both applications by the MHMS. The facility was redesigned in 2021, following an independent review of the original design. Works commenced on site in 2019 for the original design but have been suspended to allow the current facility redesign to be finalized.

4.6 Developer's endorsement of the PER

[1] National Health Strategic Plan 2022 - 2031
[2] SIIP Fact sheet
[3] ibid

The Development proponent endorsement letter is on Annex 1.

4.7 The structure of the PER

The structure of this PER adheres strictly to the PER Minimum requirements under Annex 1(H) as provided in the publication, 'Solomon Islands EIA Guidelines 2016'. The Guideline as provided is based on the Environment Act 1998 and the Environment Regulation 2008 and is hence considered a legally binding guideline document. The MECDM provided the same PER Minimum Requirements for this exercise. This PER submission seeks to meet and provide the detailed information to adhere to the minimum requirements in terms of substantive contents as well as the procedure and processes as required for PERs, given the resources and time available for this PER exercise. This assessment relied on the field reconnaissance and assessments efforts of the assessors, and existing secondary information from a variety of sources to collate, analyze and or synthesize such collected information to produce this PER. Relevant information are also gathered from consultations with a number of stakeholders.

5. POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

5.1 Policy Framework

The overarching platform and directions for national activities and programs is provided through policies at the national level. Sector based policies where they exist are applicable at the national level but are more focused on sectoral issues. Presented below are the most relevant policies in relation to this development project.

5.1.1 National level policies

5.1.1.1 DCGA Government Policy 2019[4]

The DCGA government that came into power in 2019 adopted and released its present policy statement which should provide guidance, actions and directions for the ruling national political government and the country at large. The Policy statement in general is aimed at 'doing things differently from the norm' and targeted 'getting things done'.

The vision of the policy is aimed at empowering Solomon Islanders to attain a meaningful quality of life through social and economic reforms supported by stable and ethical leadership. The policy mission is to focus efforts over the next 4 years on the core objective of delivering the priority policies outlined in this policy statement.

[4] SIG, 2019. DCGA Policy Statement, Office of the Prime Minister and Cabinet, Honiara, Solomon Islands

The policy document has ten guiding principles of which the following are the most relevant to this development project:

- Promote Sustainable development in all sectors of the economy;
- Promote and uphold principles of good governance;
- Embrace and promote gender equality and equal opportunities for all;
- People the centre of decision making;

In terms of overall objectives, the policy has a total of eleven, of which the following two are the most relevant for this development project:

- Provide equal opportunities for all; and,
- Provide an enabling environment to stimulate and advance social and economic growth.

In terms of this development project, the most relevant policy comes under part 5 on Reform Programmes. Under this part, the most relevant part is 5.2.3 on the Social sector which is part of 5.2 on Sectoral Reforms. The MHMS Reform programme under this part is covered under part 5.2.3.1 of which (d), (e), and (h) are the most relevant. These policy components support the development of such health project and do provide its basis for implementation. On the part of the project, the implementation of this development activity forms tangible implementation of such national political policies.

5.1.1.2 National Development Strategy 2016 – 2035[5]

The National Development Strategy (NDS) 2016-2035 is currently the long-term development strategy in the country. The strategy replaces short term development strategies that have been adopted from time to time in the past and maps out a strategic direction for the future development of Solomon Islands. It said to present a visionary strategy for the twenty-year period, setting out a long-term vision, mission and objectives that is supposed to reflect the aspirations of all Solomon Islanders. The strategy provides the national framework for planning development needs in the country for the twenty years period indicated.

National Vision - The National Vision of the strategy is "Improving the Social and Economic Livelihoods of all Solomon Islanders".

National mission - The National Mission is to create a peaceful, harmonious, and progressive Solomon Islands led by ethical, accountable, respected and credible leadership that enhances and protects people's culture, social, economic and spiritual well-being.

Long Term Objectives – To enable the achievement of the above national vision, five key long term NDS Objectives have been identified on which development should focus:

- Sustained and inclusive economic growth;

[5] SIG, 2016. National Development Strategy 2016-2035, MDPAC, Honiara. Solomon Islands

- Poverty alleviated across the whole of the Solomon Islands, basic needs addressed and food security improved; benefits of development more equitably distributed;
- All Solomon Islanders have access to quality health and education;
- Resilient and environmentally sustainable development with effective disaster risk management, response and recovery; and
- Unified nation with stable and effective governance and public order.

The NDS has a total of fifteen medium term strategies which are further detailed with subsector programmes and priorities. The most relevant for this development project is under objective three:

Objective 3. All Solomon Islanders have access to quality health and education. Under this objective there is the medium-term strategy 8 targeting the health sector:

Medium Term Strategy 8: Ensure all Solomon Islanders have equitable access to quality health care; and combat communicable and non-communicable diseases.

The following Key Result Areas (KRA) which are identified for the above strategy 8 and are all relevant to this development project, are:

KRA 1: Improved Service Coverage.

KRA 2: Strengthened Collaboration and Partnerships

KRA 3: Improved quality of and support for health services

KRA 4: Foundations for the Future – Governance, Planning and Management of

Health Services

5.1.2 Sector based policies

5.1.2.1 National Health Sector Strategy 2016 -2020

The National Health Strategic Plan (NHSP) 2016 – 2020 had been a successor to an earlier health strategic plan. The NHSP 2016-2020 has the vision for, "The People of the Solomon Islands will be Happy, Healthy and Productive." This has carried forward a long term approach of the MHMS to not only concentrate its efforts on curative medicine (curing sick people) but to go beyond that as a way of promoting good health and minimizing or reducing pressure on curative services.

The plan has four Key Result Areas (KRAs): 1. Improve Service Coverage; 2. Build Strong Partnerships; 3. Improve the quality and support of Health Services; and, 4. Lay the Foundations for the Future. The plan and its KRAs with their detailed programme activities have laid the foundations and guidance for the MHMS and all national partners in formulating and implementing their programmes and activities for the last planning period. The implementation of this project has been based partly on this strategic plan.

5.1.2.2 National Health Sector Strategy 2022 -2031

This is the recently launched National Health Strategic Plan 2022 to 2031. In the plan, the MHMS and partners resolved to do better, and to focus on building a health system that is 'fit for the future' and provide equitable access to health services for all. The plan's vision is hence for "a healthy future for all Solomon Islanders." It has identified three strategic focus for the plan which if right would lead to the transformation within the MHMS for the benefits of all Solomon Islanders. As can be seen from the period for the plan, it is looking into the future more on a longer term basis compared to the recent past plans. The plan is said to be a game changer and will change how the MHMS goes about its work, while building on its successes over the past few years.

5.1.2.3 MHMS Role delineation Policy

The MHMS Role Delineation Policy is currently the flagship policy of the Health sector in Solomon Islands. The MHMS took a lot of effort in developing the policy which is currently providing the guidance to much of the government's programmes and activities in the health sector. The policy is hoped to add significant improvement to the delivery of integrated people centred primary health care as a means to achieving Universal Health Coverage for all the people of the Solomon Islands. The Policy took account of health needs and accessibility issues and defines the roles and functions of health services that are to be offered throughout the country with their standard or essential infrastructure and staffing requirements including medical resources and other support requirements. The following health services with their levels have been recognized in the policy:

- Community Centre
- Rural Health Centres
- Area Health Centres
- Urban Health Centre
- General Hospital
- National Referral Hospital

The policy is inclusive of all sectors and implementers and will also involve some Registration Systems in the future.

5.1.2.4 SI National Waste Management and Pollution Control Strategy 2017 – 2026

Polices of other government ministries and agencies do exist and may be relevant to specific aspects of this project. The MECDM, which has national responsibility for environment matters has many existing polices and strategies. Many of these have surpassed their implementation period even though they may continue to provide guidance for continuing government activities and programmes. One of the MECDMs currently

active and ongoing policy strategy is the National Waste Management and Pollution Control Strategy 2017 – 2026.

This strategy is a successor to the previous solid waste management strategy for the period 2009-2014 and provides the framework for the management of waste and control of pollution throughout Solomon Islands. The strategy aims at addressing new and emerging waste issues such as e-waste and industrial waste from mining and logging. It also makes an effort to focus on wastes and pollution on isolated islands. New issues of concerns also include plastic wastes used as shopping bags, food wrapping and other uses that make up a significant amount of the waste streams that continue to pollute the country's pristine environment. Used solar batteries and the newly introduced flammable canister for cooking are also of increasing concerns. The strategy recognizes the low capacity for managing wastes at the provincial level and identified the need for landfills in the provincial centres.

This development project will of course have waste streams throughout its development phases and has put in place measures to manage the issue, including medical wastes.

5.1.3 International policies

International polices are formulated to assist countries focus on addressing priority issues at the national level. Solomon Islands is part of the international community and commits itself in implementing such polices. One of the main policy instrument at present under the UN is the Sustainable Development Goals (SDG).

5.1.3.1 Sustainable Development Goals

The current sustainable development goals under the UN global framework, has 17 goals. These goals include global targets and requires countries to take action at the national level to achieve them. This project will be a demonstration for examples of the efforts of Solomon Islands to work towards achieving the goals.

For Solomon Islands, this BUHC project will contribute towards achieving the following SDG goals:

Goal 3. Ensure healthy lives and promote well-being for all at all ages;
Goal 5. Achieve gender equality and empower all women and girls;
Goal 10. Reduce inequality within and among countries; and
Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable.

5.2 Legal Framework

5.2.1 HCC Legal Framework

As a City Council, the Honiara City Council performs its functions under the relevant national legislation and its own ordinances. These include the Provincial Government Act and the Act Honiara City 1999. The City Council has powers to introduce city laws or legislation, to address relevant issues and matters in governing

and managing the affairs of the capital city. It has thus introduced a number of ordinances for such purposes. The most relevant for this development are given below.

5.2.1 Building Ordinance

The Building Ordinance is the HCC's legislation that governs the construction of building within the city boundary. It was created to ensure that all buildings built within the Honiara City are built in a legal manner that ensures safe and healthy development of the City. The ordinance sets out the required procedures for an individual or company who proposes to construct a building within the City boundary. It further provides and outlines the type of materials that are legally approved, and which can be used in the construction of a building. It also has provisions for penalties if a building is constructed without approval from the City Council and the Town Country and Planning Board. The MHMS has been granted the required Building Permit for this development project. (See Annex 4).

5.2.2 Town and Country Planning Act 1979

The Town and Country Planning Act 1979 *(Renamed 'Planning and Development Act' in 2017)* is a national legislation and not an HCC ordinance. It is however one of the most relevant and powerful piece of legislation implemented by the HCC as it applies mostly to alienated land. The Town and Country Planning Act is the principal mechanism for managing development, environmental planning and protection at the national and provincial levels in both urban and rural areas. The Act establishes a Planning and Development Board in each province and in Honiara. However, if there is no Board appointed, the functions are transferred to the HCC and Provincial Executive. The objective of the Act is to provide for the administration of town and country planning, the making of local planning schemes, and the control and development of land. From an environmental point of view, the Act could implicate the conservation of cultural and biodiversity areas. However, a significant limitation of the Act is that it affects only non-customary land.(*SPREP 2018).* The MHMS has been granted the required Development Approval for this development project (See Annex 3).

5.2.2 National Legal Framework

5.2.2.1 Environment Act 1998 and Regulations 2008

The Environment Act 1998 makes provisions for the protection and conservation of the environment, the establishment of the Environment and Conservation Division and the Environment Advisory Committee. The Act defines the environment holistically, as "including all natural and social systems and their constituent parts, and the interactions of their constituent parts, including people, communities and economic, aesthetic, cultural and social factors". The main objectives of the Act are:

- to provide for and establish integrated systems of development control, environmental impact assessment and pollution control (including prevention and monitoring),
- to reduce risks to human health and prevent the degradation of the environment by all practical means. This includes regulating the discharge of pollutants, the production, transport, collection,

treatment, storage and disposal of wastes, and promoting recycling, re-use and recovery of materials in an economically viable manner, and,

- to give effect to regional and international conventions and obligations relating to the environment.

Key provisions of the Act include:

Section 4 - Where there is an inconsistency between the Act and the provisions of any other Act, the provisions of the Environment Act shall prevail.

Sections 5-7 The administration of the Act relies on the Environment and Conservation Division (Division), established under the Act.

Section 6 For the purposes of promoting sustainable development, the Division shall, as far as possible, be guided by the following environmental principles: the precautionary principle, fairness for future generations (*intergenerational equity*), conservation of biological diversity and ecological integrity, and improved valuation and pricing of environmental resources of Solomon Islands

Section 12 The Minister, in consultation with the Director, has the power to give directions on matters.
of policy to the Division. This will ensure that government policies are implemented by the Division.

Sections 13-14 An Environmental Advisory Committee (Committee) is also established with defined powers and functions. This Committee shall advise the Division or the Minister on any matters connected with environment and conservation referred to it by the Director or Minister.

Subsidiary legislation has been made pursuant to the Environment Act and include amendment in the Environment regulation relating to prescribed fees, and preparation of public environmental reports; prescribed development applications; appeals under section 32(1) of the Act; and control of pollution. *(SPREP, 2018).*

Part III of the Act includes specific provisions on environmental impact assessments (EIA) and is the part invoked for this assessment exercise. The part deals with all requirements for all forms and or levels of EIAs and requires all development proponents to carry out a regular EIA study on prescribed developments. The EIA study is required to be submitted to the Director, as a PER or EIS for approval. The requirement for EIA is for developments that are prescribed under the act and applies to new and existing developments. *(SPREP 2018)*

5.2.2.2 Labour Act 1996

The Labour Act 1996 is important for this development project as it establishes the provisions for the protection of workers and their rights during employment. It establishes the office of the Commissioner of Labour and all administrative requirements that enables them to address all labour related issues. The Act allows the Minister to set minimum standards such as time of work and related issues. The Minister is also given the power to make exceptions under special circumstances. Other important provisions of the Act

deals with contracts for employment, treatment of women and their rights, employment of child and young persons and the general care of workers by an employer.

5.2.2.3 Employment Act 1981

The employment act provides for redundancy payments and pension benefits for long service, requires employers to provide particulars of terms of employment and to prevent and ensure against liability for injury and disease suffered by employees.

5.2.2.4 Environment Health Act 1980

The Environmental Health Act makes provisions for securing and maintaining environmental health in Solomon Islands. The Act sets up the administration and structure for community health in the country and includes the administration of environmental health services by the Minister. Under sections 5-6, the Minister may delegate this to the Provincial Governments and the Honiara City Council, which are designated as Enforcement Authorities. The Enforcement Authority is given power to make its own by-laws under the Act to facilitate the efficient operation of environmental health services. The Enforcement Authorities are given power under section 15 to instigate their own prosecutions in their area. Subsidiary legislation have been made under this Act and include:

- Environmental Health (Public Health Act) Regulations 1987; and
- Environmental Health (SARS Acute Respiratory Syndrome) Regulations 2003 – L/N 46/03 (*SPREP 2018)*

5.2.3 International Treaties

Solomon Islands has signed and is party to many international treaties. These treaties carry and infer numerous national commitments and obligations that require actions or implementation at the national level. As a member of the UN and many of its subsidiary bodies, Solomon Islands commits itself to international cooperation and makes the effort to implement its obligations under these treaties (or even global programmes) depending on resources availability.

The main regional and global health focused organization that Solomon Islands would be a party to, are the WHO at the global level and SPC at the regional level. Solomon Islands is indeed a signatory to the Agreement establishing the South Pacific Commission (1947) now known as The Pacific Community. Both of these organizations are health based or related and do assist Solomon Islands with many ongoing programmes.

Amongst others, two other international treaties that are most relevant as far as this project is concerned are:

i. Convention on the Elimination of All Forms of Discrimination against Women, New York (1979).

   This treaty focusses on issues relating to discrimination women and Solomon Islands has been active in its efforts to see that.

ii. Convention on the Rights of the Child (1989.)

5.3 Institutional Framework

As the BUHC is a medical and health facility that will be involved in providing essential health services, the national level agency responsible for the development is the MHMS. The HCC plays a major role due to the location of the development facility within its jurisdiction and the fact that the BUHC will come under its medical services operation after construction completion.

Generalized organizational structure

5.3.1 Generalized organizational structure

A generalized overall organizational structure for environmental management for the development is thus shown on the above figure. It shows the national level organizational structure in relation to the developer. The point of contact in terms of environment management issues will be the SIIP. The general roles of the other institutions are briefly described below.

5.3.2 Ministry of Health and Medical Services (MHMS)

The Ministry of Health and Medical Services has the national role of health and medical services in the country. It therefore has the role of developing national policies and legislation relating to all matters of

health and medical services. The establishment of essential infrastructure such as clinics and hospitals are one of its most important role and functions. In this project, the MHMS is the proponent or developer.

5.3.3 Honiara City Council (HCC)

The HCC is the governing entity of the Solomon Islands capital, Honiara. Its roles and functions come under the Honiara City Act and Provincial Government Act. The governing body of the city is the HCC Executive headed by the City Mayor. Its head of administration is the City Clerk and it has a Health Division headed by a Director of Health Services within its administration that is responsible for health services. Apart from other services, the HCC's health division is responsible for the 8 urban clinics in the city, including the present Naha urban clinic. The BUHC will be managed and operated by the HCC after it is completed.

5.3.4 Ministry of Environment, Climate Change, Disaster Management and Meteorology, and other Ministries

The Ministry of Environment, Climate Change, Disaster Management and Meteorology (MECDM) is the main national agency responsible for all environmental matters at the national level. Other national agencies are also responsible for specific areas such as fisheries. Forestry and mining. This PER is a requirement of the Environment Act 1998 and Environment Regulation 2008, administered by the MECDM. It will be submitted to the Director of Environment of MECDM for the granting of the environmental approval, which is the Development Consent. The MECDM will also be responsible for the monitoring of the development facility in terms of the environmental issues and concerns and will provide advice from time to time as required. Many other government ministries and agencies do have roles that may relate to certain aspects of the development project through their own legislation and administrative functions.

5.3.5 Department of Foreign Affairs and Trade (DFAT. Aust.)

The Government of Australia provides the funding for this development project through its Department of Foreign Affairs and Trade. As the donor for the project, it also provides further roles in the actual implementation of the project, including concept planning and development, construction and even for the first few years of its eventual operation. It is also responsible for certain aspects of the management of the project.

5.3.6 Solomon Islands Infrastructure Project (SIIP)

The Solomon Islands Infrastructure Project (SIIP) is the implementing arm of the Department of Foreign Affairs and Trade (DFAT- Aust.). It manages the DFATs infrastructure projects in Solomon Islands, including

the BUHC. The SIIP itself is managed by DT Global. The BUHC is hence managed and implemented by the SIIP on behalf of the MHMS.

5.3.7 Staff/Workers

Staff and workers involved in the project in all the development phases are part of the institutional framework required for the construction and management of the project. These may involve staff and workers of the contractors or the MHMS or the HCC and may involve administrative, technical, labour or personnel issues. At this level, even the staff and workers relevant labour unions may be relevant when issues arise.

5.3.8 Communities

Communities are not only users of the health facilities but they will be affected in other ways. For the BUHC, its location within a residential area even necessitates important consultations with communities for their understanding, support and cooperation on the project. It is understood, that the SIIP is working on a Grievance Redress Mechanism to cater for issues that relate to communities.

6. DESCRIPTION OF THE PROPOSED DEVELOPMENT

The MHMS is the developer of this project. The project is however funded by the Australian Government through its Department of Foreign Affairs and Trade (DFAT) and managed and implemented by the Solomon Islands Infrastructure Project (SIIP). The SIIP is the implementing arm of the DFAT and liaises closely with the MHMS in managing and implementing the project on their behalf.

The BUHC is a medical and health facility project consisting of two components:

a. Birthing Clinic, and,

b. Urban Health Centre.

The project is referred to as the Naha Birthing Clinic and Urban Health Centre (BUHC). It is a higher-level facility that will provide both contemporary and high-quality birthing and primary health care facilities.

The BUHC consists of two single storey buildings with under crofts. The total area of the site is 6545m². The birthing clinic will occupy a site area of 677m² whilst the urban health centre occupies a site area of 575m². The security hut occupies an area of 11m² and the existing clinic which will be retained occupies an area of 182m². The total areas that will be occupied by the new buildings and the existing urban clinic building is therefore 1145m². This makes up 22.1% of the site area. The open areas that consist of the landscaped area (362m²) and non- landscaped area (4738m²) is 5100m², which makes up 77.9% of the site area. The whole site still has most of its area not occupied by buildings and remain significant open space areas.

6.1 Plans and technical drawing of the development

The main design plan components are shown below. All design plans below have been completed by Architectus Brisbane (ABN 90 131 245 684). The full plan components are provided in the annex.

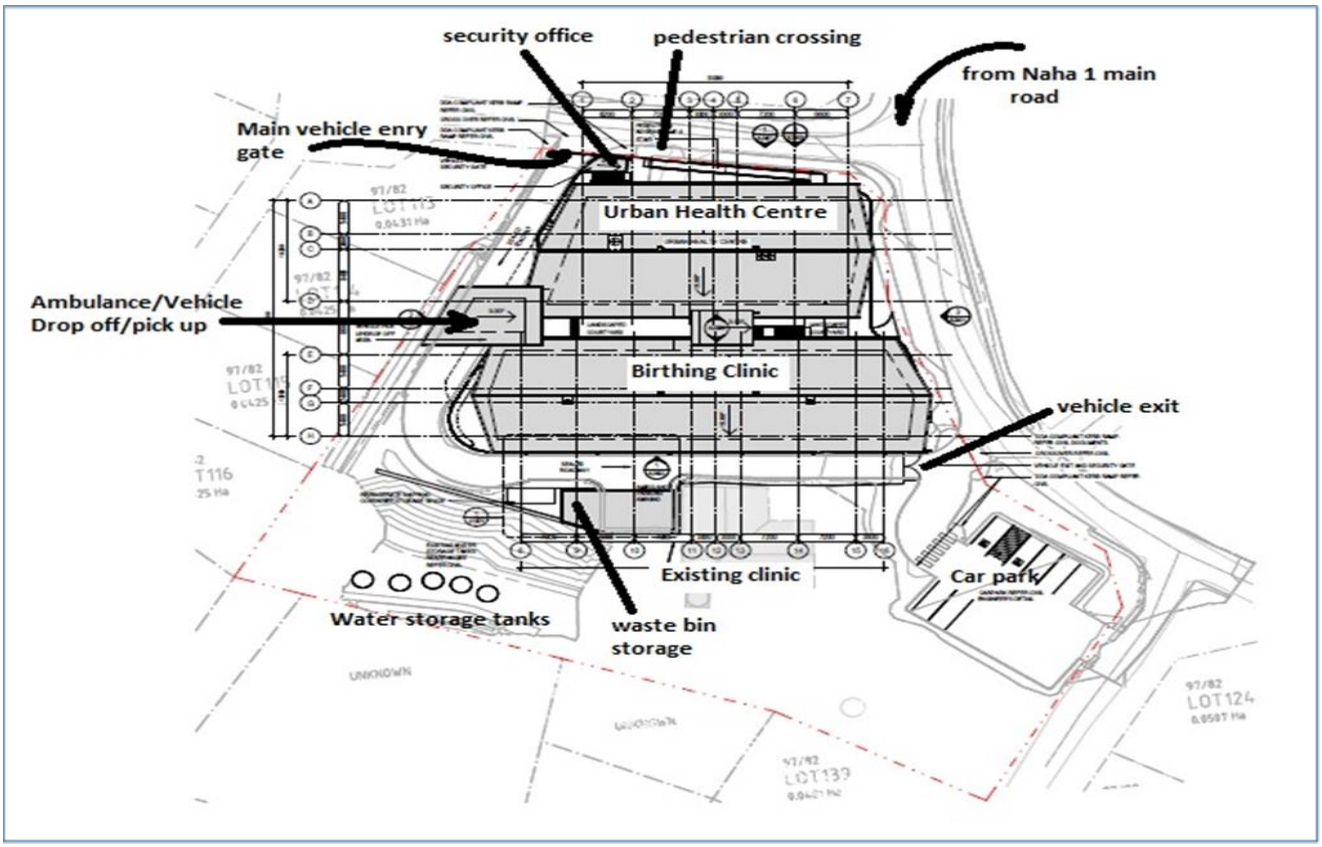


Figure 2. Overall Site Plan
Design - Architectus Brisbane

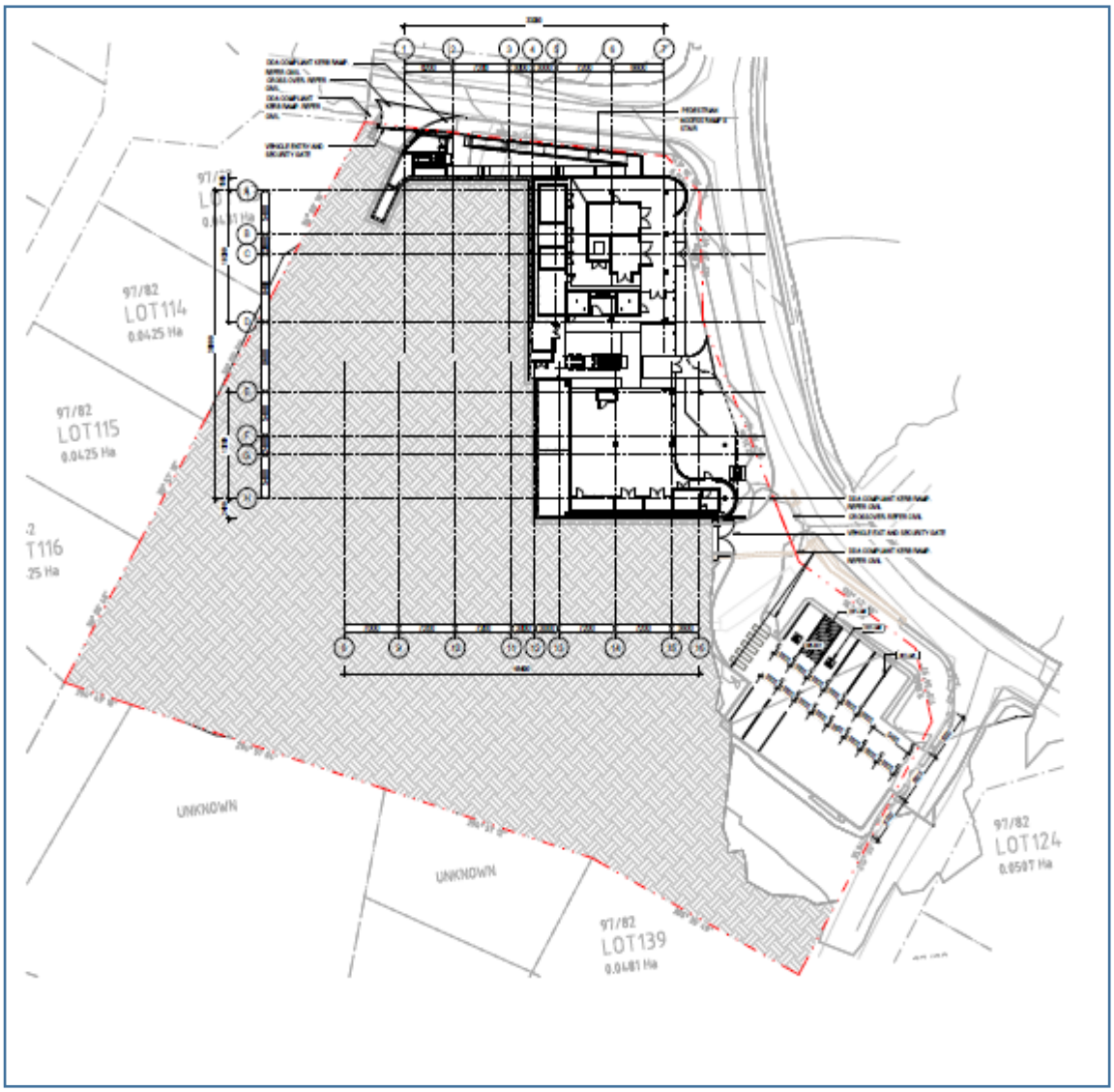


Figure 3. Overall Under croft Plan
Design - Architectus Brisbane

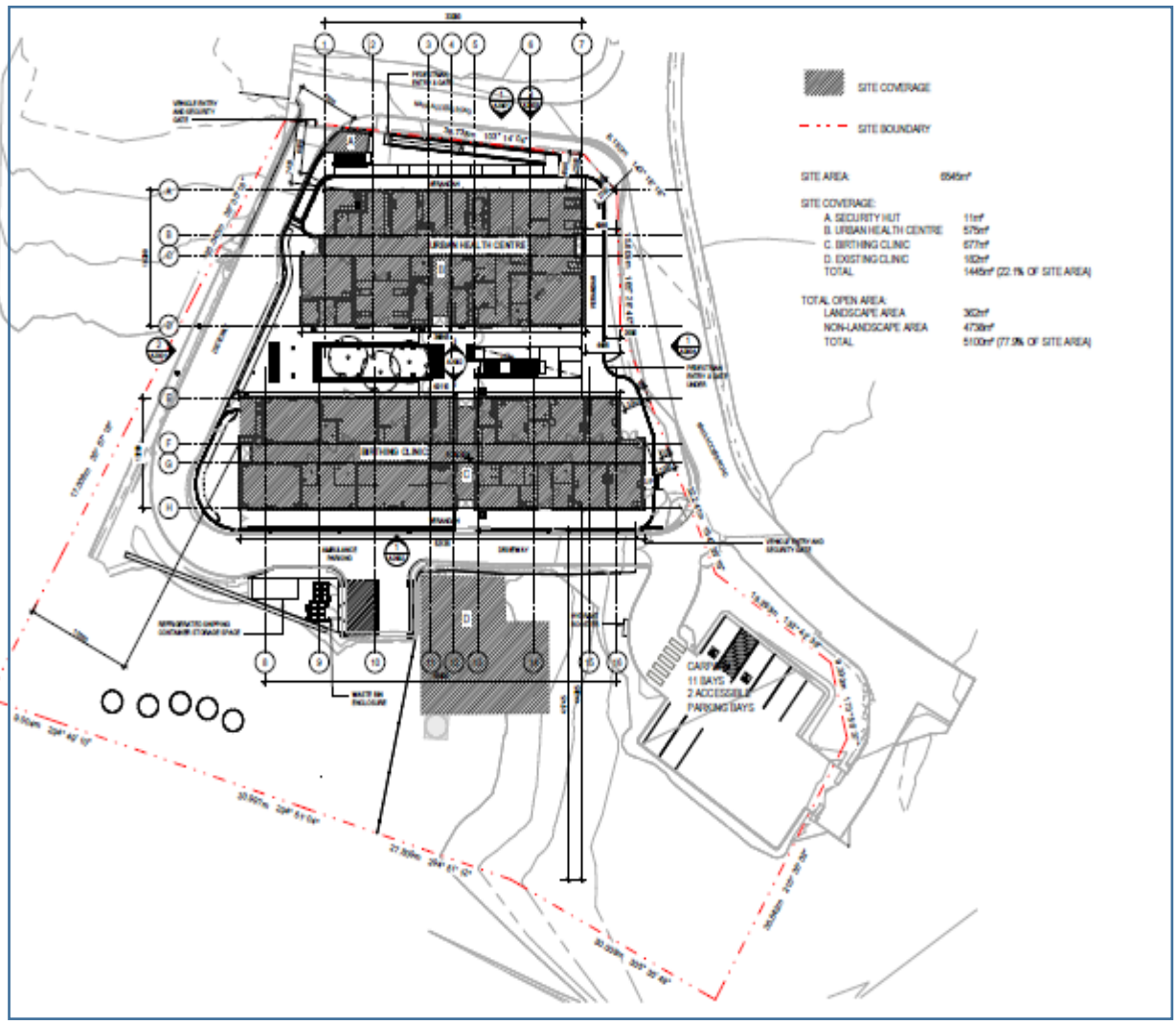


Figure 4. Proposed Site Plan
Design - Architectus Brisbane

Figure 5. General Arrangement Plan –Ground
Design - Architectus Brisbane

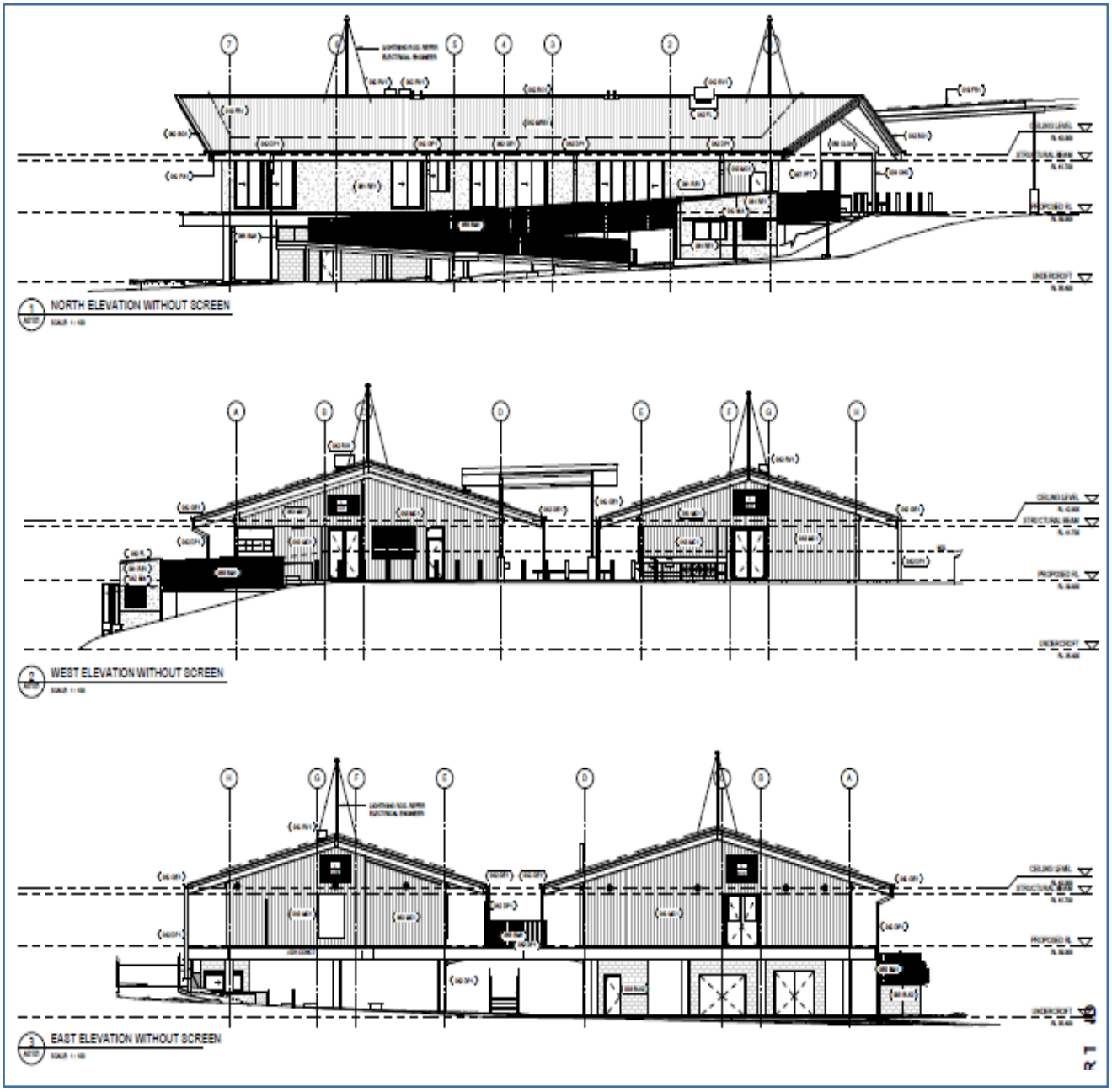


Figure 6. North, West and East Elevations
Design - Architectus Brisbane

6.2 Components and activities of the development

The main components of the project are detailed below.

BIRTHING CLINIC:

- Reception.
- 4 x Observation Bays (with beds) – can also be used as Ante natal and/ or Treatment beds.
- 3 x Ante Natal beds with associated bathroom faculties.
- 10 x Post Natal beds with associated bathroom faculties.
- 5 x Delivery Rooms – with 3 x ensuite bathrooms.
- 1 X Birthing Room can be used as a Isolated Birthing Room for infectious patients.
- 1 x Primary Assessment/ Family Planning Room.
- Total Beds – Birthing Clinic – 23 x Beds.
- Clean Sterile Stock Store Room.
- Staff Rooms.

URBAN HEALTH CENTRE:

- Reception.
- 6 x individual Consult and/or Treatment Bays for day patients.
- Eye Health Clinic.
- Dental Clinic. (1 x Chair)
- X ray and Ultrasound.
- Minor Operating Theatre including recovery space (2 x beds)
- Pharmacy.
- Laboratory.
- Public Health Clinic – Flexible Meeting Room.
- Doctor Room.
- Clean Sterile Stock Store Room.
- Staff Facilities:
    - Office.
    - External Kitchen.
    - Male + Female Shower/ WCs/ Change Rooms

EXTERNAL FEATURES

- Pedestrian ramp meeting international DDA stands.
- External Balconies.
- Birthing Clinic – private external secure female family / patient space. (Mother's Courtyard)
- Birthing Clinic – external Patient food preparation facilities – including laundry space.
- Safe vehicle access – ambulance drop off and pick up, fire tender access, service vehicles and waste management collection.
- Under Cover Patient Drop off – Ground Level.
- Full storm water drainage.
- Mains electrical power services including generator back up.
- Fire Warning and Fighting facilities.
- Approach road upgrades as required - including storm water run-off treatment.
- Emergency vehicle access and services provision (fire) – agreed with the Honiara Fire Brigade through the Royal Solomon Islands Police Force (RSIPF).
- Undercover Public Waiting Zones.
- Security Offices at each floor level.
- Security Fenced with gate access.
- Public Bathrooms – Ground and Lower Ground Floor Levels.
    - Lower Ground – 1 x Female Shower/ WC Room- DDA Compliant.
    - Lower Ground – 1 x Male Shower/ WC room – DDA Compliant.
    - Ground – 1 x Female WC – Fully Accessible.
    - Ground – 1 x Male WC – Fully Accessible.

INTERNAL FEATURES

- Dirty Utility Rooms.
- Sluice Rooms.
- Medical Gas distributions.
- Family Orientated Birth Delivery Rooms.
- Large Equipment Storage Rooms.
- Landscaped Courtyard/ Seating area.

In summary the project components are hence as follows:

a. Birthing Clinic
b. Urban Health Centre
c. Pedestrian ramp
d. Access Roads
e. Safe vehicle access including emergency access.
f. Undercover drop off and waiting areas
g. Storm water drainage
h. Fire warning and fighting facilities.
i. Security fence/office
j. Security guard house
k. Security gate
l. Generator Back up
m. Landscaped courtyard
n. Toilets and showers
o. Tank Water storage facilities
p. Refrigerated shipping container storage area.
q. Ambulances parking area
r. Waste management area
s. Car park

Since the project's earlier phase had been ceased, the scope for rebuilding will include:

a. Demolition of the original structures within the current Lot boundary.
b. Civil Engineering – in ground drainage, sewer and ground condition improvement.
c. Civil Engineering – embankment stabilization and treatment.
d. External Road upgrades including off site surface upgrading stormwater control and discharge to the northern access road.
e. Foundations – meeting earthquake resistance.
f. Structure meeting Earthquake resistance and cyclone resistance.
g. Roofing and rainwater collection and discharge.
h. Internal fit Out – with Furniture, Fittings and Equipment – including medical equipment.
i. Medical Gas distribution network.
j. External works within the site boundary – loop roads, landscaping and boundary treatment.
k. Waste Storage Zone – independently positioned away from the new facility – but located within the overall site boundary.

In terms of the development phases therefore, the main activities are generally as follows:

Preconstruction

a. Plans and designs
b. Geo-tech investigations
c. Site Surveys
d. Development Approval (*HCC*)
e. Building Permit (*HCC*)
f. UXO Survey
g. Public Environment Report (*for DC*)
h. Community awareness and consultations
i. Technical evaluations/redesigns
j. Detailed EMP or CEMP
k. Demolition of the original structures

Construction

a. Foundation works (*meeting earthquake resistance*);
b. Civil Engineering works (*for in ground drainage, sewer and ground condition improvement);*
c. Civil Engineering works (*for embankment stabilization and treatment*);
d. Construction of Main Structures (*meeting Earthquake resistance and cyclone resistance*);
e. Upgrading of External Road (*including off site stormwater control and discharge*);
f. Construction and installation of Roofing and rainwater collection discharge;
g. Installation of Internal fit out (*with Furniture, Fittings and Equipment – including medical);*
h. Installation of Medical Gas distribution network;
i. External works (*for roads, landscaping and boundary treatment*)

Operation

a. Normal Operation and management of BUHC
b. Ongoing implementation of EMP
c. Continuous monitoring following established monitoring regime

6.3 Use of Chemicals or Hazardous materials

In the project pre-construction and construction phase, there will be no chemicals or hazardous materials used. Petroleum products such as petrol, diesel, oils and grease from vehicles and machines may spill on site and will require some management measures to be put in place. In the operation phase, Medical Oxygen gas which is an essential component in operating such facilities will be stored at the site in compliance with Australian standards for storage and placement. The use of this gas will be managed under the required standards.

6.4 Hazardous wastes production

In the development phase of the project, hazardous wastes will not be produced. In the operation phase of the project, as expected of such health facilities, medical or clinical wastes will be produced. These will be managed under the present waste management procedure or systems practiced by the MHMS or HCC Urban Clinics which are considered accepted best practice. The medical waste from this facility will hence be temporarily stored in the designated locations within the Naha health centre grounds and then transferred to the incinerator at the National Referral Hospital for disposal.

6.5 Number and types of heavy & light machinery and vehicles to be used.

In the construction phase the following heavy vehicle will be used – Excavator, Backhoe, Loader, Crane, Dump Truck/ Loader, Container truck, Concrete mixer truck, 3 Tone truck and other normal construction machineries. Light vehicles will still be used for movement of personnel to and from the site.

Contractor vehicle movements of the vehicle types will be low in the early days – but will ramp up as more trades are employed to complete the project. The Contractor will be required to prepare and operate a Traffic Management Plan for all stages of the rebuilding of the new facility.

There is only one access road leading to and from the site – which lies to the North – which is used by a considerable number of neighborhood residents – hence the requirement for a comprehensive controlled Traffic Management Plan to be implemented.

In the operation phase, light vehicles for transport of essential medical materials for the Health Centre will be used. This will involve transport of medical gases and fuels for the backup generator. As this is a health centre, the Ambulance service vehicles will be a significant feature of the operational phase, transferring patients to and from the facility. Transport vehicles for the medical staff and waste collection vehicles will also be major features of the operational phase.

7. LOCATION AND SCALE OF THE PRESCRIBED DEVELOPMENT

7.1 GPS maps and plans of the location and boundary of the project

The figures 7 and 8 show the location of the project. Figure 7 shows the general location within the general Naha I suburb and surrounding areas. Figure 8 shows a close-up view of the site and its boundary.

Figure 7. Location of project site in the Naha suburb of East Honiara
Map source – Google Earth – 2023

Figure 8 – Close up view of the project site at Naha One
Map source – Google Earth - 2023

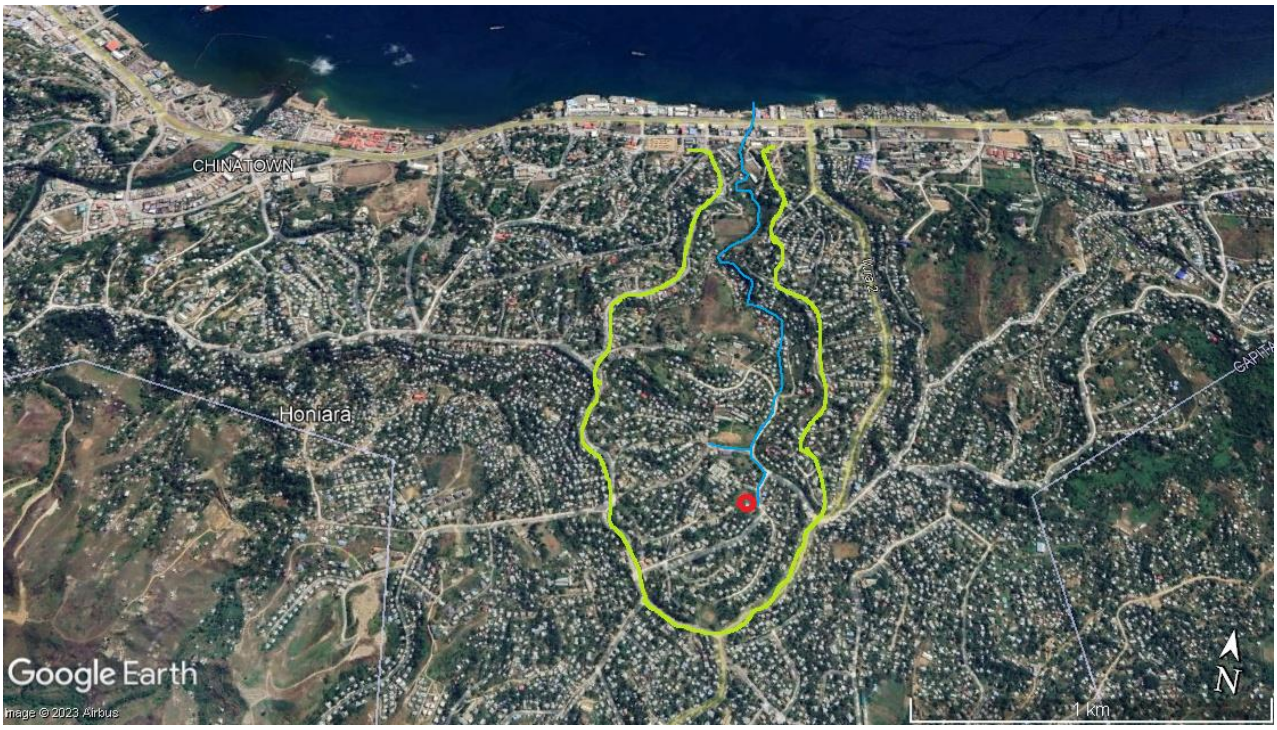
7.2 Honiara Local Planning Scheme and proposed development

The Honiara Local Planning Scheme exists and most development activities should be done and located following requirements of the scheme. The Naha suburb is a designated residential area with some commercial operations and institutions. The current Naha urban clinic has been located in this site as an essential health service for the urban population within that area of the city for a long time. This project will be located within the same site location and blends in well with exactly the same purpose and function. The HCC has already granted its Development Approval and Building Permit (Annex 3 and 4), which means that the HCC who is responsible for managing the local planning scheme has sanctioned this project under the requirements of the scheme and has seen it fit for the action it has taken.

7.3 Location of the proposed project relative to existing features

7.3.1 Watercourses and water bodies

There are no major water courses or water bodies in close proximity to the project location or are connected to it as seen other catchments in Honiara. Drainage systems from within the Naha valley residential areas developed and connect into a water course within the catchment and goes past beside the Kwaimani building in the lower section of the catchment before eventually dislodging to the sea just west of the Kambani Blo Umi Buidling at the Kukum coast. The water course is sometimes referred to as the Kukum stream. See figure below.



Map of Honiara indicating the Naha catchment (light green) and the drainage systems that developed into a water course in the catchment (commonly referred to as the Kukum stream (in blue).

The following are some of the water courses and bodies closer to the catchment area within the Honiara east area.

Panatina stream – The Panatina stream dislodges to the seacoast between the Panatina Plaza and the SINU Kukum campus.
Vura stream – This is more like a drainage system than a stream. Drainages from the upper Vura areas dislodge into this stream which runs to the seacoast next to the Didao refilling station at the Fishing village.
Kukum stream – This stream dislodges to the seacoast at the west end of the existing Kwaimani Building and has its head sources from the inner Kukum and Naha areas. Drainages from Naha 1 area including the project location join to this stream system. Surface water and liquid wastes from the project location can therefore flow to the sea through this stream system.
Matanikau River – This River is within the central location of Honiara and is the second largest (to the Lunga River) in Honiara. Its headwaters originate from upper Matanikau or upper Tuvaruhu areas. Its river mouth is just west of the No.9 National Referral Hospital.
Marine sea coast – The marine sea coast is about a kilometre downstream of the project location to the north and is the recipient of so much urban litter and wastes from the immediate land sources.

7.3.2 Infrastructure and transport components.

As the project site's location is within the existing Naha Urban clinic area, all essential infrastructure required for the project development and its eventual operation already exist within the site or are linked to the project site. These are briefly described below.

Roads

The development project site is already connected and linked to the Honiara road network and accessibility is excellent. The project site can be easily accessed using the current road networks. Immediate to the project location is the tarsealed Naha 1 main road that runs from the Kombito road junction and down towards the Naha Police station. The site is hence accessed midway from this road through a coronus feeder road a few metres to the south. From the Kombito road junction, the road links to the main Prince Phillip Highway to the northern coast via the Vura road. Links to the project site from the southern areas of Kola Ridge and Borderline road junction is through the Kola Ridge road that connects to the main coastal Prince Philip (Kukum) Highway. The coronus feeder road that connects the site to the Naha 1 road will be subjected to substantial project activities and will be upgraded to an improved standard. The main route to be used during the construction will be known when the contractor has been selected. See figure 9.

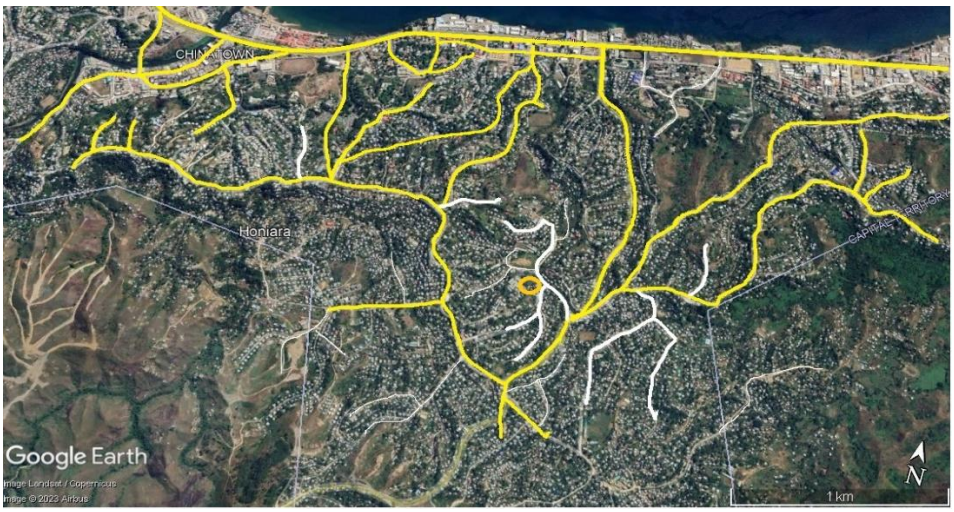


Figure 9 – Project site location and Honiara main road network
(Map source – Google Earth 2023)

Electrical Power Transmission Lines

Electrical transmission lines of the Solomon Power exist in the area and connected to the existing Naha urban clinic. Improved connections will be required for the new facilities of the development project. This grid is shown on figure 10.

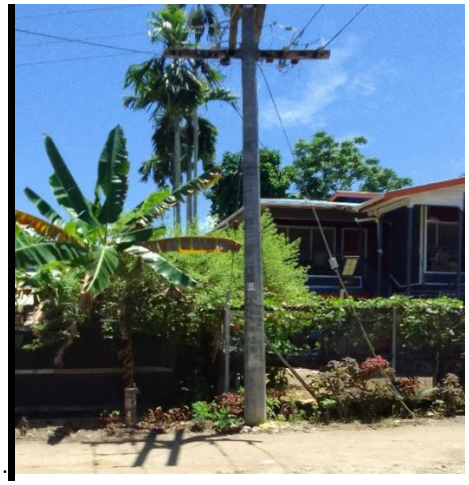


Figure 10 – Electrical power lines connected to project site

Water Pipelines

The Solomon Water (SIWA) pipelines also exists and is already connected to the site. It will need further improvements to meet the requirement of the development project. The related sewage pipeline is shown on figure 11.

Figure 11. Naha Residential area sewage pipeline distribution

(Source: Solomon Water, 2022)

Airports

All air transport access for Honiara and Guadalcanal is served by the Honiara International Airport at Henderson, east Honiara. The airport also has a domestic terminal that serves the domestic needs component. All the projects' need for air transport access will be served through this airport.

Ports

The Honiara sea port serves the sea transport access needs of the Honiara, Guadalcanal and the whole country. This port comprises the international and domestic ports and thus serves both international and domestic shipping needs and requirements. The sea port is continuously improved to cater for the country's growing development needs. All the projects' sea transportation access needs will be served through this port. Along the Ranadi sea coast to the east of Honiara, there are private wharves and jetties that serve the private sector own needs.

Telecommunications

Land line telecommunications exist and are connected to the project. Mobile communications towers exist within the Honiara areas including the project location and its suburbs. Cell phone access and most digital electronic access are very good for the project location and its communication requirements. See figure 12

Figure 12. Kombito communication tower

7.3.3 Other features of existing or past land use

Commercial development and facilities

As the project development location is designated a residential area, there are no large commercial development facilities operating in the suburb, or its surrounding suburbs. Medium sized and small retail outlets that serve the immediate needs of the suburban population are all that exist as commercial facilities in those areas.

Residential areas

The Naha 1 suburb is a residential area and is so designated, under the HCC urban zone planning controls. This residential area is currently served by the existing Naha urban clinic. This development project with its birthing clinic and the new urban health centre will be of a high standard and will add some positive effect on the aesthetic value of the surroundings. Surrounding the Naha I area are all residential areas such as Kombito, Kola Ridge, Vura and upper Kukum. Some of the nearby residential areas however are unplanned settlement areas that have developed from temporary occupation licenses or squatters' settlements.

Cultural or sacred sites

This assessment has not been able to ascertain any significant cultural or sacred sites within the project location or its nearby surroundings. These can only be known from the original landowners of Guadalcanal. The areas however may have hosted such sites or assets in the past but these have been non-existent for now. As the construction proceeds, the developer through the SIIP will liaise with the Ministry of Culture and Tourism to establish any action that might need to be taken in relation to this issue.

Social Institutions

Even though Naha is a residential suburb there are existing institutions that serve various functions for the community in the suburb. These include schools, churches and a police station. The school is a Community High School (CHS) comprising a primary level and secondary level. The Naha CHS serves students up to year 12 (form 6). Established churches within the area include the United Church, SSEC and SDA churches. The Naha Police station is the closest to the project site, about 200m to the north of the project location. See Figure 13

Figure 13 – Naha Police Station

Roadside vendors.

Throughout Honiara, a new concept has taken root and is currently uncontrolled by the authorities. This is the business of road side vending which seems to be carried out mostly by the unemployed and the low income earner segment of the population, at least in the urban Honiara population. These exist along the road sides especially in the residential areas. In certain areas, the activity has become long term mini-markets for vegetables and market products. The examples of this that are closer to the project location is the Kombito bus stop location and the Borderline bus stop. This activity has been significant in Honiara and reflects the need for cash and relates to other socio-economic issues. (Figure 14)

Figure 14 – Kombito bus stop roadside vendors

Food gardens

Residents in residential areas usually grow some food crops in the spaces outside their residential homes or back yard and this includes items such as cassava, banana and slippery cabbage. This supplements their need for a healthy diet or nutrition and eases the burden of bearing the cost of food from retail stores and the central market. Within the project site, this activity is evident and there are still cassava plots existing in the site. Fig.15.

Figure 15 – Cassava plot inside fence at project site

Urban food trees

Not only are there food gardens in the backyard but there are also food trees planted within the immediate surrounding areas. These can be seen all around the residential areas with Mango, Star fruit, Coconut, Avocado, Soursop and Cut nut trees. A large Avocado tree exists within the identified car park area of the site These not only serve a continuous supply of healthy food supplements within the urban setting but serve other functions such as shades and other natural ecosystem services.

Sports ground

Established sports grounds are features of many communities especially where they can play their favourite games, soccer, netball, basketball and volleyball. Within the Naha area these seems to be absent in the past until last year when a new facility was constructed between the Police station and the Naha CHS. This has been said to serve the Pacific Games 2023 programme after which it can be used by the residential communities.

Figure 16 – Sports ground between Naha Police station and Naha CHS (northern background)

7.3.4 Community lands and nearby communities

The project development site or location is within and surrounded by urban residential areas within Honiara city and as such, there are no community lands or villages nearby. There are even no community lands next to the site or near to it as all residential areas within the Honiara boundary are now owned by the government and there are no community lands as defined and as intended for in the environment act and regulation. Outside of the city boundary, however, there are community lands, as well as local communities or villages. These are mostly a few kilometres to the south of the project location going towards Mount Austen (Mabulu).

7.3.5 National parks, protected areas, or other environmentally sensitive areas

National Park and Protected areas

The only natural protected area in Honiara is the Honiara Botanical Garden. There is no other and there seems to be no existing area that has been reserved for any further natural or national park. The only site of such nature near Honiara city is the degraded Queen Elizabeth National Park at Mt Austen (Mabulu) at the back of Honiara. To the immediate northeast of it is also the newly established World War II Bloody Ridge Memorial Park. Both of these are far and are some few kilometres to the south of the project site.

ESAs (Environment Sensitive areas)

There are no ESAs nearby that could be directly influenced or impacted by the development project or vice versa, in any significant way. The Honiara-Kukum marine seacoast to the north, however, remains the major environment sensitive areas that exist in the broader Honiara area. It is 1.6km to the north of the project location and is considered a distant ecosystem to have much bearing to the project location, due to the nature and size of the development project. The marine seacoast nevertheless is slowly being degraded due to man-made coastal erosion and uncontrolled and poorly managed developments along the Honiara coastal areas. Honiara does have other ESAs such as the rivers, streams and wetlands or swamps but these are considered far from the project location.

7.4 The project site

7.4.1 Elevation

It may be seen from the various maps and figures included in this report, that the Naha 1 project site, is located in a lower elevation valley between the Panatina Ridge to the east (Kombito being its furthest west extension), Kola Ridge to the south and west and Vura Ridge to the northern edges. The site assessments showed about 41 – 47m ASL.

7.4.2 Slope

The whole project site is on a gentle slope of about 30˚ (58%) prior to the earlier works. The specific site has now been levelled. Only the eastern front of the current urban clinic still retains this slope gradient.

7.4.3 Soil type.

The soil type of the site is of the Honiara beds and the Kombito Marl Formation. These are basically made of sandstone, mudstone and conglomerates. The geodetic survey team had actually encountered the site rock types that are made of these soil types. Their drill results has also confirmed the rock mass to be highly weathered and disaggregates into soil when disturbed. Their work also observed that the site is overlain by mudstone, sandstone and conglomerate of the Honiara beds/Kombito formation. The soil surface is well exposed from earlier earthworks in many parts of the site where the soil type is easily observable.

7.5 Natural hazards relative to Project site

7.5.1 Coastal inundation and/or erosion

The development project site being located 1.6km in land is not affected by the coastal hazards.

7.5.2 Sea level rise

As the project is located in inland at 1.6km from the Honiara -Kukum coast, the project will not be affected by sea level rise.

7.5.3 Cyclones

The Solomon Islands is subjected to an annual cyclonic season from around November to March. Existing data and experience indicated that most of the central and eastern half of the country are usually affected as they are located right in the pathways of cyclones. The western half of the country is less impacted by cyclones than the eastern half. The original genesis of these Cyclones also occur in the eastern and the southern west half of the country. The cyclones including extreme weather incidences nevertheless do have significant impacts at times on all of the country resulting in severe damages and impacts. Guadalcanal being located in the central region of the country is well within the cyclone pathway and can be struck by severe cyclones. See Figure 19 and 51.

The BUHC has been designed to required Solomon Island and Australian Standards and therefore should be resistant to major cyclones.

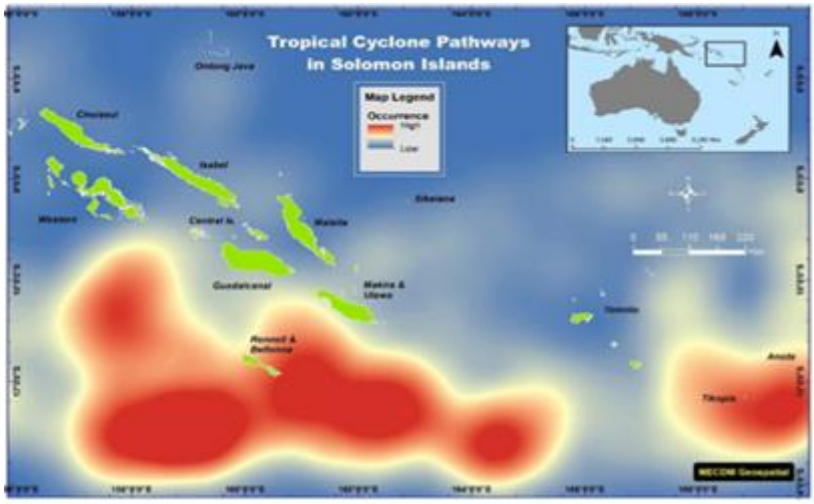


Figure 17 - Cyclone (genesis) footprints in Sol Is
Source – MECDM GIS, 2020

7.5.4 Extreme rainfall and flooding

All islands of the Solomon Islands do experience extreme rainfall and flooding during cyclones, severe storms and other extreme weather events. These events seem to be occurring on a frequent basis with increasing damages not only to the natural environment but to infrastructures as well. Guadalcanal including Honiara are no exception and have had major incidences including the 2014 April floods that saw significant damages to infrastructures (and including human deaths) along the Matanikau River catchment in central Honiara,

Flood prone areas of east Honiara are shown on figure 20b. In the northern Kukum coast, flooding does occur from excess surface run off along the main roads to the coastal areas (figure 20). This area is just an extension from the eastern end and is affected in the same similar manner. The Matanikau River mouth and nearby areas are also subjected to flooding and its catchment areas are also flood prone zones The same also happens during coastal inundation for those areas. The Naha BUHC project location is not in a flood prone area and would not be affected by flooding events. The detailed design of the project incorporates stormwater drainage works to manage surface water run off during extreme rainfall events..

Figure 20a – Indicative flood prone area of Kukum coast
Map source - Google

Figure 18b- Flood prone areas in East Honiara
(Source- MECDM 2020)

7.5.5 Landslide and land slip

Landslides are a frequent occurrence in the hilly and mountainous regions of Guadalcanal. It is not an issue within the Honiara areas unless the land is disturbed by unplanned human activities and or developments. Due to the topography, slope and soil type of the of Naha area, landslides are not an issue for this project as it is very unlikely to occur within the location. Landslip however remains a concern and measures will be taken to address and mitigate the issue.

The civil design for the new facility has considered and accounted for all ground conditions and potential land slip.

7.5.6 Earthquake and tsunami

Earthquakes are frequent as the Solomon Islands is right within the Pacific 'Ring of Fire'. All forms of developments throughout Solomon Islands, therefore, are subjected to the inherent risks and hazards due to earthquakes. Tsunamis due to earthquakes are also observed in the country and do cause major coastal damages to the natural environment and infrastructures. The proposed medical health facilities have been designed to adhere to accepted Solomon Island and New Zealand Codes and have taken impacts of earthquakes into account. The site's location away from the coastal zone keeps it safe from Tsunamis of the type that have been observed so far in the country. Earthquake footprints for Solomon Islands are shown on figure 21.

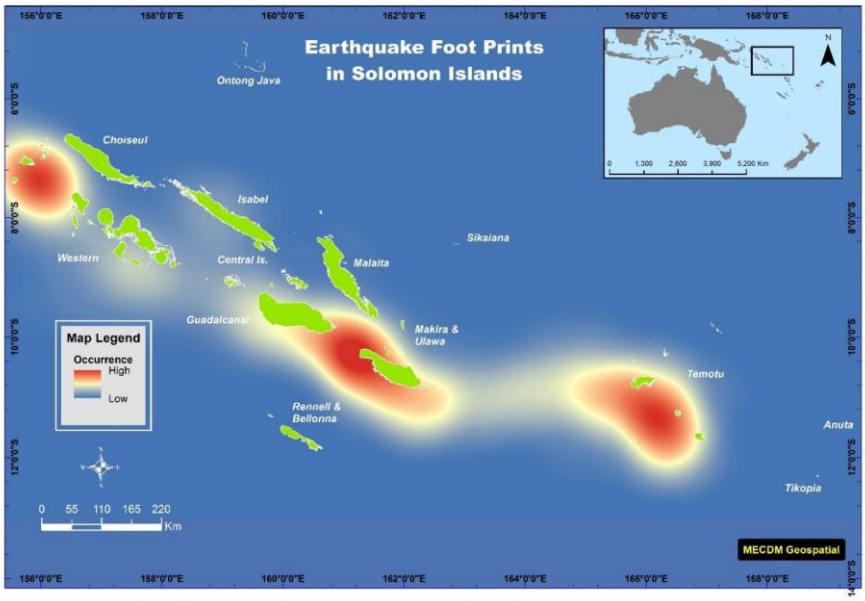


Figure 19- Earthquake major foot prints in Solomon Islands
Source – MECDM 2020 –Quoted in E.Koli – BUHC Proposal Application (draft)

7.5.7 Volcanic activities.

The active Savo volcano on the island of Savo which is located to the North West of Honiara, remains the only volcano that presents risks to the western half of Guadalcanal and Honiara. The volcano has erupted in the past and continues to present risks to the Honiara population. For the time being, the risk from the volcano is considered low and people themselves are still living on the island itself probably due to this reason.

7.6 Project site and transportation routes

The map on figure 22 shows the major Honiara Road network and their linkage to the project site (orange circle). Specific sections of the roads linking to and from the project site will be the major transportation routes for the project. Specific routes will be given by the contractors who are yet to be selected.

Figure 20. Site location (orange circle) relative to Honiara major road networks for transportation routes
Map source – Google Earth - 2023

7.7 Photographs of the proposed project location

Pictures from the project site and adjacent areas are given in the figures below.

Figure 21 Naha 1 road going to project site from Kombito bus stop

Figure 22 -Foundations from earlier phase, looking east from south hill

Figure 23 – Foundations from earlier phase works and Naha 1 east side residence

Figure 24- Existing Naha Urban Health Clinic

Figure 25 – Existing eastern gate to proposed Car park area

Figure 26 – Feeder road directly next to site on northern boundary

fig Figure 27 – Feeder road going to project site and offside drainage

Figure 28 – Main Naha 1 road junction going to site

Figure 29 – Coronus feeder road from Naha 1 main road looking at project site

Figure 30 – Foundations works from earlier phase looking from east section

Figure 31 – Foundations from earlier phase looking north from Existing clinic

Figure 32 – Earlier phase foundation works looking west from existing clinic

8. DESCRIPTION OF THE ENVIRONMENT

This part of this PER provides the general baseline conditions of the existing environment in the project site and its surrounding areas where its area of influence is considered applicable. The description where possible, includes the interactions between these different components and the importance of such relationships.

METHODOLOGY

The general methodology used for the collection of information for this part are as follows:

- Desk top study
- Field reconnaissance and assessment
- Field investigations
- Internet Searches – websites
- Interviews and consultations – with stakeholders and individuals
- Use of existing maps
- Mapping on site
- Examination of plans and strategies

8.1 PHYSICAL COMPONENTS

8.1.1 General Geography

Guadalcanal hosts the country's capital territory, Honiara. It is the largest of the six major islands in the Solomon Islands archipelago, with a land area of about 6475 km^2. Its rugged mountainous interior are aligned more towards the southern parts of the island with a distinctive and productive lower plain characterizing the north east half. The mountainous region comprises the highest summits found in the country with the highest at 2450m. The mountainous ranges are drained by large, long but shallow meandering rivers that run in a north easterly directions that feed into the northern plains, forming major catchment systems on the northern section of the island. The northern plains are sheltered from prevailing trade winds by the mountainous ranges in the south which form a rain shadow area in the northern section that experiences true dry seasons. The southern 'weather' coast of the island usually records the highest rainfall in the country due to its exposure to the prevailing trade winds.

Honiara is located in the western border of the Guadalcanal plains, where the hills begin to rise towards the interior on the west part of Guadalcanal. Honiara is basically characterized by a narrow coastal strip that extends from the eastern end and runs along the coast to the western part of the city. Small hills that predominate its surface topography were previously coral reefs that have risen in geological time. The hills are dissected and comprise of a mix of narrow ridge tops and terrace surface to wide ridges with gentle slopes. A number of average sized rivers and streams dissect the Honiara area. These include the largest one being the Matanikau River. In the eastern end of Honiara, (but outside of the city boundary), is the large Lunga/Mbetikama River, one of the longest rivers on the islands and probably in the country. The other streams from the eastern end are the Betivahalo (Burns Creek), Panatina, Vura, Mbokona, Rove, and White River streams. The Kakambona River is at the western end of the city area (but is also outside of the city boundary). In the coastal sections, the soils are basically sandy loam and calcareous stones. *(DDC, 2011)*

8.1.2 Climate and implications of climate change

The climate of Guadalcanal, as with all islands of the Solomon Islands is tropical but is also influenced by prevailing trade winds. This interaction between a tropical climate and prevailing trade winds causes certain parts of the islands, especially the northern plains to experience two distinct seasons on annual basis, a true dry season and a wet season. The wet season occurs from November to March and the dry season, from April to October. The mountainous region of the island would usually receive more than 6000mm of rainfall whilst the lower foothills would receive around 3000mm of rainfall. In the plains the rainfall record is lower at 2000mm per year.

Rainfall for Honiara follows the distinct seasons as described above with high rainfall in the early and late part of the year and lower rainfall in the middle of the year (see figure 35). Temperature for Honiara is consistent throughout the year as are all parts of the country. Night temperatures can go down below 20ºC. In the long term, temperature trend for Honiara is increasing which may be due to climate change. At the same time, average annual rainfall is also decreasing in the long term. Cyclones and extreme events are decreasing in frequency but increasing severity.

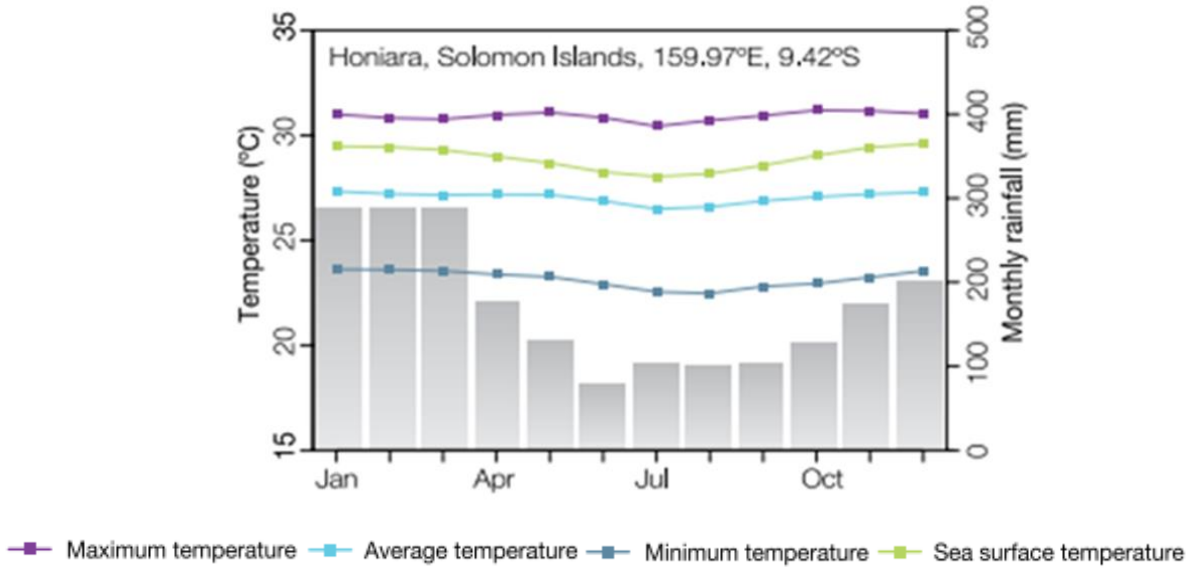


Figure 33. - Average monthly rainfall in Honiara

Source - PACCSAP

The Solomon Islands, through the government, NGOs and other stakeholders continues to address issues relating to climate change. Its recognition of the importance of climate change to the country's future, gave rise to the Government's adoption of the latest Climate Change Policy 2012–2017, which itself is also aligned to the National Development Strategy 2016–2035. Effects of climate change is already happening in Solomon Islands through observed and actual trends of increasing temperature, decreasing precipitation, changing patterns of weather and extreme events, and accelerated coastal erosion due to rising sea levels. These changes in climate bring challenges and affects some of the most important sectors in the country including agriculture, fisheries, biodiversity, water resources and people's health.

Some efforts have identified a range of impacts which are projected to affect many sectors in Solomon Islands including[6]:

- Small islands will be very vulnerable to sea level rise and extreme events.
- Sea level rise will increase rates of inundation, storm surges, erosion and other coastal hazards and will threaten infrastructure, settlement, coastal food stock and facilities supporting livelihoods.
- Water resources are likely to be seriously affected.
- Coral reefs, fisheries and marine-based resources will be heavily impacted.
- Species is starting to be lost or replaced due to warming in higher altitudes.
- Subsistence and commercial agriculture will be adversely affected.
- Effects on tourism are likely to be direct and indirect and largely negative; and
- There is growing concern that human health will be impacted, mostly in adverse ways.

Predicted future climate for Solomon Islands as per IPCC:

- Temperature is projected to increase in the range of 0.4–1.0°c by 2030.
- Average annual and seasonal rainfall projected to increase.
- Extreme rainfall periods will occur more often and be more intense.
- Less frequent but more intense cyclones including increase in average maximum speed and possible increase in rainfall intensity.
- Sea level will continue to rise and impact of storm surges and coastal inundation.
- Ocean acidification will continue to increase and affect health of reefs.

This development project is not expected to have significant adverse impacts on climate or climate change. Any impacts are considered insignificant due to the nature and size of the development project. The project itself may however be impacted by the increasing impacts related to climate change due to its location. This can be from events such as high rainfall or strong wind events during cyclone events or during extreme weather events. Increasing heat in the long term will also have adverse impacts. More details on climate change are given on chapter 10 on Climate Change and Disaster Risk.

8.1.3 Topography

The development project location is characterized by small hills surrounded by the narrow ridges of Kola to the south west, Panatina to the east and Vura/Kukum to the north. It is hence located on a valley formation now referred to as the Naha valley. Prior to the earlier phase of this development which had completed earthworks and foundations for an earlier design of the BUHC, the project site has a gentle slope as on the current small hill where the current clinic is located. Following the activities of the earlier phase referred to above, the site has now been levelled and the BUHC will be located on a levelled piece of land that is about 3 m above the present road ground level. The general elevation at the project site is about 41 m above sea level. Its highest point may about 50m ASL. Higher level elevation characterizes the surrounding ridges. The elevation then rises from these areas southwards behind the Honiara hills and ridges.

8.1.4 Geology

Guadalcanal is geologically complex than all of the islands in the country. Its basement consists of two lithological types: the basalt dominated Mbirao group and the Guadalcanal Ultrabasic Unit. The cover sequences range from the Oligocene-Miocene, highly phyric calc-alkaline Suta Volcanics; the Poha Diorite; Kavo Greywacke beds; Mbonehe and Mbetilonga limestone Formation; the Plio-Pleistocene Gallego Volcanics of West Guadalcanal and Gold Ridge Volcanics. This formation are further overlain by the Pliocene

[6] State of Environment Report, Solomon Islands 2019

Mbokokimbo Formations of Central-east Guadalcanal and Koloula Diorite Complex; overlying this deposit are the Quarternary – Recent sediments which are dominated by the alluvial deposits around the Guadalcanal Plains as well as Honiara beds that are represented by raised coralline reefs up to 800m above sea level.

In the Honiara area, the predominant systems are the Lunga and the Honiara beds. The Lunga beds are made up of a lithosome of three distinct facies: in the south the Plio-Pleistocene Mataniko siltstones comprise of volcanic arenites and wackes with turbidite features. Around Honiara and Mt Austen, the Pleistocene Honiara Beds form a sequence of calcareous volcanic arenite and rudites which phase westwards into the Saghalu Conglomerates that form a mantle of volcanoclastic rudites derived from the Gallego Volcanics in the northwest. The northwest Marls are a lagoonal back reef facies of the Honiara beds. In the town area, the Honiara beds are capped by about 60m of coralgal biolithite and derive debris, the Honiara Limestones. These are associated with a series of terraces, ranging in height from 700m above sea level to 100m below. Most of the coast is fringed with dead coral which is being swamped by alluvium derived from the major rivers. Extensive alluvial valleys occur along the courses of the Lunga, Poha and Umasani rivers[7]. Details are as shown in figure 36 which is a geological map of the Honiara and surrounding areas in north Guadalcanal (*Didao PER, 201).* The project is composed of the Pleistocene Honiara coral reef limestone.

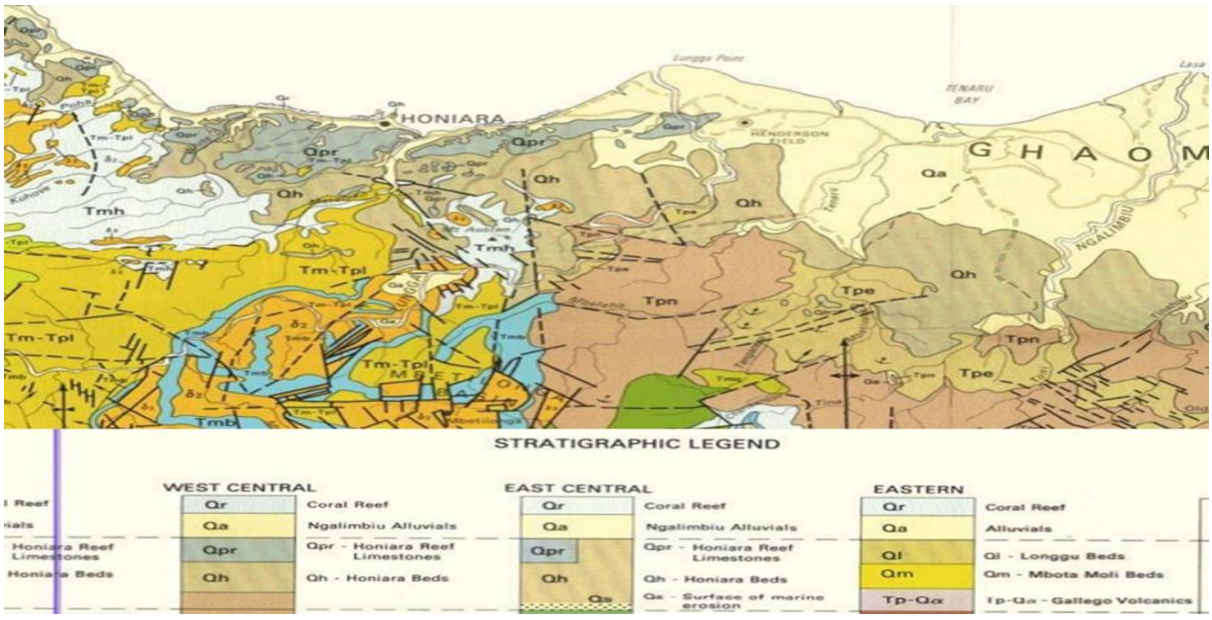


Figure 34 - Geological map of Honiara areas and adjoining areas of Guadalcanal
Source: Guadalcanal Map Sheet GU 4 and GU 5, Geological Survey Division, Solomon Islands

[7] ibid

8.1.5 Air

Air quality throughout Solomon Islands is excellent as there are no large industries to influence air quality significantly. In the urban areas of Honiara, there could be some differences mostly due to Carbon Dioxide levels and dust particulates, but in the rural areas there are no major concerns on air quality. In the project site, this is usually determined by wind directions and diurnal conditions within the area. There are no air quality records available for Honiara and the rest of the country to enable further analysis of air quality.

Air quality will be affected by the construction activities including from working transport vehicles. This exercise was not able to establish any air quality baseline within the project site or surrounding areas. Where possible this should be done as the work progresses as part of any ongoing monitoring regime for the project. This requirement should be covered on the detailed EMP for the project.

8.1.6 Noise and sounds.

The Naha one suburb is a residential area and as such is mostly a quite area typical of urban residential areas. The sources of noise and sounds usually comes from the residences and traffic along the roads (main, access and feeder). Typical noise levels from common zones in the country are provided in the table 1 and figure 35 below. Noise levels will be monitored during the construction and operation levels. It is sure that noise levels will increases during these development phases.

Table 1 – Mean noise level on some common zones in Solomon Islands

Zones	Mean Noise (dB)
CBD	59.44
Honiara Residential	44.33
Rural Setting	43.24
Park	42.44
Industrial	58.27
Forest Jungle	35.05
Highway	68.53

Source for table 1 and fig 35 – E.Danitofea, MECDM

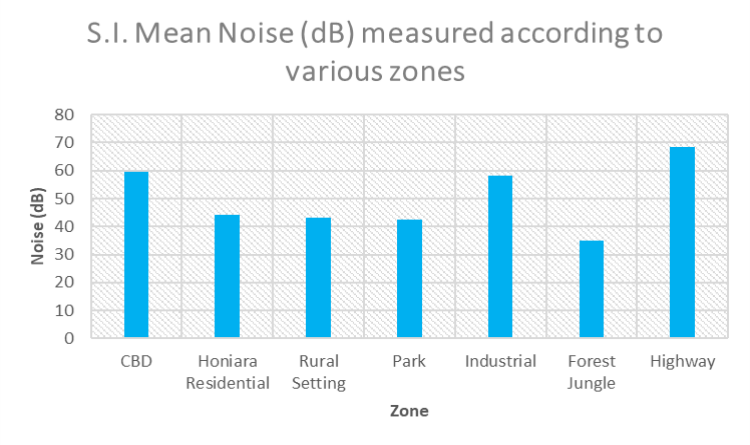


Figure 35 – Graph of mean noise level in common zones in Solomon Islands

8.1.7 Surface waters

The Honiara area is characterized by a mix of rivers and streams that run in a northerly direction and discharges into the northern coasts. These rivers and streams are, from East to West: Lunga River, Burns Creek stream, Vura Stream, Matanikau River, Mbokona stream, Rove stream, White River Stream and Kakabona River. Within the city areas most of the streams are heavily polluted and contaminated by urban wastes and most probably sewage and feacal wastes as none of these sewage are processed prior to disposal to the marine environment. Some water quality assessment of certain water sources in the coastal areas of Honiara found that certain spots are quite polluted[8].

Some of the rivers and streams are used for domestic purposes by the Honiara population mostly residing in the upper catchment areas of the streams or rivers. The large rivers, especially Lunga, Matanikau and Kakabona Rivers are used quite a lot for various domestic purposes but they are also of poor quality. The use of such surface waters is due to some settlement areas having limited access to safe water. Many rural areas of the Solomon Islands do have the same issue of access to safe water as there are limited access to improved water supply.

For this development project site, this assessment exercise carried out a baseline study on the physical characteristics of soil and surface water to establish some baseline for the project. This will be important for further data collection for monitoring purposes. The baseline study and results are given below.

8.1.6.1 Baseline study on the physical environment (soil and surface waters) of the Naha BUHC project

Survey design and methodology

1.1 Methodology

The survey was designed to collect data on the physical and chemical parameters of the soil on the project site as well as the physiochemical parameters of the surface water close to the construction site of the project. The survey was also extended to obtain the microbiological contaminants of the surface water that is situated close to the project site as depicted on the map (figure 37).

1.2 Survey Sites

The study on soil quality is carried out in three different locations denoted by S1, S2, and S3. Similarly, the study on water quality is also carried out on three different sites and is denoted by SW1, SW2, and SW3. (See satellite aerial map figure 36)

1.3 Study Design

There are three sites identified for soil sampling. The sites selected were determined based on the degree of impact the project will have on the environment.

1.4 Soil Samples

S1 – This site acts as the control of the study and it is located at the base of a slope just behind the clinic. A soil sample of this site was collected for analysis.

[8] Rapid assessment of Mataniko River catchment report

S2 – This site is located 5m N in front of the project site and soil samples are collected for analysis.
S3 – This site is ~30m N from the project site and is selected because soil erosion from runoff will be transported to this site.

Figure 36 ESA Sampling Points

1.5 Water Samples

SW1 – Water samples collected from this site are extracted from a running stream that collects runoff from the project site.
SW2 – This site is a live running stream that collects runoff from site SW2 as well as from the project site.
SW3 – This site is taken as the control of the baseline study. This stream is moderately active and runoff from the project site will not have any direct impact on this stream.

RESULTS AND DATA ANALYSIS.

Soil Sample

Table 2 - Physical & Chemical Parameters - Soil

Site	GPS Coordinates		Elevation	pH	Electrical Conductivity	Moisture	Phosphate PO_3^-	Iron Fe
	Latitude (E)	Longitude (S)	(m)		(µS/cm)	(%)	(mg/L)	(mg/L)
S1	-9.4458785 °	159.9861201 °	42.57	8.44	41.6	5.17	< 5.0	0.201
S2	-9.4456247 °	159.9856236 °	42.07	7.97	114.6	3.92	< 5.0	< 0.200
S3	-9.444886 °	159.9856919 °	40.88	8.20	78.5	3.96	< 5.0	< 0.200
Analytical Method				APHA Standard Method 4500-H^+	APHA Standard Method 2510	AOAC Official Method 925.40	EPA Method 365.1, 365.3	Hach Method TNT 858

Water Sample

Table 3 - Physiochemical Parameters - Water

Site	GPS Coordinates		Elevation	pH	Dissolved Oxygen	Electrical Conductivity	Total Dissolved Solids	Total Suspended Solids	Turbidity	Salinity	Apparent Color
	Latitude (E)	Longitude (S)	(m)		(mg/L)	(µS/cm)	(mg/L)	(mg/L)	(NTU)	(ppt)	(PtCo Units)
SW1	-9.4449995 °	159.9856852 °	40.88	7.54	6.27	761.4	425.5	17.70	24.2	0.365	83
SW2	-9.4429580 °	159.9859243 °	40.88	7.35	8.17	494.4	281.5	3.26	3.85	0.229	20
SW3	-9.4443740 °	159.9843140 °	39.38	7.75	8.02	568.4	325.5	143.20	239	0.266	840
Analytical Method				APHA Standard Method 4500-H^+	APHA Standard Method 4500-O	APHA Standard Method 2510	APHA Standard Method 2540 B	APHA Standard Method 2540 D	APHA Standard Method 2130 B	APHA Standard Method 2520 B	APHA Standard Method

Table 4 - Chemical Contaminants - water

Site	GPS Coordinates		Elevation	Chemical Oxygen Demand	Phosphate	Iron	Nitrite	Ammonium	Chromium	Lead
	Latitude (E)	Longitude (S)	(m)	COD (mg/L)	PO_3^- (mg/L)	Fe (mg/L)	NO_2^- (mg/L)	NH_4^+ (mg/L)	Cr (mg/L)	Pb (mg/L)
SW1	-9.4449995 °	159.9856852 °	40.88	< 3.0	< 5.0	0.737	0.25	> 1.50	0.051	0.91

SW2	-9.4429580 ◦	159.9859243 ◦	40.88	< 3.0	< 5.0	0.266	0.23	< 0.02	0.042	0.12
SW3	-9.4443740 ◦	159.9843140 ◦	39.38	< 3.0	< 5.0	0.418	0.30	< 0.02	0.053	0.23
				APHA Standard Method 5220 D	APHA Standard Method 4500-P	Hach Method TNT 858	APHA Standard Method 4500-NO_2	APHA Standard Method 4500-NH_3	Hach Method TNT 854	Spectroquant Photometric Method 1.09717

Table 5 - Microbiological Contaminants

Site	GPS Coordinates		Elevation	Total Coliform	E. Coli	Enterococci
	Latitude (E)	Longitude (S)	(m)	(MPN/100ml)	(MPN/100ml)	(MPN/100ml)
SW1	-9.4449995 ◦	159.9856852 ◦	40.88	> 1600	> 1600	3260
SW2	-9.4429580 ◦	159.9859243 ◦	40.88	> 1600	> 1600	11200
SW3	-9.4443740 ◦	159.9843140 ◦	39.38	> 1600	> 1600	8660
Analytical Method				APHA Standard Method 9223 B	APHA Standard Method 9223 B	APHA Standard Method 9230 D

Data Analysis

S1 is moderately alkaline and this could have been attributed to the source of the parent rock of this site which is mostly limestone which was exposed during the excavation of the project site. Sediments eroded from the limestone have been transported to the base of the cliff at the back of the construction site. It is also notable that this site has slightly higher moisture because of the high waterlogged at the construction site.

The low dissolved oxygen observed at SW1 is due to its high salinity as depicted in figure 3. The high TDS and TSS observed at this site is quite obvious as it is the main catchment area that receives sediments from runoff from Naha Main market as well as residential living close to the project site. The same explanation can also be provided for its high turbidity and apparent color observed at this site.

At site SW3, it has recorded a high DO because its salinity content is slightly lower as compared to SW1. Obviously, it has a high TDS and TSS due to the runoff of sediments from the construction of the playing group that is adjacent to the stream from which sample SW3 is obtained.

Ongoing data collection

This result has established some baseline conditions for the soil and surface waters in relation to the project site and the development. As the work progresses and goes into eventual operation, this work will need to continue under any existing monitoring regimes for the development project.

8.1.7 Ground waters

The topography of most land defines the physical limit of ground water resources for oceanic islands such as the whole island of Guadalcanal. Locally at the project site, the nearby hills and ridges would have certainly contributed to the formation of the aquifers or groundwater systems. The steep ridges behind the site could contribute to fast groundwater flow and deep ground water lenses below the land's surface.

This assessment could not perform any ground tests within the time available. The geotechnical investigation team had indicated that ground water was not encountered at their drill testing sites even at a depth of 2 m. Water was only collected after the drill sites was left for some time. This is probably due to the low permeability of the soils on site.

8.1.8 Coastal waters

Coastal waters play a significant role in the lives of Solomon Islanders in many different ways. It is a major reservoir of rich biodiversity resources and is one of the main sources for the people's livelihoods and income generating activities. It also plays a significant role in the culture of the communities throughout the country.

There is increasing anecdotal evidence that this system is increasingly affected by the growing human population and their development activities. This is manifested in the decreasing status of the coastal water quality and the status of resources therein. Poor coastal water quality has been reported in a number of coastal areas through the work of researchers and project based surveys. It has been alleged that this is due to logging activities, mining, waterfront developments and waste management in some localities (SI SOE, 2019). The coastal waters are also affected by other issues such as increasing sea surface temperature, sea level rise, acidification, resources over-exploitation and plastic pollution.

8.1.10Soil

Land systems and soils of Solomon Islands were surveyed and studied by the colonial government in the past through The Land Resources Division of the Ministry of Overseas Development of the United Kingdom. This remains the major source of information and knowledge on land systems and soils in the country. This major work involved the mapping of the land systems and soils by Hansell and Wall (1976) and Wall et al (1979) who identified and mapped a total of 27 groups of soils in the country using US soil taxonomy.[9] The Guadalcanal Plains has the recent alluvial which is the most agriculturally important soils and are the most fertile in the country. In general, the soils of Solomon Islands are rich in nitrogen, phosphorus and organic carbon but relatively poor in magnesium and potassium. Phosphorus is most abundant in soils on limestone and in those on basic and ultrabasic rocks and organic matter is an important component in the top soil where the bulk of the soil nutrient are trapped. The soils generally, have good structure, well drained and are usually deep.[10]

The soil type of the site is of the Honiara beds and the Kombito Marl Formation. These are basically made of sandstone, mudstone and conglomerates. The geodetic survey team had actually encountered the site rock types that are made of these soil types. Their drill results has also confirmed the rock mass to be highly weathered and disaggregates into soil when disturbed. Their work also observed that the site is overlain by

[9] Solomon Islands State of Environment Report 1993.
[10] ibid

mudstone, sandstone and conglomerate of the Honiara beds/Kombito formation. The soil surface is well exposed from earlier earthworks in many parts of the site where the soil type is easily observable.

Baseline information on some physical and chemical characteristics of soil from the project site are presented and discussed on section 8.1.6.

8.2 ECOLOGICAL COMPONENTS

8.2.1 Wetlands

When Hansell and Wall (1976) first mapped the wetland vegetation in Solomon Islands the following wetlands vegetation communities were then recognized:

SALINE SWAMP FOREST

- Low mangrove forest
- Tall mangrove forest

FRESHWATER SWAMP FOREST

- Casuarina swamp forest
- Reed swamp (Phragmites)
- Herbaceous swamp
- Campnosperma swamp forest
- Mixed species swamp forest
- Pandanus swamp
- Sago palm swamp
- Terminalia swamp forest

Herbaceous swamps, Terminalia swamp forest and Pandanus swamps made up the largest areas of the wetlands then. Large wetlands which were considered to be of international significance have been identified in the past with an additional 24 other wetland areas that are known to be of special conservation value. Increased resources will be needed to work on these identified areas for formal conservation status.

The wetland records for Guadalcanal include Lauvi Lagoon in south Guadalcanal and Lees Lake in central Guadalcanal. There is need for more work to identify more wetland systems on the island. The Honiara areas itself does have existing wetland areas, many of which are swamps. Most of the wetlands areas are encroached by human subsistence or large development activities. None of these wetland systems in Honiara are protected at present and most are already degraded (SPREP 2017).

This development project is not close to any known wetland areas and is not expected to have any impacts on such ecosystems.

8.2.2 Corals and coral reefs

As a tropical oceanic archipelago, Solomon Islands is well endowed with coral reefs which plays a significant role in the lives of Solomon Islanders. The country's coral reef system is recognized globally and has placed the country as part of the ecologically important coral reef region of the world, now known as the Coral Triangle.

In Honiara, coral reefs do occur along the coastal areas but occur at deep locations. Recent assessment of these system has found that these corals are mostly degraded and are dead. The development project will not affect any coral reefs along these coasts unless significant wastes from its development or operation are dumped directly into those coral reef areas and provided the mitigation measures in this PER are implemented.

8.2.4 Protected areas and national parks

There are very little terrestrial areas protected in Guadalcanal even though there are informal marine protected areas in the Marau Sound area. The only formal and existing terrestrial site is the degraded Queen Elizabeth Park at Mount Austen (Mabulu) at the back of Honiara which was established under the old National Parks Act. To the immediate north east of it is the newly established World War II Bloody Ridge Memorial park. Both of these are far to the south of the project site and will not be impacted by the project in any way. In the project site area and surrounding project development areas, there are no protected areas to be of concern.

8.2.5 Flora and fauna

As a global hotspot for biological diversity, Solomon Islands is well endowed with diverse terrestrial and marine flora and fauna. Endemism is low in the terrestrial flora, whilst in the terrestrial fauna it is very high as seen in the country's avifauna (birds) with a record of 173 valid species of land birds which breed there.[11] This does not include the sea birds, shore birds and occasional visitors or migrants that could add a further 50 species. Almost half of the birds or forty-four (44) percent are endemic to the country. [12]

[11] Leary 1990c – SOE 1993 p16
[12] Ibid

The latest SOE report of 2019 reported a total of 24 birds and 16 mammal species that are listed as threatened on the IUCN Red List. In the mammal's group, there are a total of 53 species, of which 50 percent are endemic. This puts the Solomon Islands mammal fauna to one of the most diverse and endemic to be found on oceanic islands anywhere on earth.[13] Insects have been estimated at a record of 14,511 which include 130 butterflies (30 endemic) and 31 cicada species. There are 80 species of reptiles and twenty-one (21) identified frog species.[14] Unsustainable and poorly regulated logging is by far the most important threat to most of these and other threatened flora and fauna. (SI SOE 2019)

The development project location being a very disturbed site due to its existence in the midst of an urban environment, does not host suitable habitat for any significant flora or fauna. The location is previously dominated by grasses and other invasive species plant species but has had some changes due to the planting of food trees and food crops, ornamentals and the growth of invasive species. These have all been cleared in the site location to make way for the development. Significant macro-fauna is non- existent at the project site except for small insects, lizards and invasive birds. Domesticated animals however do roam the areas. The broader Honiara area has a notable bird community and common species that do appear on site include the Lorries. The invasive Indian myna (*Acridotheris tristis*) is the most common species and is very active but mostly causing nuisance. Other large invasive and problematic species are the Giant African snail, Marine toad (*Bufo marinus*) and the Rhinocerus beetle.

8.2.6 Forests

Solomon Islands comprises large and small islands fully covered with vegetation communities. These vegetation communities however are of different types/biomes and formations. The largest in terms of area and coverage are the forests which are mostly tropical moist rainforest. While the forest is estimated to have around 4500 species, it is low in endemism with fewer families, genera and species. There are no endemic families and only three endemic genera.[15]

A number of efforts have been completed to update the information on the country's forests to serve various national objectives. The Fifth National report to the CBD reported some works proposing the forest types or biomes comprising the following:

- Coastal strand vegetation
- Riverine forest
- Lowland forest
- Montane forest
- Non-forest communities
- Seasonal dry forest, and
- Grass land[16]

In Guadalcanal, most of the vegetation communities and forest types or biomes as presented above do occur on the island. The island, due its geological age probably hosts more forest species than all of the other major islands in the country. In the early development of Honiara, the surface cover of all the hills are covered with grass savannahs and appear more like deserts. (The grass species are actually alien invasive species). With the development and growth of the city, Honiara has recovered a form of vegetation and is now a forested city compared to the grass covered hills seen before and as can be presently seen in those

[13] Ibid
[14] Ibid
[15] ibid
[16] ibid

western areas of Guadalcanal that are still covered with grass savannahs. The vegetation near the project site and surrounding areas have come under observation for this assessment and the common species present are listed below. (Table 6)

Table 6 – Common Plant species (mostly invasive) found on location within and near the project site

	Common name	Scientific name	Family
1.	Ambarella (PÖraka)	*Spondias dulcis*	Anacardiaceae
2.	Asthma plant	*Euphorbia hirta*	Euphobiaceae
3.	Avocado tree	*Persea americana*	Lauraceae
4.	Banana (siku)	*Musa sp*	Musaceae
5.	Basil (Basa)	*Ocimum basilicum*	Lamiaceae)
6.	Bettle nut	*Areca catechu*	Arecaceae
7.	Cactus plant	*Cactus sp*	Cactaceae
8.	Carpet grass	*Axonopus compressus*	Poaceae
9.	Cassava (tovioko)	*Manihot esculenta*	Euphorbiaceae,
10.	Casuarina tree	*Casuarina sp*	Casuarinaceae
11.	Cherry	*Muntingia calabura*	Muntingiaceae
12.	Christmas tree	*Delonix regia*	Fabaceae
13.	Clover creeper	*Oxalis corniculata*	Oxalidaceae
14.	Coconut (konda)	*Cocos nucifera*	Arecaceae
15.	Croton (Jajala)	Codiaeum variegatum	Euphorbiaceae
16.	Cut nut (Veile)	*Barringtonia edulis*	Lecythidaceae
17.	Frangipani	*Plumeria rubra,*	Apocynaceae
18.	Guava	*Psidium guajava*	Myrtaceae
19.	Heliconia sp (Kokolo)	*Alpinia oceanica*	Zingiberaceae
20.	Coleus(kalakua)	Coleus saulellarioides	Lamiaceae
21.	Kangaroo grass	*Themeda australis*	Poaceae
22.	Lemon (laene)	*Citrus limon*	Rutaceae
23.	Macaranga sp (Sosoe)	*Macaranga tanarius*	Euphorbiaceae
24.	Mangoes (Zaki)	*Mangifera Indica*	Anacardiaceae
25.	Mile a minute	*Mikania micrantha*	Asteraceae
26.	Ming aralia (Makamaka)	*Polyscias sp.*	Araliaceae
27.	Noni (Kokori)	*Morinda citrifolia*	Rubiaceae
28.	Oil palm	*Elaeis guineensis*	Arecaceae
29.	Paper tree (lutu)	*Broussenetia paperifera*	Moraceae
30.	Pawpaw (manepo)	*Carica papaya*	Caricaceae

31.	Peanut	*Arachis hypogaea*	Fabaceae
32.	Periwinkle	*Catharanthus roseus*	Apocynaceae
33.	Rottler (arovo)	*Premna corymbosa*	Lamiaceae
34.	Pumpkin (Duru)	*Cucurbita*	Cucurbitaceae
35.	Rain Tree (Azu möqa)	*Samanea saman*	Fabaceae
36.	Sago palm (Atava)	*Metroxylon salomonensis*	Arecaceae
37.	Sea almond (Taleke)	*Terminalia cattapa*	Combretaceae
38.	Sea hibiscus (Varu)	Hibiscus tiliaceus	Malvaceae
39.	Sensitive grass	*Mimosa pudica*	Fabaceae
40.	Slippery cabbage (Rasa)	*Hibiscus manihot*	Malvaceae
41.	Soursop (Bareo)	*Annona muricata,*	Annonaceae
42.	Star fruit ((PÖraka)	*Averrhoa carambola*	Oxalidaceae
43.	Taro (töka)	*Colocasia esculenta*	Araceae
44.	Ti plant (Lopara)	*Cordyline sp*	Asparagaceae
45.	Water grass	*Ipomea sp*	Convolvulaceae
46.	Wild apple (kapöka)	*Syzygium malaccensis*	Myrtaceae

Local name in brackets refer to Sisiqa dialect of Senga District, North Choiseul

The plant species in the table above comprise generally of ornamental plants, alien invasives, food crops and food trees. There are a total of 46 common species that represent 29 families with Fabaceae, Euphorbiaceae and Arecaceae most represented. This assessment did not come across IUCN red listed or threatened plant species.

8.2.7 Coastal resources

Coastal fisheries plays a significant role in coastal communities for their subsistence living and livelihoods. However, there are threats which include overfishing, use of destructive practices and natural disasters. It has been seen in many urban markets that juveniles are over-represented for most commercially important species, suggesting widespread overfishing. In the Honiara coastal areas of the project site which for most purposes of this project is quite far, coral reefs are not well developed and fishing is not a significant activity. Individuals however continue some subsistence fishing within the area. This can be seen more to the eastern coastal areas of the Lunga river mouth. Sand, which is also a coastal resource is an important resource for construction and has been mined by individuals from the Ranadi sea coast for some time and has resulted in coastal erosion of the Ranadi beach. Sadly though, the coastal Ranadi beach has lost all its beach areas to commercial establishments such as jetties and timber yards. The activities of this development project will have no effect on coastal areas and its resources.

8.3 ECONOMIC COMPONENTS

The Solomon Islands economy is mostly based on primary industries such as agriculture, fisheries, forestry and mining. There is a small manufacturing industry with tourism and other service industries also serving

and contributing to the national economy. As a small economy, Solomon Islands is heavily influenced by external factors which is beyond its own control. The importance of the natural environment is a clear case in Solomon Islands as its economy and hence its GDP is heavily dependent on the exploitation of natural resources.

In 2019, the largest contributors to rural incomes and government revenue were the agriculture and forestry sectors.[17] Economic performance during that year was muted at 1.2% due to the fall in export prices of the country's major commodities which also saw declines in domestic production for most of the primary commodities except for fish and cocoa which increased production.[18] In 2020, economic performance continue to decline and had bottomed out due mostly to the global pandemic. By 2021, the economy was set to rebound, however, growth was interrupted by the adverse impacts of the (medieval) riot in November which pushed the economy back into a recession and real output contracted by 0.6% led by broad-based declines in key indicators of the economy[19]. The overall economic growth for Solomon Islands for the years 2009 to 2018 is shown on figure 37 where economic performance was high in 2010 and 2011 and has been subdued since to levels below 5%. Economic growth for the period 2015 – 2021 is shown on figure 38.

Figure 37 - Overall economic growth in Solomon Is for years 2009 to 2018
Source: CBSI & SINSO, CBSI Annual Report 2018

Figure 38 - Overall economic growth in Solomon Is for years 2015 to 2021
Source: CBSI & SINSO, CBSI Annual Report 2021

[17] CBSI Annual report 2019 p3
[18] ibid
[19] CBSI Annual report 2021 p

8.3.1 Employment sectors

In the national or domestic economy, most Solomon Islanders are employed within the primary industries sectors. Information from the NPF in 2019, shows a total labour force of around 60,000 plus. This probably includes non-active employees and the actual employed could be lower. The 2009 population census report recorded a total of around 80,000[20] for those in paid work at the time of the census count which may reflect the employment figure throughout the country at any given year. This may have also increased in the 2019 population census.

The largest single employer in the Solomon Islands seems to be the Solomon Islands Government through the Solomon Islands Public Service. Soltuna Fishing Company at Noro in the western province and the GPPOL in Guadalcanal are other large development entities that are large employers as well. Agriculture was the largest or major employment sector by industry. Other major employment industry sectors are: wholesale and retail trade, manufacturing, fishing and forestry. These however refer to paid or salaried workers and most of who may be unskilled. The bulk of the country's rural population who are mostly unskilled, however, may be self-employed and do their own work to earn income for their own or family support. An increasing number of Solomon Islanders are now joining the seasonal workers program with Australia and New Zealand and are employed for specific periods in those two countries.

In Guadalcanal, employment could be higher than other provinces due to the activities relating to the capital city and large development projects in the province itself. There is a possibility that the employment situation in Guadalcanal, without taking into account the Honiara data, may not be that significant from the other larger provinces such as the Western province.

This project development will provide increased employment opportunities for young people, both males and females and will probably be a catalyst for other business and economic activities within the Honiara city and Guadalcanal province itself. The total estimated figures of employment due to the project development on site will be in excess of 200 persons. Employment figures for the project is therefore significant throughout the phases of the development. This will provide long term benefits to the employees and their families. The impact of the development project on employment will be positively significant.

8.3.2 Infrastructure facilities

Infrastructure facilities are critical requirements for a country to move its development aspirations forward or to sustain its development activities. As a Least Developed Country (LDC) the Solomon Islands infrastructures are still weak and poor and require a lot more improvement to enable it to function as an effective platform and catalyst to the country's national development aspirations. As a country of many islands, Solomon Islands needs improved roads, wharfs, airports, power, communication facilities, education facilities and so on, to facilitate increased social and economic development outcomes for the whole nation. Most infrastructures however are still limited and need improvement. Most major islands still need good roads, wharfs, airports and increased social and economic services to enable social and economic activities to improve at a level that should assist the country meet the needs of its fast growing population.

Guadalcanal hosts the capital, Honiara, where most infrastructures are developed which also benefit the people of the province, including its rural population. These include the Honiara International Airport and the international sea port at Point Cruz. As roads get developed in Honiara, subsidiary roads also expand to the rural areas of the province so the rural population of Guadalcanal especially on the northern side of the island have good access to better roads than all of the other provinces. Most of the population on the

[20] 2009 Census Report on Economic Activities and the Labour Force

southern part of the province however, can only depend on sea transport for their transport needs. Communication facilities have improved in the last few years and should now play its role in the country's development activities. This has been achieved mostly through the establishment of digital mobile communication services which allows expansion to many parts of the rural areas and allows good access to the rural population. Guadalcanal Island enjoys such mobile communications amongst its rural population.

At the project site, all major infrastructures are already in existence or are within easy reach and should be accessed easily. These include the tar-sealed roads, water supply, power systems and communication services. There is excellent access to these infrastructures at the project site and should enable the project development to function as planned and to be successful. The project will benefit from the existing infrastructures and will also improve certain components of the existing infrastructures in the site location. The project itself is also a major improvement in infrastructure itself in terms of the needed medical health facilities.

8.3.3 Land use

Land use in Guadalcanal is the same as those for the whole of Solomon Islands such as agricultural uses, logging, mining, town, villages and settlements and tourism use. Agricultural use and mining probably take up more use of land in Guadalcanal than other provinces as these two activities are quite large and active in the province. A major land use in the province is the oil palm plantation of GPPOL which is currently a major contributor to the national economy. In terms of mining, two are currently active. These are Gold Ridge mine and the Turarana Alluvial mine both of which are gold mining operations. A new major land use currently under development is the Tina Hydropower project which will put a substantial area of land under water.

In the immediate project areas, land use is basically residential areas, roads, schools, churches, retail or convenience shops, power and water facilities, communication towers, clinic, and a police station. Within the immediate boundary of the site of the project, it has been observed that small garden plots of cassava and banana do exist on site. (The ownership of these small garden plots will need to be confirmed.) These have mostly been removed with small patches still remaining. The same situation can be seen in many of the residential areas with backyard food garden. The establishment of this project does not affect any designated land use for the site or the surrounding areas as it will be located on a site already serving the same function and so designated for such function.

8.3.6 Agriculture

Agriculture remains the most profound economic activity in Guadalcanal due to the fertile plains of north Guadalcanal, This involves the largest oil palm plantation GPPOL, the former rice farm of the 1970s, cocoa plantations, both of large and small holder farmers, large and small coconut plantations, and livestock farms. Subsistence level production is substantial in Guadalcanal just like any other rural communities throughout Solomon Islands. The rural subsistence production serves domestic needs and the urban Honiara market where demand for such products is very high.

The project development area is an urban residential area and there are no agricultural activities. The residential communities, however, do entertain some small back yard gardens within their residential areas. Within the surrounding informal settlement areas, these do cover larger areas. These usually supplement what they would purchase from the vegetable markets. Some informal roadside small markets selling vegetables are also present within the area. These are at Kombito and Borderline bus stops and are quite convenient for the communities in the area, considering the cost of getting to the Honiara main market and back to their homes. For this development project, it could only benefit from increased or consistent agricultural production.

8.3.7 Tourism

In the Solomon Islands, tourism is a slow but growing industry. It has been contributing substantially to the country's economy prior to the global Covid 19 pandemic. The industry had been severely affected by the COVID 19 pandemic but should pick up again with the reopening the country borders.

The industry has been affected by a number of factors. These include transport, accommodation and marketing issues. The country is not a large tourist destination compared to other countries of the region due to these factors. In the country, Western province has been the most significant tourist destination especially for those so called eco-tourists (divers, bird watchers and nature lovers). Until relevant tourist infrastructures are well developed and effective marketing strategies are adopted and implemented, will the country then see high numbers of tourist arrivals.

In Guadalcanal, the main tourist destination seems to be the Marau Sound area where there are islands and coral reefs and tourist accommodation do exist. Many who do visit the Honiara areas and other surrounding areas would be those interested in the history of the World War II and especially on the battle of Guadalcanal. The Honiara area and Guadalcanal also have a good number of accommodations which also serve the internal or domestic travelers and are important in the tourism sector within the domestic tourism market. Many areas of the West Guadalcanal coastal beaches also serve the residents of Honiara as picnic or party areas and have been very active for those activities.

In the project area there are some tourism related facilities such as rest house accommodation that serve local travelers. The project will not have any adverse impacts on tourism in anyway. It could always be there to provide its health services to travelers or tourists.

8.3.8 Other industries

There are other industries that play important roles in the country's economy and development. These include Transport, Mining, Energy, Communication, and Water Resources industries.

8.3.9 Types of common or individual rights on natural resources

All natural resources in Solomon Islands traditional societies, are common property that are used and enjoyed by all. Natural resources to Solomon Islanders are the land, sea, sky and what is under the land and the sea. It may be seen or unseen. Nevertheless, even though these natural resources may be common properties, they are managed through the community traditional system or traditional customary practices or law. In many cases, members of tribes and communities would seek permission from their chiefs or leaders for specific resources that may be under some strict control or traditional management. In terms of individual rights on natural resources, there are usually only user rights for individuals of the tribe or family or community. Individual rights can only be recognized for those natural resources where one is responsible for, in their growth or cultivation such as food crops or agricultural crops planted by oneself. This is the same for Guadalcanal societies. New concepts of ownership under modern laws seem to be in conflict with some of these concepts e.g. as in mineral resources.

In the project site, these rights do not apply as the land has already been alienated by the government, and its title and control is under the Commissioner of Lands. Only those who still have some cassava plots within the site may still have rights in the traditional sense, to those food crops. Otherwise, all rights to any natural resources within the site including the land rests with the Commissioner of Lands.

8.4 SOCIAL COMPONENTS

8.4.1 Population and communities

The Solomon Islands population has grown to more than 721,000 in 2019 from 94,000 in 1931[21]. This is a fast growing population and means that the population has grown nearly eight times the size in 1931 and three times the size since independence (SINSO Provisional results 2019) - *See figure 39*. According to the 2019 provisional result, population growth during the 2019 census was 2.7 percent. This is the same as the 2009 census but has come down from a high of 3 percent during the 1999 census. In 2019, the national sex ratio was 105 with 51.2 percent males and 48.8 percent females. The country's population density was at 24 people per square kilometres which is a progressive increase from the previous censuses.

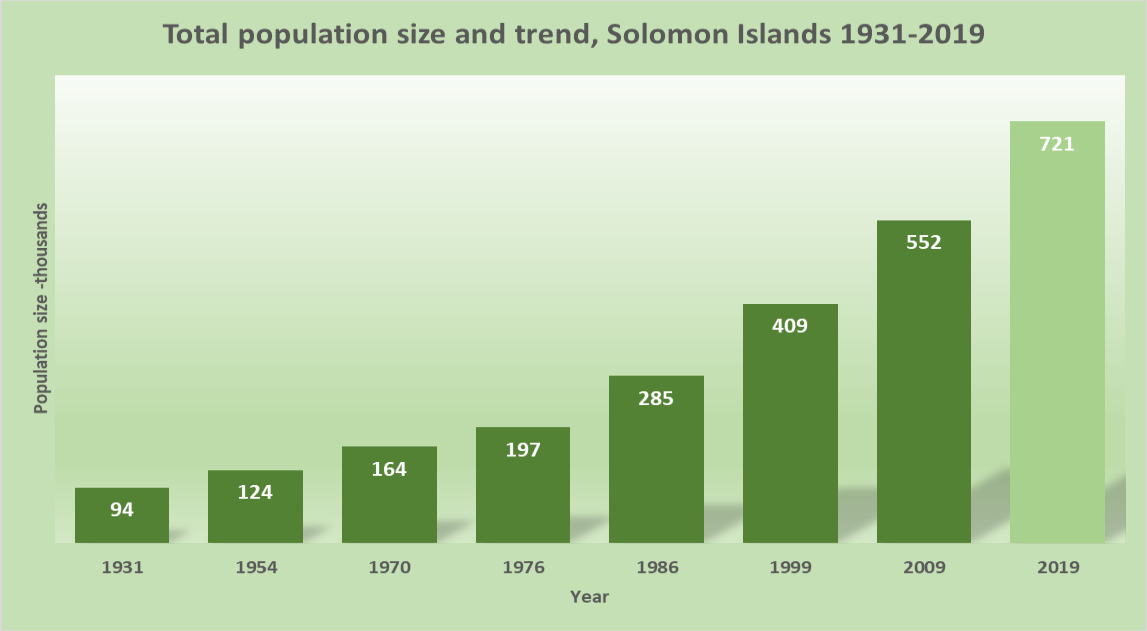


Figure 39- Total population size and trend in Solomon Islands 1931 - 2019
Data Source: SINSO 2009 Census Result and 2019 Census provisional result.

The provinces population components follow from the previous census (2009) trend with Malaita having the highest, followed by Guadalcanal, Honiara, Western, Makira-Ulawa, Choiseul, Isabel, Temotu and Rennell – Bellona. Three provinces recorded increased growth rates: Western, Honiara and Rennell- Bellona. Three provinces recorded growth rates higher than the national average of 2.7 percent. These are Honiara (5.8%), Guadalcanal (3.7%) and Rennell- Bellona (3%). Honiara recorded the fastest growth rate of 5.8 percent.

Honiara city, the capital and where this development project is located, recorded 130,176 people during the 2019 census (figure 41) and a very high growth rate of 5.8 percent which is more than two times the national average population growth rate of 2.7 percent. Sex ratio in the capital city is 106 and population density is the highest in the country with 5950 people per km^2. This is nearly twice the density recorded in 2009 and three times the size recorded in 1999. Urban migration is really manifesting itself in these figures.

[21] Figure for 2019 is provisional

In the project region, which for this assessment, takes in the wards of Kola'a, Kukum, Naha and Vura, the total population in 2009 was about 21,000 people. Considering the Honiara city experienced a 5.8% growth rate in that census year, and assuming that the rate remains constant, the population of that region would be more than 30,000 people during the 2019 census. Adding the ward of Panatina to the east of the Naha region which has a population of around 14,000 people in 2009, the whole population of the whole urban region would be more than 50,000 people. This points to the magnitude of the task required to provide health services to that Honiara area urban population alone.

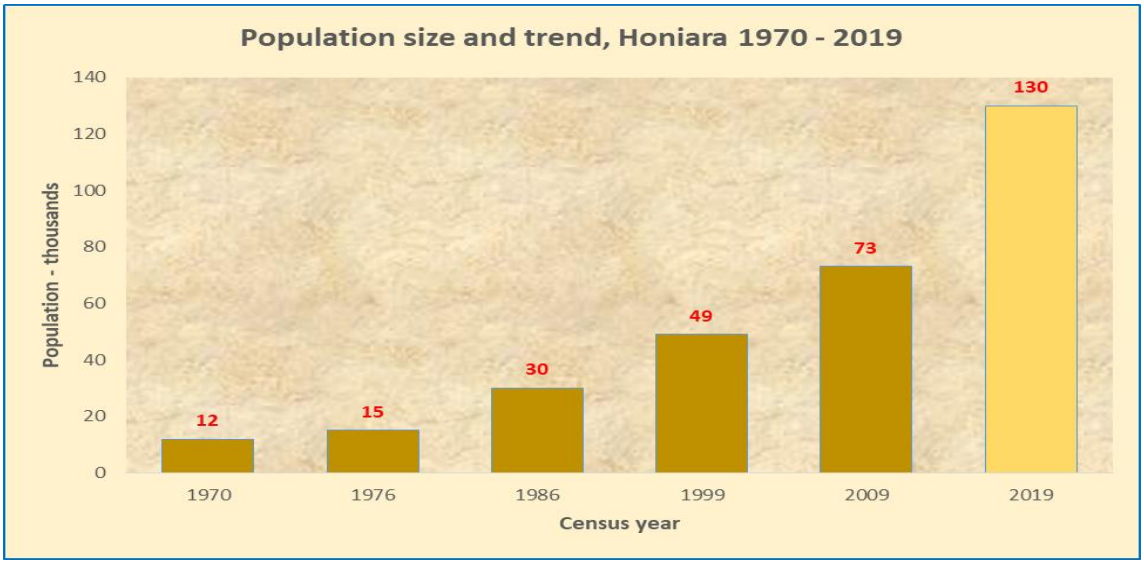


Figure 40 - Population size and trend, Honiara 1970 - 2019
Data Source: SINSO 2009 Census result and 2019 Census provisional result.
(2019 figure is provisional)

According to the 2009 unadjusted population figure of 64,000, Honiara then, had an economically active population or labour force of 22,962 people and an inactive population of 24,686 people. There were 13, 487 employees of both government and private sector, 522 employers, the labour force participation rate was 48.2 percent and unemployment rate was 9.4 percent. Other significant groups of the population are self-employed or are producing goods for sale (See table 7).

The main vulnerable groups in Honiara, would include children and youth, people with disability and older people. Hence children of less than 15 years of age were 20,670, those older than 60 years of age were 1785 and those with forms of disability were 561. All these would be heavily dependent on others, especially parents and relatives for their existence in the city. For this purpose, the dependency ratio in Honiara was 53 percent.

Table 7 - Summary of some main indicators of Honiara as per the unadjusted population figure of 2009 census

Total population	64,609	**Education**	
Average annual growth rate, 1999-2009 (%)	2.7	School enrolment rates of 6-15 years- olds (%)	86.3
Population density (number of people/km2)	2,953	School enrolment rates of 15-19 year -olds (%)	68.5
Urbanization		Proportion of population aged 12 and older (%)	
Urban population	64,609	With no school completed	5.8
Per cent urban (%)	100	With secondary education	34.7
Households		With tertiary education	12.8
Number of people in private households.	62,960	With vocational qualification	1.1
Average household size (number of people per household)	7	**Number of people with a severe disability**	
Household Characteristics		Blindness	31
Wages/Salaries is main household income (%)	78	Deafness	71
With improved drinking water sources (%)	91	Lameness	206
With improved sanitation facilities (%)	97	Senile and /or amnesic	253
Connected to electricity grid (%)	64	**Fertility**	
Population structure		Total Fertility Rate (TFR)	3.3
Number of children (<15 years)	20,670	Teenage Fertility Rate (ASFR, 15-19)	3.5
Youth population (15-24 years)	15,628	Mean age at childbearing (in years)	30.2
Population aged 25-59 years	26,526	Annual number of births, 2009	2,434
Older population (60 yrs and older)	1,785	Crude Birth Rate	37.7
Median age	22.7	**Mortality**	
Dependency ratio (15-59)	53	Proportion of children ever born still alive (%)	94.9
Sex ratio	112	Infant mortality rate (IMR) (per 1,000)	19
Marriage		Under-five mortality (per 1,000)	23
Mean age at first marriage (SMAM)	26.8	Life expectancy at birth	71.3
Labour force (population 12 years and older)			
Employee (Gov. and Priv).	13,487		
Employer	522		
Self-employed	2,172		
Producing goods for sale	1,273		
Unemployed	2,156		
Economically active population (labour force)	22,962		
Inactive	24,686		
Labour force participation rate	48.2		
Unemployment rate	9.4		

8.4.2 Health profiles of communities

In the 2009 national population census, Solomon Islands reported a life expectancy at birth of 69.6 years (66.2 males, 73.1 females). This was the same for Guadalcanal whilst Honiara has a higher life expectancy of 71.3 years (67.9 males, 74.9 females)[22]. These life expectancies are heavily influenced by the standard of health prevailing during those periods. It is now apparent that the fast growing population is putting a lot of pressure on health services and facilities in the country.

Most health indices have been steadily declining over the years (indicating improving health) even though there have been some periodic fluctuations. These include crude death rate, infant mortality, under five mortality, neonatal mortality and maternal mortality. The leading causes of mortality in the country have been said to be cardiovascular diseases, malaria, neonatal causes, neoplasm and respiratory diseases with pneumonia as the leading cause.[23] The health status of the country has been characterized by high prevalence of infectious diseases and at the same time, increasing incidence of non-communicable diseases (NCDs) such as cardiovascular diseases and diabetes[24].

In terms of environmental health and public sanitation, there are issues with access to safe water throughout the country, even though access is increasing. It is said that there is a low percentage of urban dwellers having access to water source in distributed system through the Solomon Islands Water Authority (SIWA). The most common sources of drinking water in Solomon Islands are communal standpipe and rivers/streams. A large percent of private households continue to rely on communal standpipe and rivers and streams for their drinking water. In terms of major sources of water, stand pipes rivers, lake and stream continue to be major sources throughout the country. Most of the private households still have no proper toilet facility. In the management of wastes, the households' own backyards continue to be common places where solid wastes are disposed in the rural areas.

In terms of infrastructure and resources, Solomon Islands has a total of eight public and three private hospitals. The SIG through the Ministry of Health and Medical Services (MHMS) is the major provider of health services in the country. The MHMS is responsible for the administration and management of health services and for implementing the national health policies and plans. The MHMS headquarters is based in the capital Honiara, located near to the National Referral Hospital. In terms of health manpower, Solomon Islands is increasing its trained physicians, dentists, pharmacists, nurses and midwives but may just be catching up with demand due to the fast growing population..

In Guadalcanal the health situation discussed above would be the same or could be worse for some health indices, health infrastructures and health manpower. The remoteness of many rural inland communities on the island could make the delivery of health services a real challenge. They have the advantage of using the services provided in Honiara though, due to their proximity and easy access through existing road networks and other transport means. Other related main indicators are shown on table 9.

In Honiara, life expectancy as mentioned which is higher than the national average, may be a reflection of the health services provided and better standard of living in urban areas compared to the rural areas. Apart from many common health incidences referred to above, one major concern in the last few years is to do with non-communicable diseases, especially cardio-vascular diseases and diabetes. HIV prevalence is an ongoing concern with what seems to be very low surveillance testing and monitoring. In terms of

[22] 2009 Census Report, Vol 1
[23] SMM Isabel EIS 2012
[24] ibid

infrastructure, Honiara may have the best in the country with the National Referral Hospital manned by the most qualified doctors and medical experts in the country. The Honiara City Council runs all the satellite clinics in the city of which there are eight in all. There are other private clinics operating on a commercial basis. Some institutions also run their own clinics such as SINU and KG VI School.. In the project site is the existing Naha urban clinic which provides the basic health services to the urban communities there. This project will significantly improve the current health services from the existing clinic. Issues of general hygiene, safe water and sanitation may be other general issues within the area. One of the main concerns in relation to health in such cities or urban areas is to do with diet and nutrition where residents of the city are now too dependent on processed foods from the shops than healthy local foods. This is now putting the blame on the rise of non-communicable diseases.

8.4.3 Institutions, schools and health facilities

Institutions in Solomon Islands are mostly for educational and training purposes. These are primary schools, secondary schools, colleges, vocational centres and universities and hospitals. Whilst most of these are run and operated by the government and religious groups such as churches, some are run by community groups or private organizations. Other special schools or institution do exist in the country. These includes the vocational centre for the disabled at Aruligo in West Guadalcanal, the Red Cross school for young disabled children in Honiara and a Women's Care Centre in East Honiara run by the sisters of the Church of Melanesia for victims of gender-based violence.

Honiara being the capital city, has the best resourced schools and institutions. A trend that has been observed for some time relates to many rural families sending their children to enrol in these Honiara schools. As other high institutions are also located in the capital such as the universities, it is also where many graduates of high schools end up looking for opportunities for further education. In the project area are schools, churches and institutions. There are the Naha and Vura CHS within the neighborhood. The SINU Kukum campus is about a kilometre to the northeast coast. Various churches are also present which includes the United Church, SSEC, SDA, Baptist Church, ACOM among others. These areas therefore have a significant population of students moving in and out of those institutions on a daily basis except for weekends. It is believed that activities and operation of the project facility will not have much significant impact to the operation.

8.4.4 Community structures, family structures

Traditional community structures govern the general way of life in Solomon Islands communities. This can be specific to the communities' whole province or their part of their province or islands. It is their traditional structures that guides their village governance or welfare, traditional decision making relating to issues such as land tenure, use of resources, marriage, conflicts etc. In those traditional communities, these are done through tribes and their chiefs and or elders. However, since the coming of Christianity and the establishment of today's foreign modern government, all the communities are also governed under arrangements imposed under these new government systems which have been accepted as good and or necessary to some extent. In the communities, while many religious issues and related matters are decided or managed under existing religious structures, government matters may be managed under existing government structures. Certain traditional or customary issues may even be dealt with under these new systems, especially where modern laws are seen as more applicable or where Christian based approaches are considered relevant and best.

In the urban areas, communities are generally a mix of families or groups from many different islands and still maintain their traditional structures which vary between islands but do have some common features and values as in most Melanesian societies. These common features and values do assist many urban

communities to live together and function the way they are today in Honiara. In the project development area, there are some homogenous communities that may have concentrations of people from a particular islands group or the same language group and may still observe strong traditional systems. Otherwise, many communities are a mix of people from different island groups and may adapt to new systems.

All families throughout the Solomon Islands traditional societies are headed by the male husbands or uncles in certain circumstances. Their affairs are managed within their own family, and they work and go about their lives to improve their livelihood and to develop themselves. Most other matters such as that related to resource use and land or user rights are overseen by the tribe and community elders or the chiefs.

Within the project area or as with other similar areas in Honiara in general, the communities can be best described as urban based but who still maintain their traditional based values and customs within an urban setting. In some of the informal settlements though there are large groups of populations from the same islands or province with the same language and do exist as a community more aligned to the traditional sense of communities. Urban culture and modern laws however, have determined much of their day to day living. These communities exist in the residential areas, even though there are institutions and churches mixed within the area. The characteristics of these communities do differ in many ways with poor and rich groups, public servants and private sector workers, unemployed groups, illegal settlers and vagrants, self-employed groups and thieves (*Belligas*). Many of the communities have organized themselves and do have their own recognized community leaders that help them in their community welfare. Many of these are done through existing institutions such as churches or ethnic or provincial based groups. This development project will serve all their basic health needs and hopefully improve their healthy living and contribute to improving their livelihoods. The project can also work through their existing systems or structures to deal with their relevant community issues.

8.4.5 Land ownership

The whole of Solomon Islands is customary owned except for the 15% or so of land that has been alienated by the colonial government and which now remains with the existing independent state or national government. Customary land covers most of the whole country and allows the majority of rural people to live their subsistence lifestyle. It is their own choice to improve their livelihood from what they can produce from their natural resources in those lands and seas that they own. Whilst most societies in Solomon Islands do own land and have user rights through their maternal parents, some also do so through their paternal parents. Most of the alienated land still own by the government are on Guadalcanal where it has been used to establish and develop Honiara the capital and its urban and surrounding areas.

Guadalcanal landownership is through the maternal parents. Land and user rights are inherited through the females, mostly through the mother. Relatives outside of the maternal group can have access to user rights or share benefits through their paternal parents or tribal lineages but that can only be done through the presentation of the gift of a *Tsupu*.

The project site is part of government land in Honiara under the legal custodian of the Commissioner of Lands. It is currently allocated for the MHMS and HCC urban clinics and should continue to serve as such. The land block is parcel number 191-039-0452 / Lot 505 and the letter from COL (Annex 8) has confirmed the status of the land.

8.5 CULTURAL COMPONENTS

Culture is generally specific and unique to communities and identifies them as a group of people or community or race. Solomon Islands, as a country of many islands and many communities is likewise strongly cultural and rich in cultural resources. These comprises various forms of cultural heritage, archaeological, historical, and Sacred sites, and unique landscapes. The project site may have hosted some such physical sites in the past but there are no records of such knowledge for the site at present. This assessment has not been able to determine if such resources do exist on the project site or the nearby surrounding areas. As such, the project through the contractor will see to it that should any such cultural resources or sites be discovered during the development of the project, normal procedures for reporting and dealing with such cultural sites will need to be activated so that responsible authorities can be informed in a timely manner. This will involve informing the authorities of the Ministry of Culture and Tourism who are responsible for such matters at the national level.

In relation to cultural considerations for the project, an issue that was identified is to do with birthing which is culturally sensitive for Solomon Island communities. This assessment has considered this issue and concluded that at this advance stage, a decision had already been made by the high authorities and the project can only ensure that all birthing events are taken care of at the Centre and as privately and less disturbing as possible. Scientifically and technically, there are no significant issues or problems with the birthing facility being near or closer to such residential areas and cultural beliefs in such circumstances may be less important than the national need for such facilities and should not be entertained. Mitigation measures nevertheless, have been considered and have been integrated into the new design considerations in the facilities.

9. ALTERNATIVES

9.1 Alternative locations

The location for the BUHC had already been made by the MHMS and HCC and substantive site works have already been carried out by a previously engaged construction contractors on site based on an earlier design prior to this PER exercise. The decision for this location had been made by the responsible government agency, the MHMS and the HCC and it is assumed that relevant policy considerations and technical criteria were used to identify and chose this Naha location. In the absence of concrete information coming from the MHMS, this assessment considers the following as valid criteria or reasons for the choice of the current location.

a. The location is centrally located in Honiara (*position of site in Honiara*)
b. The location is in a densely populated area of the city (*Location in terms of population*)
c. Access to the location is excellent (good road network and connections) – *Public access*
d. Essential physical infrastructures and services exist and serve the location – (*Presence of essential infrastructure and services)*
e. The existence of the current urban clinic establishes the location as a medical health precinct. – *HCC Zoning requirements*
f. Land is available (*land availability)*
g. The land area available for this location is large enough and perfect for the project compared to other existing urban clinic areas. *(Size of land available)*
h. Community views may be seen as supportive or accommodating *(Community perceptions and attitude)*

With the above considerations and the general difficulty in securing separate parcels of land for such projects, the MHMS and the HCC may not have any other best alternative locations than this Naha site. This assessment is of the view that the Naha location does meet the above considerations well and hence agrees with the location.

9.2 Different project sizes or design

As the project re-design has already been completed, it is proof that the project developer and managers have done their part in considering what needs to be taken into account in the design. The fact that the project had to go through a redesign phase also shows that the project had gone through some vigorous design evaluations to bring it to its current status. For the purpose of this PER, various issues or parameters were considered to assess the present project size and design. These are grouped into climate, environmental and disaster risks as shown below:

Climate

- Directions of prevailing winds
- Exposure to weather
- Rainfall regime on proposed location
- Weather fluctuations
- Increasing heat

Environmental

- Impacts on surface or groundwater.
- Topography
- Geotechnical conditions
- Sensitive habitats or protected areas
- Influence of environmental fluctuations

Disaster Risks

Potential for natural disasters such as

- Cyclones
- Earthquakes
- Rainstorms
- Flooding
- Tsunamis
- Landslides
- Surface erosion

Potential for other disaster risks such as

- Fires
- Riots and civilian unrests
- Structural failure of building
- Chemical poisons
- Health pandemic

In addition to the above, this assessment exercise considered other issues to check on the size and design of the project. These include considerations on community issues, constructability and operational issues relating to the project as given below.

Community

- Existing land use
- Impact on local and nearby communities
- Opportunity for local benefits

Constructability

- Ease of access
- Area of land available
- Availability of fill material and earthworks required.
- Distance to port and suppliers
- Capital cost

Operational

- Purpose of project
- Serviceability
- Connectivity or proximity to other project components
- Patients, customer and client's access on site
- Operating cost
- Security and safety issue

9.3 Alternative technologies and methods

The BUHC is a higher-level health facility designed to international standards and at the same time meeting Solomon Islands standards and requirements. Higher level medical facilities as seen in this projects design, have many specialist sections or components and require purpose designed spaces and specialised equipment. Specialist design services from the following disciplines have been engaged to contribute to the redesigned facilities:

- Architectural design
- Architectural design – Healthcare
- Structural Engineering design
- Civil Engineering design
- Hydraulic Engineering design
- Mechanical Engineering design – including Medical gases
- Electrical Engineering design
- Fire Services and protection design
- Health Infrastructure advise.
- Quantity Surveyor

As such the BUHC will require higher level expertise and updated or relevant technology for its construction and eventual operation. It is proposed that a Tier One Construction Services entity with key past experience and quality in delivery will partner with a locally based Solomon Island Contractor to undertake the construction.

The construction will address the various components of the project as given in section 6.2 of this report. These components construction or installation will require relevant technology and methods and will be done by construction company expertise.

9.4 No Project Alternative

In the 'no-project alternative' or where the development project does not proceed, a few scenarios may be considered. In the case where the project does not proceed, the current urban clinic will still serve its normal clinic function and the already cleared area may be left for similar health purposes that may be decided on

in the future. This will mean losing out on an opportunity for a much needed and necessary health service that is not easily available to Solomon Islands.

There could be other alternatives as well but for the time being, the development project is the best for the site and that the developer has identified it to be so, with the good opportunity that has been provided through donor funding.

10. CLIMATE AND DISASTER RISK

The Solomon Islands climate is tropical and is typical of most tropical areas with uniform temperature, humidity and abundant rainfall throughout the year. Localised rainfall distribution vary considerably from one location to another as it is affected by topography.

As earlier discussed in earlier sections, there are two distinct seasons in Solomon Islands: a wet season that occurs from November to April and a dry season that occurs from May to October. These two seasons are commonly known as *Komburu* (wet season), and *Ara* (the dry season), by the local communities throughout the islands. It is their traditional knowledge gained from their observations of the changes in the prevailing wind directions during the seasons.

Air temperatures throughout the Solomon Islands are fairly uniform and consistent, with low seasonal variation evident. This is due to the fact that in the tropics the sun is almost directly overhead so that the amount of solar radiation (heat) is high and fairly constant throughout the year (BOM & CSIRO, 2011a). The range of average maximum temperature is approximately 2 ^{0}C throughout the year (in the range of 30 – 32 ^{0}C). The range of minimum temperature is almost the same. The mean daily range of temperature (or diurnal variation) is approximately 7 ^{0}C.[25]

The average annual rainfall experienced throughout the Solomon Islands is mostly within the range of 2,000 – 5,000mm, with the majority of monthly rainfall totals in excess of 200mm (Solomon Islands Meteorological Service, 2007). Its current climate is controlled by global and regional atmospheric wind circulation patterns that influence both the ocean currents and the sea-surface temperatures. The ocean in turn impacts the atmospheric winds, air temperatures and rainfall. The major climate patterns of the Solomon Islands are dominated by broad scale wind convergences, the Warm pool, sub-tropical high pressure systems and associated rainfall patterns. (See figure 42).

In the region of the Solomon Islands, warm water is forced in a westerly direction by the equatorial trade winds resulting in the zone of the Warm Pool (figure 45). The directional movement of the trade winds drives the upwelling of cooler water in the Eastern Pacific ocean. The warmer water near the equator, the Warm Pool in particular, then drives the convection currents in the overlying atmosphere which help to sustain the trade winds across the Pacific. This large scale atmospheric pattern is also known as the Walker Circulation (BOM & CSIRO 2011a).

The combined impact of the broad scale wind convergence zones and associated rainfall patterns are the key drivers of climate variability in the region of the Solomon Islands (BOM & CSIRO 2011a). The main or key drivers of climate change in the country are: El Niño Southern Oscillation; Convergence zones and monsoonal events, Temperature, Rainfall, Cyclones, Drought, and Sea Level Rise (SI National Climate Change Policy, 2015-2017).

[25] ibid

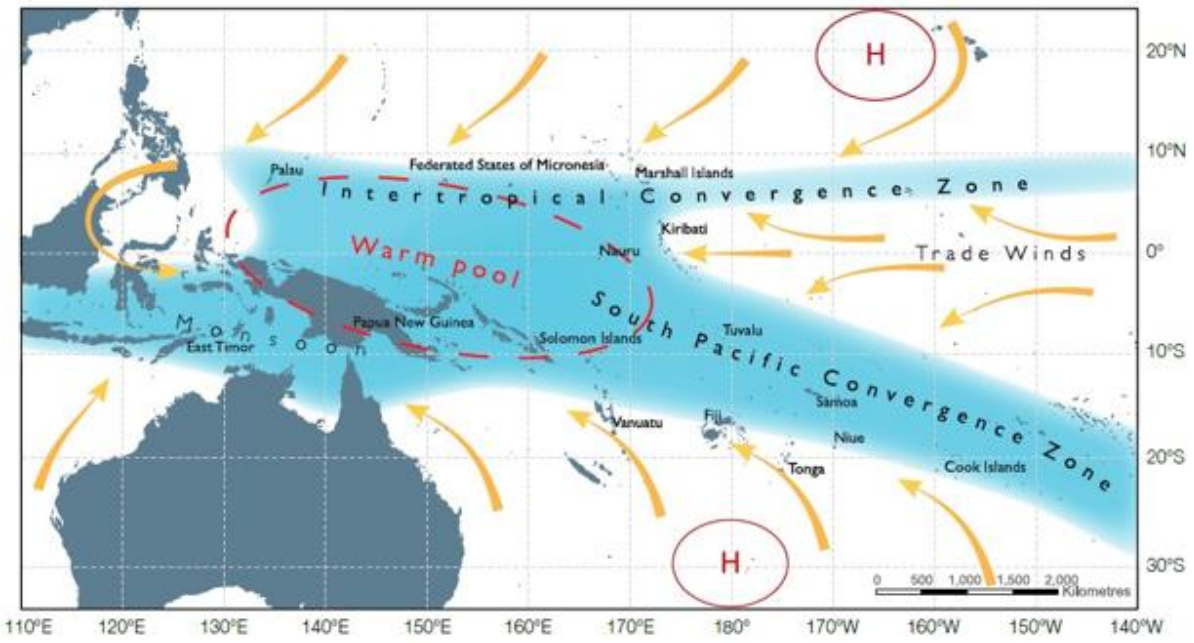


Figure 41 - South Pacific region Climate patterns

Figure42 above shows the average positions of the major climate features in November to April. The arrows show near surface winds, the blue shading represents the bands of rainfall convergence zones, the dashed oval shows the West Pacific Warm Pool and H represents typical positions of moving high pressure systems. Source – PACCSAP, 2015

10.1 Description of historic weather observations and trends

(Most information adapted from SI National Climate Change Policy 2015-2017 and SMM EIS Choiseul Report on Climate Change)

Weather observations in Solomon Islands does not go back many years as seen in other countries who have long term records. It however, has some few decades of observation information and has also benefited from recent interventions especially through the international efforts to understand global weather patterns aimed at understanding changes in the global climate. Regional and global weather observations, research and findings are relevant and useful to Solomon Islands and will assist the country in dealing with climate change issues. The current global effort under the UNFCC and especially through International Panel on Climate Change (IPCC) are providing information that are relevant to all countries including Solomon Islands. Weather observations continue with the country's own efforts and through donor assisted regional and global programmes.

The Solomon Islands Meteorological Services (SIMS) within the Ministry of Environment, Climate Change, Disaster Management and Meteorology (MECDM) is responsible for weather observations in the country. This is done through the SIMS's weather stations established throughout the nine provinces including Honiara. The two weather stations in Honiara are at Vavaya Ridge in central Honiara and at Henderson airport. These two weather stations have a longer period of observational records than the provincial weather stations. Other sources of national weather information do come from other sources including some projects.

The weather characteristics of Solomon Islands is typical of the tropical region of the South Pacific and is heavily influenced by prevailing winds, sea surface temperatures and land topography. The general observational trend in the Solomon Islands region at present shows that annual average temperature is increasing, (see figure 46 and 47 and for Honiara), average annual rainfall may be decreasing (see figure 47 and earlier figures for Honiara - even though some provincial weather stations show increasing trend), and sea level continues to rise above the global average (figure 48 and earlier figures).

10.2 Future projections under projected climate change

Solomon Islanders continue to notice that the atmosphere around them is getting hotter and that their coastal environment is frequently inundated and eroded, with many of their rivers and streams running at unusually low levels or have dried up. Coastal communities have seen high tides continuing to encroach on areas previously safe from such rising seas. Some areas have experienced unusually long periods of continuous and persistent rain. Local people in the communities have noticed therefore that the weather and climate are indeed changing. These are indeed some of the tangible impacts of what we are now referring to as climate change.

Climate change as well known today is basically caused by increasing concentrations of Green House Gases (GHG) in the atmosphere. The global scientific community including the IPCC have informed that the concentrations of GHG in the atmosphere have rapidly increased since the industrial revolution and is responsible for global warming. Rising temperature in the atmosphere is known to have significant adverse biophysical and biological impacts on the planet. It is said that atmospheric temperature could increase by 3^0C or more by the end of this century which will mean catastrophic impacts to the planet and its living components. The global community is currently struggling to curtail the temperature rise by less than 2^0C which will still be disastrous for the planet. All these has been said to be caused by human activities such as burning of fossil fuels for all kinds of development activities, removal of carbon from forests and soils and increasing emissions from waste and industrial processes. (SI National CC Policy 2015-17, 2012). In the Solomon Islands, current observations have shown increase in mean annual air and sea surface temperatures, probably increasing mean annual rainfall and rising sea level. Predictions have also shown the same trends.

10.2.1 Temperature

Annual mean temperature in Honiara has been increasing at about 0.17C^{0}C per decade (figure 43). This is the trend throughout all the weather stations in the country. Using data on emission scenarios (low to high emissions) developed by the IPCC, a regional project, the Pacific Climate Change Science Program (PCCSP), (now the Pacific-Australia Climate Change Science and Adaptation Planning Program - PACCSAP), developed projections for countries of the region. The scenarios are linked to trends in global greenhouse emissions and potential global mitigation actions. (SI National CC Policy 2015-17, 2012). The projections for Solomon Islands that is given in table 8, shows that annual average air temperature and sea surface temperature will continue to increase over time and that there will be a rise in the number of hot days and warm nights and decline in cooler weather. Under a low-emission scenario, air temperatures in Solomon Islands will increase by a range of 0.4-1.0˚C by year 2030.

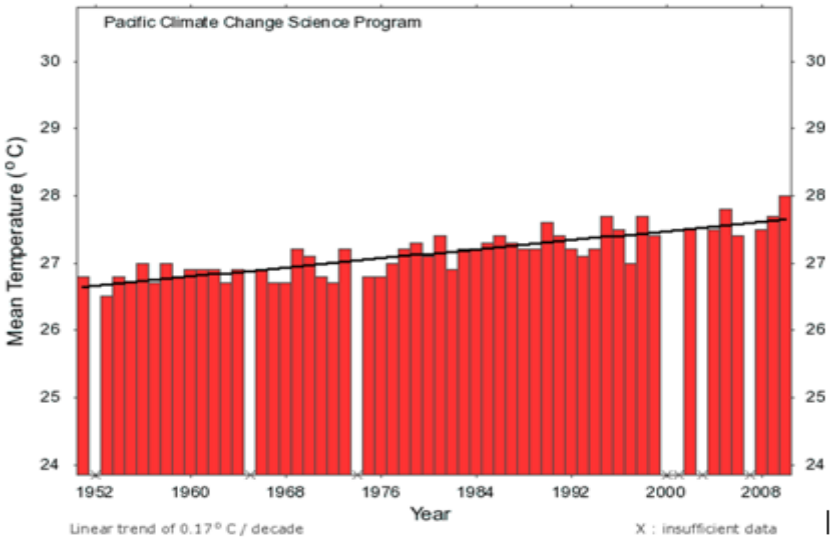


Figure 42 - Annual Mean temperature – Honiara
Source - PCCSP

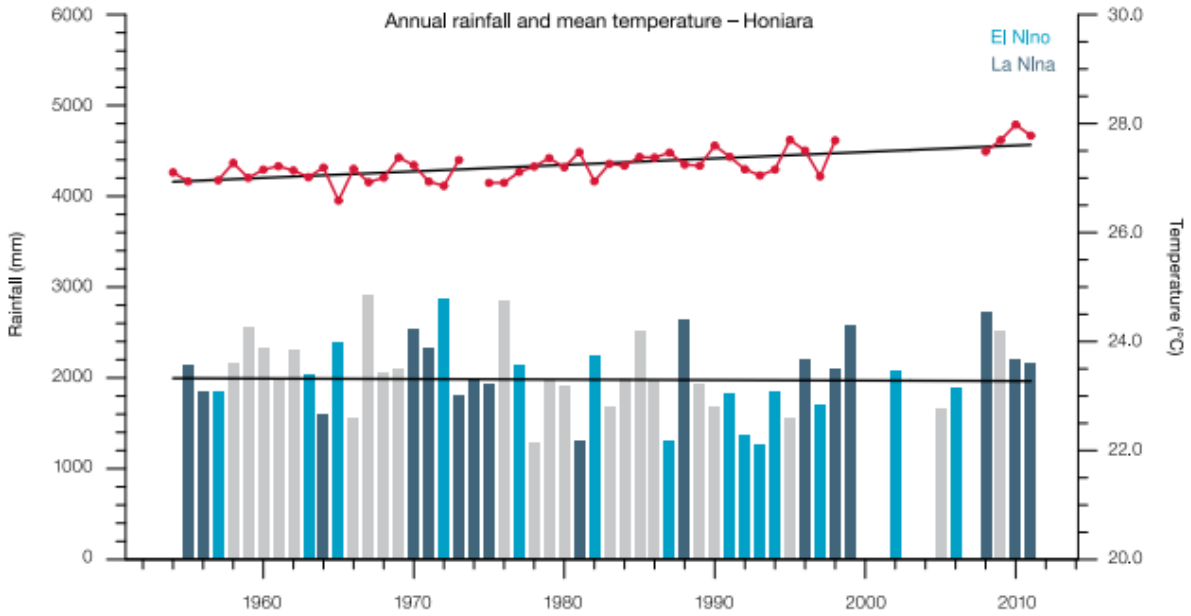


Figure 43 - Annual average rainfall and temperature for Honiara.

Figure 44 above shows the annual average air temperature (red dots and line) and total rainfall (bars) at Honiara. Light blue, dark blue and grey bars indicate El Niño, La Niña and neutral years respectively. No bars indicate that data is not available. The solid black lines show the trends. - Source: PACCSAP, 2015.

Table 8 – Predictions for changes in annual average surface air temperature in Solomon Islands under different emission scenarios

Scenario	2030(^{0}C)	2050(^{0}C)	2070(^{0}C)	2090(^{0}C)
Very low emissions scenario	0.4 – 0.9	0.6 – 1.2	0.4 -1.2	0.4 – 1.2
Low emissions scenario	0.4 – 1.0	0.7 – 1.4	0.9 – 1.8	1.0 – 2.1
Medium emissions scenario	0.5 – 0.9	0.7 – 1.4	1.0 – 2.0	1.3 – 2.6
Very high emissions scenario	0.5 – 1.0	1.0 – 1.9	1.5 – 3.0	2.0 – 4.0

Values represent 90% of the range of models and are relative to the period 1986 -2005 (PACCSAP)

10.2.2 Rainfall

In Honiara, annual rainfall observations shows a decreasing trend (figure 44 and 45). This is the same for a few other provincial weather stations. Some provincial stations do show increasing rainfall though. The rainfall models that had been generated do show some uncertainties and inconsistencies, but a new trend is emerging showing expected increase in annual rainfall during both the wet and dry seasons due to expected intensification of the South Pacific Convergence Zone (SPCZ) and its related western monsoon (SI National CC Policy 2015-17, 2012).

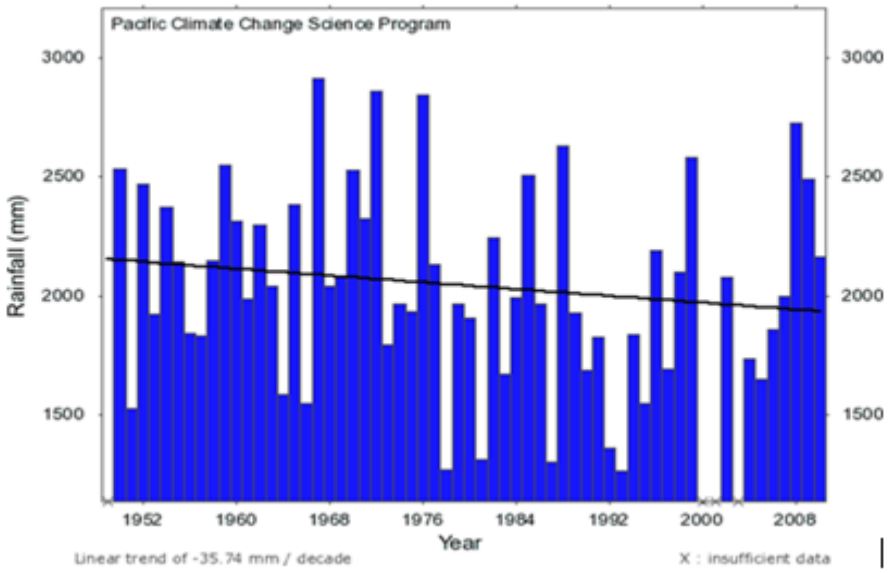


Figure 44 - Annual Rainfall – Honiara
Source – PCCSP

This projection therefore reveals that there will be extreme rainfall days that are likely to be more frequent and more intense, while drought is expected to become progressively less frequent over the course of the 21st century. It is also assumed that the El Nino Southern Oscillation (ENSO) will continue to exert an influence over weather patterns in much the same way as in the past, as there are uncertainties in the projection and the absence of data to the contrary (SI National CC Policy 2015-17, 2012).

10.2.3 Sea Level Rise

Sea level rise monitoring is done using the automatic sea level monitoring station at Mbokona bay at Point Cruz in Honiara. This is part of a regional system in sea level monitoring funded by donors. Early results from this facility shows a sea level rise of 7.7 mm per annum which could be much higher than predicted for the country. Observed and projected sea level trends in the Solomon Islands have been examined and put together using the IPCC scenarios (BOM & CSIRO 2011b). These all show increasing sea level trends (Figure 46).

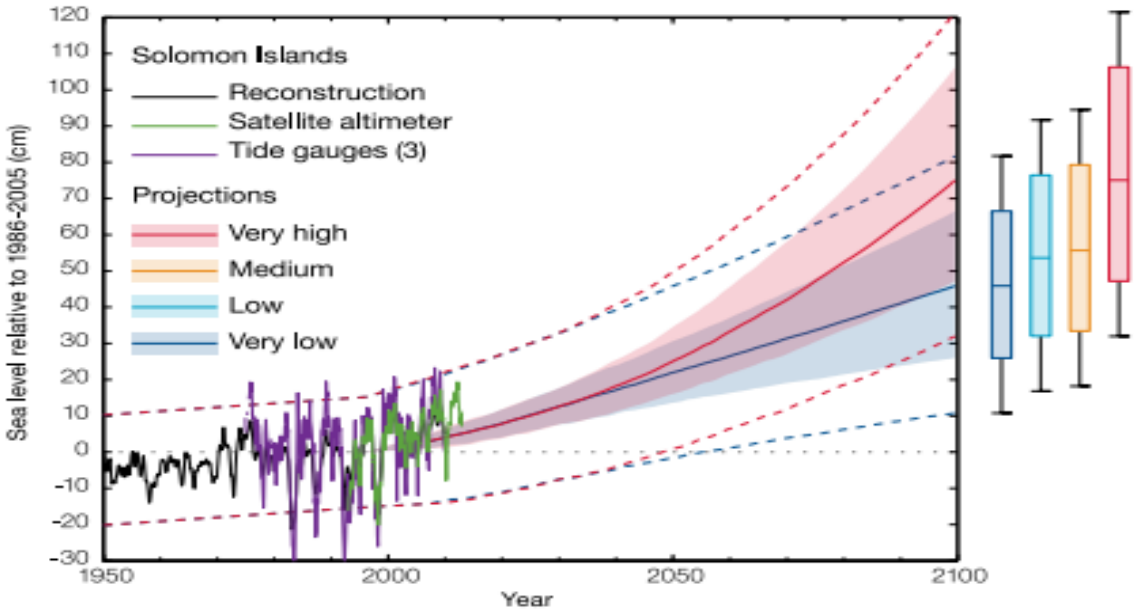


Figure 45 - Observed and projected relative sea-level trends in the region of the Solomon Islands.

In the graph above, tide gauge records of relative sea level rise (since 1974) are indicated in purple, and the satellite record (since 1993) in green. The reconstructed sea level data in the Solomon Islands (since 1950) is shown in black. Multi-model mean projections from 1995-2100 are given for the very high (red solid line) and very low emissions scenario (blue solid line) with 5-95% uncertainty range shown by the red and blue shaded regions. The ranges of projections for the four emissions scenarios by 2100 are also shown by the bars on the right. The dashed lines are an estimate of year-to-year variability in sea level (5-95% uncertainty range about the projections) and indicate that individual monthly averages of sea level can be above or below longer-term averages. (PACCSAP 2015)

Estimates of sea level changes in the region produced by PACCSAP uses data from the IPCC assessment reports. The sea level projections for Solomon Islands using the emissions scenarios from the IPCC are summarized in table 9. From the projections, sea level is projected to increase and likely to have higher rates than projected. Combined with storm surges and extreme events this is likely to cause increasing coastal erosion and coastal flooding. (SI National CC Policy 2012-17).

Table 9 - Prediction for sea level rise under different emission scenarios for Solomon Islands

Scenario	2030 (cm)	2050 (cm)	2070(cm)	2090 (cm)
Very low emissions scenario	8-18	14-31	19-45	24-60
Low emissions scenario	7-17	14-31	21-48	29-67
Medium emissions scenario	7-17	14-30	21-47	30-69
Very high emissions scenario	8-18	16-35	28-58	40-89

Values represent 90% of the range of the models results and are relative to the period1986-2005
Source: PACCSAP

10.2.4 Tropical Cyclones

A recent review of international literature by the World Fish report (Brokovich *et al*., 2012) cited in The National Climate Change Policy 2014 – 2017, stated the following summary ontrends of cyclones in the Pacific:

- The dissipation force of a cyclone is correlated to sea surface temperature.
- Number of high intensity cyclones (categories 4 and 5) in the north-western Pacific has gone up in the last 30 years.
- A recent study has shown that for the South Pacific region, there is no significant trend in cyclone frequency nor intensity.
- Records of cyclones compiled by the NDMO indicate a gradual shift in the location of cyclones from Northern parts of the country (i.e. north of the capital city of Honiara) towards the South-eastern parts of the country. This is consistent with the modelled andobserved southerly drift of sea-surface temperatures in excess of 27˚C. Cyclones in the early 1900's to the 1950's caused destructive winds and damages to sites at Ontong Java atoll, the northernmost part of the country.

The same National Climate Change Policy 2012-2017, stated that 'there is a projected decrease in the number of tropical cyclones by the end of the 21st century. It is likely that of the cyclones that do occur, more will be intense or severe (category 4 & 5) with a projected 2 to 11% increase in maximum wind speed. Preliminary analysis also suggests there may be an increase in rainfall intensity within 100km of cyclone centre, although much more work is needed to confirm this.' The number of cyclones passing through 400km of Honiara from 1969 – 2010 are shown on figure 47 below. Figure 48 shows cyclone paths from 1980 to 2015.

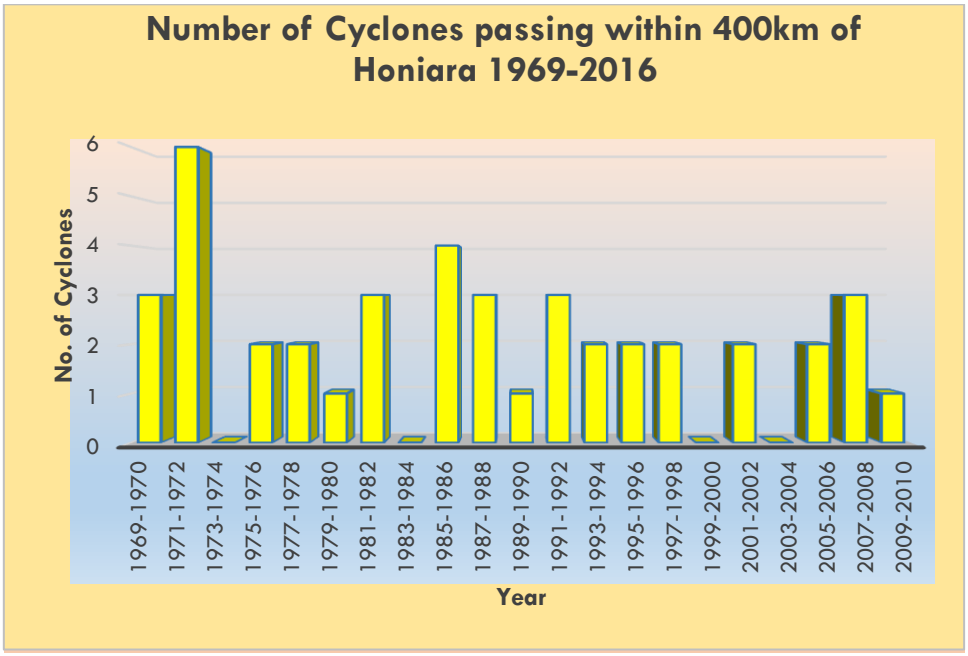


Figure 46 - Number of Tropical Cyclones passing within 400km of Honiara.
Source: PCCSP Project.

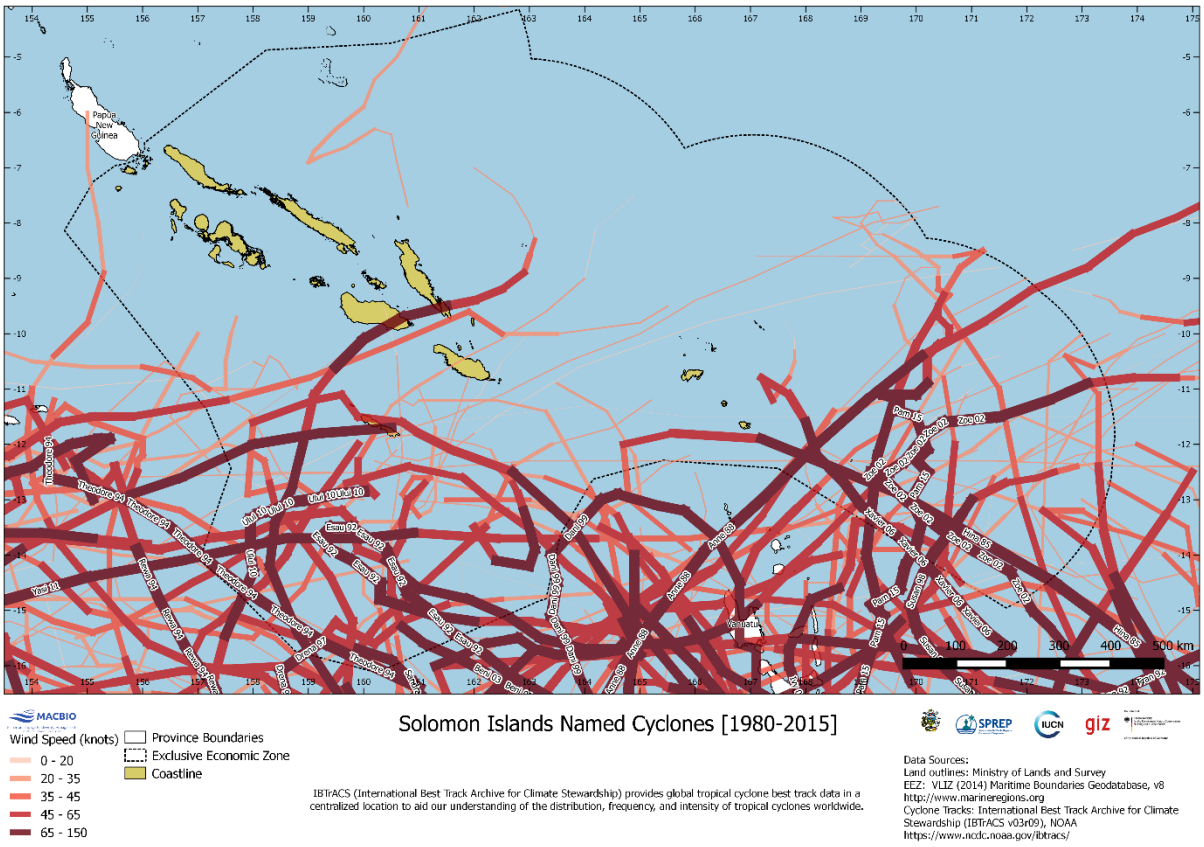


Figure 47 – Genesis and pathways of Solomon Islands named cyclones 1980-2015
Source – Macbio and others

(Note concentrations of pathways south of Solomon Islands main archipelago for the period)

10.3 Implications for proposed development under trends and projections

The main areas where climate change is really happening globally and especially in the region is in terms of air and sea surface temperature, which is increasing, rainfall which is increasing in some region and decreasing in others, and tropical cyclones which may be decreasing in frequency but increasing in intensity and severity for those that do occur. Other events such as drought do occur.

In terms of increasing temperature, the proposed development will not be significantly impacted as the buildings will be constructed of materials that will mitigate against normal and increasing tropical heat. It will however result in increasing energy demand for cooling systems within the facilities. It will also demand specific storage management requirements for many of the specialized components within the facilities that need specified temperature storage conditions and other specifics.

In terms of increasing rainfall, the Honiara observations does show a decreasing trend which may differ from the emerging trend for the country. In any case, the issue is to do with rainfall events that result in flooding. This is one main issue that seems to be frequent in the Honiara area. Flooding events in the past have created risks to infrastructures and have resulted in loss of lives. As the project location is not within a flood prone area, it is not expected that facilities will be affected.

In terms of cyclones, the development project, as for all developments in Solomon Islands will be affected to some certain extent. This is due to the regions location within a cyclonic belt where cyclones do occur annually. The project has been designed and will be constructed to the relevant Solomon Islands and Australian standards and will be resistant to cyclones. Its location at 1.6km away from the coastal front, does not subject it to coastal erosion and coastal flooding issues due to cyclones, storm surges or elevated water levels.

10.4 Risks and potential hazards of project location

The project is not located in any high-risk area such as that subjected to riverine or coastal flooding. It is not located in or near any wetland system or on the coastal zone area that could be prone to coastal flooding and erosion either Earthquakes and cyclones events do present risks and hazards to the project location and the project facilities itself. Risks and hazards are common throughout the country as the country is located within the Pacific ring of fire where earthquakes are common. Such earthquake events have been experienced in the country on many occasions with considerable damages and had even involved loss of lives. Another geological risk and hazard is due to volcanoes. For this project the risk is due to the Savo volcano which is just north- west of Honiara.

Freak weather events such as that from sudden heavy storms with strong winds could potentially damage physical infrastructures. Strong winds during high category cyclones are continuous risks. In the long term, increasing heat could increase fire hazards in the surrounding areas and even within the project site and the infrastructures. Risks due to traffic have always existed and will continue due to use of vehicles in transport. Landslip is still an issue on site, especially on the western end portion of the project site but this has been addressed in the new civil engineering design for mitigation and protection of the new facilities.

10.5 Significant impacts of climate, environmental and disaster risks

Some impacts from climate, environment and disaster risks identified in relation to the project are discussed in above sections. The likely significant impacts are from strong winds from cyclones and earthquakes with high magnitudes. These events have already been experienced in many situations and locations throughout

the country and are well known. These potential risks have been taken into account in the designs plans of the development project.

10.6 Climate or disaster risks of project to environment and climate change

Some activities of the project do result in the creation of products that could contribute to climate or disaster risks. These are nevertheless considered small or low in volume and impacts and are therefore judged insignificant. During the construction of the project and the operation stage of the project, there will be an increase in emissions from vehicles and machines. All these are considered insignificant. Solid wastes does remain an issue in the construction and operational stages of the development. There is potential increase from packaging materials and other activities which will need to be disposed-off in designated landfill sites. There is also the issue of liquid wastes including waste water ending up in the drainages. The volume of these wastes where they do occur are considered small or low and are considered insignificant.

10.7 Climate and disaster vulnerability impacts of project to communities.

The surrounding communities of the project site are all urban residential communities even though some institutions such as schools and churches are located within the residential areas. The residential communities themselves are not homogenous and can be further categorized according to other characteristics such as their socio-economic status. Due to the very low potential of climate or disaster vulnerability impacts to the natural environment, it is also considered that such impacts to the communities are low and are insignificant. Health related impacts can have potential significant impacts to the communities due to the existence of the medical facilities such as that in a pandemic situation. The project is beneficial in improving the resilience of the community by providing improved health care and proximity to improved health services in an emergency.

At the same time, the project could provide opportunities for some community members for employment that will enable them to earn critical income that may assist them in dealing with some of the climate change and disaster risk vulnerability issues. At the operational stage of the project, the increasing movement of people to and from the facility will stimulate increasing small scale commercial activities which benefit the residential communities. These may be in the form of some of the existing retail outlets increasing their sales. Other forms of beneficial commercial activities could even be created due to existence of the medical facilities.

10.8 Necessary adaptation or disaster risk reduction measures

The following measures have been addressed to reduce potential disaster risk in the project:

- BUHC designed and will be constructed according to standards in respect of earthquake and cyclone resistance.
- Foundations and the retaining walls of the BUHC are professionally designed to Code and Australian Standards and engineered to ensure foundations to mitigate against earthquake events
- Correct solar orientation of both buildings to allow for solar gain minimization and to provide good airflow from prevailing winds to site and facilities.
- Well-designed drainage systems within and outside facilities to direct waste water and excess water to existing offsite stormwater drainage. Periodical clearance of drainage systems during operation stage will be required.

- The provision of large open space areas for earthquake emergencies – car park, courtyard and road access areas
- Vehicle movement designed spaces and road access provided for safe traffic movement within and leaving the site including near site road approaches for vehicle and pedestrian safety purposes.
- Well allocated access areas such as roads and gates with the same safety concerns
- Installation of security protection capacity for security purposes to prevent purposeful sabotage and other conflicts. Security houses and areas for security personnel for all security issues have been provided.
- Installation of fire detectors, alarm systems and fire extinguishers in BUHC – Fire security systems.
- Engineered surfaces to prevent long term surface erosion.
- The provision of a full DDA compliant pedestrian access ramp to the North elevation – that allows all Solomon Islanders with a disability access.
- The provision of DDA compliance for Signage for people with impaired vision.
- Backup Power supply – i.e. the provision of a Generator.
- Backup Mains Water supply – in the form of the rainwater Storage Tanks – sufficient for 3 x days' supply.

11. IMPACT ASSESSMENT AND MITIGATION MEASURES

11.1 Methodology and approach

The relative size, nature, type and location of the development project play the main role in determining the methodology and approach used in assessing the potential impacts of the development project. The methodology and approach are considered relevant for a project of this level. These involved the use of:

- Checklists or matrixes.
- The Solomon Islands EIA Guideline itself which already provides the structure on which the environmental assessment is carried out, including the Minimum requirements for Public Environment Report, and
- The assessor's expert opinion.

The approach in general, is to provide as much relevant information as possible, in accordance with the Minimum Requirements for Public Environment Reports as provided by the MECDM through the EIA Guideline.

11.2 Scope of the assessment

The exercise to determine the baseline situation for the environment and socio-economic components as required under the EIA Guideline, has guided this assessment to make an effort to assess those requirements at the national, provincial and locality levels where relevant required information exists and where field exercise and consultations may have enabled the compilation of those information.

In temporal terms, this assessment made the effort to assess issues from the design and pre-construction to the operation stages. Spatially, more focused assessment is targeted at what is being generally referred to as the 'project development area' and the project site, even though other relevant issues have been addressed at the national and provincial levels as indicated above. The magnitude and depth to which information are collected, analyzed and compiled are also determined by the time and resources available which enabled this assessment exercise to be carried out and to the level it is being presented in this PER.

11.3 Identification of impacts and issues

The identification of potential impacts for this development project has been done through the following:

- Using the EIA Guideline structure (Minimum requirements for EIA) as a guide and focus
- Using the expert opinion of the assessor
- Community consultations and feedback.

The following potential impacts and issues have been identified in relation to the development project from the design/preconstruction stage to the operation stage as shown in the table below. The impacts identified are a mix of low and potentially significant impacts (and issues) from the development project and natural impacts to or on the project on which mitigation measures have been considered potentially significant.

Apart from natural impacts, there are also other impacts that are potentially significant that may have effects on the project.

Design and pre-construction	*Construction*	*Operation*
Increasing heat	Traffic movement	Traffic movement
Heavy rains	Transport of construction materials	Transport of goods
Flooding	Safety issues	Safety issues
Presence of UXO	Waste management	Waste management
Safety within site	Heavy rains	Heavy rains
Cyclones	Cyclones	Cyclones
Earthquake	Earthquake	Earthquake
Fire	Increase employment.	Increase employment
Security Fencing	Population increases - Workers influx	Population increase - Workers influx
Security Gate access	Air quality	Increasing air temperature
	Water quality	Air quality
	Wildlife	Water quality
	Noise	Wildlife
	Flora	Noise
	Freshwater resources	Flora
		Freshwater resource
		Privacy

11.4 Determination of significance of those impacts

The significance of the project impacts are important in determining relevant management measures to mitigate and manage those impacts. For this development project, some efforts have been made to determine the potential impacts using a combined procedure of the opinion or judgement of the assessor, and using standard conventions for assigning significance ratings or level as given on table 10 and graphically represented in the significance matrix on figure 49.

Table 10 - Convention for Assigning a Significance Rating

Significance Rating/level	Consequence and probability
High significance	• High x Definite • High x Highly Probable • High x Probable • Medium x Definite
Medium significance	• High x Improbable • Medium x Highly Probable • Medium x Probable • Low x Definite
Low significance	• Medium x Improbable • Low x Highly Probable • Low x Probable • Low x Improbable

Source – SMM, 2012

Probability of Impact	Consequence of impact			
		Low	Medium	High
	Definite	MEDIUM Significance	HIGH Significance	HIGH Significance
	Highly Probable	LOW Significance	MEDIUM Significance	HIGH Significance
	Probable	LOW Significance	MEDIUM Significance	HIGH Significance
	Improbable	LOW Significance	LOW Significance	MEDIUM Significance

Figure 48 - Impact Significance Matrix
Source – SMM, 2012

11.5 Mitigation measures

The mitigation measures to the identified potential environmental and socio-economic impacts or issues in relation to the project are given in table 10.

The following are given in the table:

Potential issues – These are potential environmental or socio-economic issues that can impact the project or project site. Some of these can also be impacted by the project or project activities. *(In other sections of this report these may be used interchangeably as potential impacts.)*

Potential impacts – These are potential environmental or socio-economic impacts that have been identified. These may happen or occur due to the issues that have been identified.

Mitigation measures – These are measures to mitigate those potential issues (termed potential impacts) identified above to eliminate or minimize their potential negative impacts to the project or vice versa.

Significance – The significance rating refers to the potential magnitude or severity of the issues or impacts to the project or vice versa.

Table 11 – Potential impacts/issues and mitigation measures

DESIGN AND PRE-CONSTRUCTION			
Potential issues	*Potential Impact*	*Mitigation measures*	*Significance*
Increasing Temperature	Continuous heat exposure for pre-construction workers.	Ensure design of facilities adheres to accepted standards and building codes, takes account of increasing temperature. Ensure designs with climate proofing systems and allocations for cooling systems within facilities. Shade spot for preconstruction workers Preconstruction workers have relevant wear for heat protection	High
Heavy rains	Wet conditions and rain exposure for Preconstruction workers	Ensure design of facilities adheres to accepted standards and building codes, takes account of heavy rains with climate proofing systems, land surface protection, tar sealed road access and well-designed permanent drainage systems. Ensure temporary shelter for pre-construction workers is available.	High

Flooding/ surface runoff	Sediment piling on project site and offsite drainage	Ensure design of facilities adheres to accepted standards and or building codes, takes account of flooding events with climate proofing systems, tar sealed road access and well-designed permanent drainage systems. (issue may relate more to drainage systems and off site road access) Preconstruction workers may deal with excessive sediments piling on site.	Low
Cyclones	Increase sediment piling on site from rain during cyclones.	Ensure design of facilities adheres to accepted standards and or building codes, and takes account of cyclonic events with climate proofing of whole designs, site foundations and related systems. Preconstruction workers to deal with increase sediment piling on site.	High
Earthquake	Potential geological /topographical structure change on project site	Ensure designs of Facilities and related systems adheres to accepted standards and or building codes, and takes account of earthquakes and other geological phenomenon.	High
General Safety within site	Theft or damage to any assets in project site during pre-construction	Allocate enough space for traffic movements, staff and patient movements, loading and collection areas within project site including facilities in design plans. Security are put in place during pre-construction	Medium
Fire	Grass/debris fires on project site presenting risks. Damage to assets	Ensure design of Facilities and related systems adheres to accepted standards and or building codes and takes account of fire occurrences with fire proofing in designs and spaces for safety within and outside the facilities.	Medium
Security issues	Theft and damage to assets on site	All issues relating to security issues are addressed in designs and plans. Existing fences and gates are secure	High
UXOs	Explosive risks throughout project development phases	Carry out UXOs survey to clear site of UXOs.	High

	causing damage and loss to lives		
CONSTRUCTION			
Potential issues	***Potential impact***	***Mitigation measures***	***Significance***
Increasing air temperature	Continuous heat exposure for construction workers. Risks of fire. Risks to equipment, machines.	Ensure design of facilities adheres to accepted standards and building codes, takes account of increasing temperature with climate proofing systems. Temporary firefighting equipment are available on site Temporary shades are available for construction workers. Construction workers have heat protection wear during construction.	High
Air quality	Air pollution due to construction and related activities. Increase health risks such as air respiratory infections and lung diseases.	All working vehicles shall be serviced regularly to function efficiently. All working environments within site shall be cleaned and moistened regularly to prevent dust particles being stirred up by construction activities. Dust masks shall be provided to workers where dust levels are regularly high. A dust management plan will be formulated as part of the tenderer's OHS and EMP Plan. This will be regularly checked for compliance.	High
Water quality	Degradation to any potential water source	Any waste having potential to contaminate any water source shall be properly disposed-off in a designated site or land fill. Oils spillage kits will be kept on site to clean up any oil or chemical spillage on site. Any waste water will be directed to holding sites or drainage for safe disposal during the construction period.	Low
Fauna/ Wildlife	Loss of potential wildlife	All wildlife found within the project site will not be disturbed and or hunted.	Low

Flora	Loss of flora	A landscaping plan will be implemented to plant ornamental plants on the project site. Any existing plants on site that will not be affected by the construction may be retained on site. Any other related activity components will limit destruction to flora e.g. sources of material sites or waste dumping sites)	Low
Freshwater resources	Loss of freshwater resources	All forms of waste from the construction to the operation phases will not be dumped into any water sources (eg. Sea, river, streams, lakes or swamps) where living resources do exist and are abundant or significant. All forms of off-site related activities e.g. sourcing of materials from another location shall take into account the protection and management of freshwater resources. All wastewater will be directed to soak holes or storm drains where relevant	Low
Noise	Increase and continuous noise disturbance to nearby residential communities	Noise control measures will be covered in the contractor's terms and conditions.	High
Cyclones	Damage to construction works due to strong winds or heavy rain or surface runoff	All construction materials will be managed and used in the construction process to take account of cyclonic events. BUHC constructed according to building codes to withstand strong cyclones. Construction work will cease during any cyclonic event affecting Honiara and Guadalcanal.	High
Earthquake	Damage to construction work components Risks of injuries to construction workers	Construction activities will be managed according to standard construction management practice and will take into account earthquake events.	High

		Escape and safety procedures established to adhere to during such events. Facilities already designed to take account of such events and will be constructed to withstand strong magnitude earthquakes. Allocated areas within project site used as gathering areas during earthquake events.	
Heavy rains	Surface erosion Sediment piling on site, drainage. Interference to construction work schedule	Facilities constructed to take account of heavy rains as per designs. Temporary offices and construction shelters will be established for workers and visitors during construction period for shelter during heavy rains. Workers will be transported to other durable shelters if heavy rain persists.	High
Flooding/ surface run off	Sediment piling on construction sites Interference to construction works and schedule Excess water flooding drainages and water course down to the coastal areas	All drains will be cleared at all times to allow for free and easy flow of excess waters. Near off-site drains be cleared at all times to allow free and fast flow of excess waters to prevent any waters from pooling on project site and access roads. Rainwater will be collected in tanks and stored for re-use for specified activities in the facilities. This will decrease excess rainwater from entering the drainage systems and the water course down the catchment.	Medium High
Waste management	Air pollution from gaseous odours Soil/land contamination from liquid wastes and other substances Water contamination from waste substances Increase litter Increase risks to health	Waste Management rules will be formulated and observed. All construction wastes will be collected frequently and piled on designated areas for safe removal and disposal at designated landfills. Re-usable materials will be separated for further use. Waste receptors will be placed on site for collection of relevant wastes.	High

	Increase animal pests/disease carrying animals		
Safety issues	Increase risks to workers health Increasing accidents resulting in injuries and damage to equipment or machines	Health and Safety rules will be fully adhered to as required under relevant legislation eg Health and Safety Act. All safety equipment such as PPEs will be used. All required safety rules shall be made known to all workers and be put up in notice boards for workers and visitors.	Medium/ High
Increasing Traffic movement	Traffic accidents resulting in damage to vehicles and risk to lives Reduced time in transport of workers, materials and goods	Ensure all vehicle drivers involved in project development are qualified and adhere strictly to traffic rules. Impose speed limits within access to project site and limit frequency of unnecessary traffic movements. Relevant traffic signboards be put up near construction sites.	Medium
Transport of construction materials	Damage to transport vehicles Damage to materials and equipment and goods if not transported on right transport vehicles Traffic accidents resulting in injury or loss of lives Reduced time in transport of workers, goods and materials	Transport of heavy and loaded constructions materials to adhere strictly to traffic rules and be done on designated and purposely built industrial transport vehicles. Transport of such materials be done designated safe time if possible.	Medium
Population increase.	Increasing number of people looking for work on site. Increasing number of roadside vendors especially beetle cigarette sellers. Natural increase in number of patients	People movement near the project site will be managed according to needs. Road side sellers will be discouraged.	Medium

	due to natural population increase.		
Workers influx	Increasing number of workers on site due to the construction. Increasing social issues in areas of project site	Workers management rules will be established to manage workers on site during the construction period.	Low
OPERATION			
Potential issues	*Potential impacts*	*Mitigation measures*	*Significance*
Increasing air temperature	Increase heat within facilities affecting comfort to staff/workers. Risks of fire. Risks to equipment, machines and medical drugs or substances	Ensure design of facilities adheres to accepted standards and building codes, takes account of increasing temperature with climate proofing systems. Cooling and temperature controlled systems installed within facilities. Fire extinguishers installed on relevant areas of facilities.	High
Air quality	Air pollution due to increasing dust and exhaust fumes from moving vehicles construction and related activities. Increase health risks such as air respiratory infections and lung diseases.	Moving vehicles will be allocated speed limits along access roads and within project site. All working vehicles shall be serviced regularly to function efficiently to release fumes at acceptable limits. All working environments within site shall be cleaned and moistened regularly to prevent dust particles being stirred up by moving vehicles or freak strong winds. Dust masks shall be provided to workers when required.	High
Water quality	Degradation to any potential water source.	All forms of waste materials from the operation phases shall not to be dumped into any water based environment unprocessed. Waste water will be directed to soak holes and will not be discharged onto the drains.	Low

		BUHC will have proper sanitation systems to manage sewage and waste water Excess rain water will be collected in tanks and resused.	
Fauna/ Wildlife	Loss of potential wildlife	Any wildlife found within site or nearby areas will not be disturbed unless found to be causing nuisance and deemed to be potential carrier of diseases. Harvesting of wildlife in the surrounding areas will be strictly forbidden or restricted.	Low
Flora	Loss of flora	A landscaping effort will involve planting of ornamental plants to beautify the site, provide shade trees or create some natural aesthetic value to the site. Any such plants replanted for ornamental purposes or other natural purposes shall be managed according to any management plans or regimes covering the BUHC. Planting of useful medicinal plants as part of the landscaping will be encouraged (eg. The lactative stimulant, *Polyscias sp* – used in road edges in Honiara) All plants planted for landscaping will be managed as required to beautify the site and serve their natural functions as well as adding to the aesthetic value of the site.	Low/ medium
Freshwater resources	Loss of freshwater resources	All forms of waste from the construction to the operation phases will not be dumped into any water sources (eg. Sea, river, streams, lakes or swamps) where living resources do exist and are abundant or significant. All waste water will be directed to soak holes or storm drains where relevant	Low
Noise	Increase and continuous noise disturbance to nearby	Impose speed limits within BUHC access areas.	High

	residential communities	Limit frequency of unnecessary traffic movements. Relevant traffic signboards be put up near sites dealing with speed limits and noise. Sound proofing systems be installed in birthing clinic to minimize noise to nearby residence and vice versa.	
Cyclones	Damage to buildings due to strong winds or heavy rain or surface runoff.	BUHC designed and constructed to accepted high standards and building codes to withstand strong cyclones. Cyclone management procedures will be established to deal with such events which is common in the country. Cyclone and weather warnings from the Met Services will be monitored to invoke established procedures including evacuation, when necessary. Staff undergo continuous training on emergency procedures for cyclone events.	High
Earthquake	Damage to buildings/centre components Risks of injuries and loss of lives patients and staff/workers	BUHC designed to take account of such events and constructed to withstand strong magnitude earthquakes. Safety including evacuation procedures will be established to cater for strong earthquake events. Specific designated areas within site used as gathering areas during evacuation in earthquake events. Staff undergo continuous training on emergency procedures for earthquake events.	High
Heavy rains	Surface erosion. Sediment and debris piling on site and drainage. Interference to staff/workers schedule.	BUHC designed and constructed to accepted high standards for shelter and protection from continuous heavy rain conditions. Facilities installed with gutters and drainage to direct excess rain waters away from the facility areas to the offside open drainage system.	High

	Damage to certain assets.	All windows constructed with appropriate louvers and shutters to prevent rain droplets from getting in to the facility.	
Flooding and surface runoff	Sediment and debris piling on sites. Interference to construction staff/workers and schedule. Damage to certain assets. Excess rainwater entering drainage systems and water course down the catchment	All inner and outer drains will be cleared at all times to allow for free and easy flow of excess waters and surface runoff. This is also to prevent water from pooling within the BUHC area and on access roads. All guttering systems properly installed to direct rainwater to connected drainage systems. All bare ground surfaces will be prepared to ease erosional events. No liquid wastes from medical facilities will be disposed-off into open drains Rainwater collected in rainwater tanks and re-used in the facility.	Medium/ High High
Waste management (including sewage)	Air pollution from gaseous odours. Soil/land contamination from liquid wastes and other substances. Water contamination from waste substances. Increase litter. Increase risks to health. Increase animal pests/disease carrying animals	Segregated waste receptors (bins) have allocated areas within the area for collection. All medical wastes within BUHC managed separately from general wastes and stored on allocated area for transfer to No. 9 Incinerator. Specific areas will be allocated for large and excess solid wastes for collection to designated landfills. Toilets for all (staff and public, male/female) and connected to existing sewage system. All waste water will be directed to existing soak holes and drainage where appropriate.	Medium/ High
Health and Safety issues	Increase risks to staff/workers health.	All relevant issues will be addressed according to relevant legislation and	Medium/ high

	Increasing accidents resulting in injuries. Damage to equipment or machines.	standard practice. Required safe public access will be provided. All requirements for firefighting will be installed such as fire extinguishers, water sources etc. PPEs will be provided where required, especially when handling dangerous goods. Relevant incidents will be dealt with to the authorities –health clinics, fire service and police. Security personnel will assist as first responders to major incidents. Evacuation procedures will be established. Staff undergo continuous training on emergency procedures.	
Increasing Traffic volume	Traffic accidents resulting in damage to vehicles and risk to lives Reduced time in transport of staff/workers, materials and goods.	Ensure all vehicle drivers involved in the operation stage of the BUHC are qualified and adhere strictly to traffic rules. Impose speed limits within access to project site and limit frequency of unnecessary traffic movements. Notice on traffic issues will be put up and displayed on large notice boards. Car parking area exists to cater for all Staff. Allocate car park areas, traffic routes within project areas with signs where required.	High
Population increase.	Increasing number of people looking for work on site. Increasing number of roadside vendors especially beetle nut and cigarette sellers. Natural increase in number of patients due to natural population increase.	Patients, care givers and visitors will be managed according to their specific needs. Road side sellers will be discouraged. The site is only for medical health purposes and will not be used for any other purposes. Security personnel will be present on the site on a 24/7 basis.	Medium/ high

Workers influx	Increasing number of workers on site due to the new facilities. Increasing social issues in areas of project site.	Workers management rules will be established to manage workers on site during the operation phase of the development.	Medium
Employment	People seeking employment will increase. Issues relating to labour and employment will continue and may potentially increase.	All employers relating to the operation of the BUHC will need to observe all employment related laws and accepted industry practice in taking care of the welfare of workers.	Medium/ High
Gender equality	Gender bias may occur in terms of employment, and even attendance to patients.	Authorities and employers will need to promote gender equality in its workforce and see to it that this is accomplished. BUHC components have taken care of gender issues and needs in the design plans	Medium
Disability issues	Needs and requirements of people with disability may limited.	All designs have taken account of disability issues and are in place in the essential areas or components of the BUHC An Access auditing of the facilities may be required to identify any further ongoing improvements.	High
Privacy	Pregnant and birthing mother could be exposed publicly and viewed from outside the centre boundary.	Western boundary fence design will be upgraded to provide increased privacy for those neighbors and facility users.	High

11.6 Incorporation of mitigation measures into project design

Most measures are already taken into account in the design plans as part of the technical requirements of the planners or those doing the architectural works. Other measures will be included in other physical works that will be implemented as the project proceeds with development. Measures are also incorporated into the EMP for implementation during the phases of the project development and its operation and monitoring.

11.7 Determination of any residual impacts

Residual impacts are not considered significant for this project. Otherwise, some impacts considered residual may be caused by other human activities not related to the project.

12. SUMMARY OF ENVIRONMENTAL MANAGEMENT PLAN

The EMP for this development project should be presented as a detailed separate document. The main aspects of the EMP are provided as an outline below.

12.1 Potential Impacts identified.

The potential impacts are identified under impacts identification on section 11. 3. They form the main issues to be addressed for mitigation in the EMP.

12.2 Mitigation Measures

The main mitigation measures are also formulated under section 111.5. These are included in the EMP to mitigate against identified potential impacts. The general purpose of mitigation measures are to avoid, reduce or minimize and compensate for impacts identified.

12.3 Cost of Mitigation Measures

The cost of mitigation measures are not detailed in this EMP outline and this PER. Most costs would already be integrated into the overall costs of the construction of the project and its operation for the first three years. The detailed EMP should include more detailed costs of the mitigation measures. Periodical costing reviews of the project should also enable costs items for mitigation measures to be identified and included in the projects budget.

12.4 Monitoring Requirements

A detailed monitoring programme should be part of the separate and detailed EMP. This should basically monitor the implementation of the EMP and other related issues that may require monitoring. In the absence of a detailed EMP, the project developers, managers and implementers including the contractors, should be able to carry out the basic required monitoring. These should be MHMS, DFAT/SIIP, HCC and Contractors.

12.5 Institutional Roles and Responsibilities

In the EMP Outline, provided, the roles and responsibilities of institutions and individuals for the EMP are given. These should ensure that the EMP is implemented as required.

The following is a general outline of the project's environmental management plan (EMP). Further detailing of this outline will be subjected to further consultations with the MECDM.

Table 12 – Environmental Management Plan Outline

Type of project Activity/ event or issue	**Potential Impacts**	**Effect of impacts (Short/ medium/ long term/ permanent)**	**Mitigation measures**	**Cost of mitigation**	**Monitoring requirement/ Parameters/ Indicators**	**Means of verification and frequency**	**Monitoring responsibility**
DESIGN PHASE							
Designing and drawings	No impacts	NA	NA	NA	NA	NA	DFAT/SIIP
Consultations	No impacts	NA	NA	NA	NA	NA	SIIP/DFAT/MHMS
PRE-CONSTRUCTION							
Site surveying	No impacts	NA	NA	NA	NA	NA	SIIP Contractor
Geotechnical investigations	Low level noise on some drilling operations	*Short term*	Short durations for drilling	Contractor	Normal personal judgment of noise level	Hearing observations on site	SIIP, Contractor
	Drill holes present low risks	Short term	Re-filling of drill holes where required	Contractor	Number of drill holes	Visual observations	SIIP Contractor
UXO surveys	Dug out holes in case of discovery	Short term	Refilling of holes where required	contractor	Existence and number of refilled holes	Visual observations	SIIP Contractor
Vegetation clearing – re-growths/weeds	Clearing of project site vegetation	Permanent	Clearing of debris/organic materials	Contractor	Area cleared	Visual observations	SIIP Contractor

Demolition	Increase in noise level	Short term	Work only during official working hours	SIIP	Personal judgement of noise levels.	Normal hearing observations.	ECD, DFAT/ SIIP safeguards officer, contractor, Community
	Increase in dust productions/emissions.	Short term	Work only during official working hours	SIIP	Personal judgement of dust (conc.) level	Visual, Consultation, complaints,	ECD, SIIP Community
CONSTRUCTION							
Type of project Activity/event or issue	***Potential Impacts***	***Effect of impacts (Short/ medium/ long term/ permanent)***	***Mitigation measures***	***Cost of mitigation***	***Monitoring requirement/ Parameters/ Indicators***	***Means of verification and frequency***	***Monitoring responsibility***
Foundation works. **(*meeting earthquake resistance*)**	Noise levels elevated leading to noise pollution/nuisance	Short term to medium term	Work on official working hours Workers using ear protection where applicable.	Contractor	Observations and Judgement of noise levels/otherwise measure to decibels using device	Hearing observations on site and measurements in decibels where possible using appropriate device.	ECD, DFAT/ SIIP Safeguards officer
	Dust concentrations elevated leading poor air quality and affecting human health	Short term to medium term	Work on official working hours Workers using ear protection where applicable. Regular watering of the soil surface within project site and road approaches	Contractor	Observations and judgement of dust (conc.) level Measure to pm where possible	Visual, Consultation, complaints, using monitoring device where possible	ECD, DFAT/ SIIP Safeguards officer, Community
	Surface Soil erosion events increase leading	Short term to medium term	Earthworks plan (including road works and civil infrastructure plan) are	Contractor	Observations judgement of erosion on site	Visual observations, Consultation,	ECD, DFAT/ SIIP Safeguards officer

	to surface destabilization and blockages of drainages and land channels.		included in the design plan which will guide such works Surface managed with bunks, bunds and cover protection to. minimize surface erosion. Other erosion control measures will be applied as required.			complaints	
	Traffic levels increase leading safety risks	Medium to long term	Work on official working hours Ensure vehicles are in good working condition	Contractor	Vehicle trips per day	Daily recording of trips Consultations	SIIP Safeguards officer, Contractor
Civil Engineering works **(*for in ground drainage, sewer and ground condition improvement*)**	Noise levels elevated leading to noise pollution/nuisance	Short term to medium term	Work on official working hours Workers using ear protection where applicable.	Contractor	Personal Judgement of noise levels/otherwise measure to decibels	Hearing observations on site and measurements in decibels where possible using appropriate device.	ECD, DFAT/ SIIP Safeguards officer, community
	Dust concentrations elevated leading poor air quality and affecting human health	Short term to medium term	Work on official working hours Regular watering of the soil surface within project site and road approaches	Contractor	Personal judgement of dust (conc.) level Measure to pm where possible	Visual, Consultation, complaints, using monitoring device	SIIP SafeGuards officer, Contractor, Community
	Surface Soil erosion events increase leading to surface destabilization and blockages of drainages and land channels.	Short term to medium term	Surface managed with bunks, bunds and cover protection to minimize surface erosion. Other erosion control measures will be applied as required.	Contractor	Personal judgement of erosion on site	Visual observations, Consultation,	ECD, DFAT/ SIIP Safeguards officer

	Traffic levels increase leading safety risks	Medium to long term	Work on official working hours	Contractor	Vehicle trips per day	Daily recording	SIIP Safeguards officer, Contractor
Civil Engineering works ***(for embankment stabilization and treatment)***	Noise levels elevated leading to noise pollution/nuisance	Short term to medium term	Work on official working hours Workers using ear protection where applicable.	Contractor	Personal Judgement of noise levels/otherwise measure to decibels	Hearing observations on site and measurements in decibels where possible using appropriate device.	ECD, DFAT/ SIIP Safe Guards officer, community
	Dust concentrations elevated leading poor air quality and affecting human health	Short term to medium term	Work on official working hours Workers using ear protection where applicable. Regular watering of the soil surface within project site and road approaches	Contractor	Personal judgement of dust (conc.) level Measure to pm where possible	Visual, Consultation, complaints, using monitoring device	SIIP Safe Guards officer, Contractor, Community
	Surface Soil erosion events increase leading to surface destabilization and blockages of drainages and land channels.	Short term to medium term	Surface engineered to control and minimize erosion. Other control measures will be applied as required (eg bunks, bunds and surface cover protection)	Contractor	Personal judgement of erosion on site	Visual observations, Consultation,	ECD, DFAT/ SIIP Safeguards officer
	Traffic levels increase leading safety risks	Medium to long term	Work on official working hours	Contractor	Vehicle trips per day	Daily recording	SIIP Safeguards officer, Contractor
Construction of Main Structures (*meeting*	Noise levels elevated leading to noise pollution/nuisance	Short term to medium term	Work on official working hours Workers using ear protection where applicable.	Contractor	Personal Judgement of noise levels/otherwise	Hearing observations on site and measurements in decibels where	ECD, DFAT/ SIIP Safe Guards officer, community

***Earthquake resistance and cyclone resistance*)**					measure to decibels	possible using appropriate device.	
	Dust concentrations elevated leading poor air quality and affecting human health	Short term to medium term	Work on official working hours Workers using ear protection where applicable. Regular watering of the soil surface within project site and road approaches	Contractor	Personal judgement of dust (conc.) level Measure to pm where possible	Visual, Consultation, complaints, using monitoring device	SIIP Safe Guards officer, Contractor, Community
	Surface Soil erosion events increase leading to surface destabilization and blockages of drainages and land channels.	Short term to medium term	Surface managed with bunks, bunds and cover protection to minimize surface erosion	Contractor	Personal judgement of erosion on site	Visual observations, Consultation,	ECD, DFAT/ SIIP Safeguards officer
	Traffic levels increase leading safety risks	Medium to long term	Work on official working hours	Contractor	Vehicle trips per day	Daily recording	SIIP Safeguards officer, Contractor
Upgrading of External Road (*including off site stormwater control and discharge)*	Noise levels elevated leading to noise pollution/nuisance	Short term to medium term	Work on official working hours Workers using ear protection where applicable.	Contractor	Personal Judgement of noise levels/otherwise measure to decibels	Hearing observations on site and measurements in decibels where possible using appropriate device.	ECD, DFAT/ SIIP Safeguards officer, community
	Dust concentrations elevated leading poor air quality and affecting human health	Short term to medium term	Work on official working hours Workers using ear protection where applicable.	Contractor	Personal judgement of dust (conc.) level Measure to pm where possible	Visual, Consultation, complaints, using monitoring device	SIIP Safeguards officer, Contractor, Community

			Regular watering of the soil surface within project site and road approaches				
	Surface Soil erosion events increase leading to surface destabilization and blockages of drainages and land channels.	Short term to medium term	Surface managed with bunks, bunds and cover protection to minimize surface erosion	Contractor	Personal judgement of erosion on site	Visual observations, Consultation,	ECD, DFAT/ SIIP Safeguards officer
	Traffic levels increase leading safety risks	Medium to long term	Work on official working hours	Contractor	Vehicle trips per day	Daily recording	SIIP Safeguards officer, Contractor
Construction and installation of Roofing and rainwater collection discharge	Noise levels elevated leading to noise pollution/nuisance	Short term to medium term	Work on official working hours Workers using ear protection where applicable.	Contractor	Personal Judgement of noise levels/otherwise measure to decibels	Hearing observations on site and measurements in decibels where possible using appropriate device.	ECD, DFAT/ SIIP Safeguards officer, community
	Dust concentrations elevated leading poor air quality and affecting human health	Short term to medium term	Work on official working hours Workers using ear protection where applicable. Regular watering of the soil surface within project site and road approaches	Contractor	Personal judgement of dust (conc.) level Measure to pm where possible	Visual, Consultation, complaints, using monitoring device	SIIP Safeguards officer, Contractor, Community
	Surface Soil erosion events increase leading to surface destabilization and blockages of	Short term to medium term	Surface managed with bunks, bunds and cover protection to minimize surface erosion	Contractor	Personal judgement of erosion on site	Visual observations, Consultation,	ECD, DFAT/ SIIP Safeguards officer

	drainages and land channels.						
	Traffic levels increase leading to safety risks	Medium to long term	Work on official working hours	Contractor	Vehicle trips per day	Daily recording	SIIP Safeguards officer, Contractor
Installation of Internal fit out (*with Furniture, Fittings and Equipment – including medical*)	Noise levels elevated leading to noise pollution/nuisance	Short term to medium term	Work on official working hours Workers using ear protection where applicable.	Contractor	Personal Judgement of noise levels/otherwise measure to decibels	Hearing observations on site and measurements in decibels where possible using appropriate device.	ECD, DFAT/ SIIP Safeguards officer, community
	Dust concentrations elevated leading poor air quality and affecting human health.	Short term to medium term	Work on official working hours Workers using ear protection where applicable. Regular watering of the soil surface within project site and road approaches	Contractor	Personal judgement of dust (conc.) level Measure to pm where possible	Visual, Consultation, complaints, using monitoring device	SIIP Safeguards officer, Contractor, Community
	Surface Soil erosion events increase leading to surface destabilization and blockages of drainages and land channels.	Short term to medium term	Surface managed with bunks, bunds and cover protection to minimize surface erosion	Contractor	Personal judgement of erosion on site	Visual observations, Consultation,	ECD, DFAT/ SIIP Safeguards officer
	Traffic levels increase leading safety risks	Medium to long term	Work on official working hours	Contractor	Vehicle trips per day	Daily recording	SIIP Safe Guards officer, Contractor
Transport of construction materials	Damage to transport vehicles	Short to long term	Transport of heavy and loaded constructions materials to adhere strictly to traffic rules	Contractor/ SIIP	Presence or availability of	Visual observation Transport records	SIIP Contractor

	Damage to materials and equipment and goods if not transported on right transport vehicles Traffic accidents resulting in injury or loss of lives Loss of materials during transportation Reduced time in transport of workers, goods and materials		and be done on designated and purposely built industrial transport vehicles. Transport of such materials be done designated safe time if possible.		materials on site and on time Number of traffic incidents	Delivery dockets Incident reports Consultations Materials stocks on site	
Installation of Medical Gas distribution network;	Works creates risks to accidents and safety issues	Short term	Workers use PPEs and strictly observe standard safety procedures	Contractor	Number of accidents or safety failures	Visual observations Consultations	SIIP Safeguards officer, Contractor
External works (*for roads, landscaping and boundary treatment*)	Noise levels elevated leading to noise pollution/nuisance	Short term to medium term	Work on official working hours Workers using ear protection where applicable.	Contractor	Personal Judgement of noise levels/otherwise measure to decibels	Hearing observations on site and measurements in decibels where possible using appropriate device.	ECD, DFAT/ SIIP Safe Guards officer, community
	Dust concentrations elevated leading poor air quality	Short term to medium term	Work on official working hours Workers using ear protection where applicable.	Contractor	Personal judgement of dust (conc.) level	Visual, Consultation, complaints, using monitoring device	SIIP Safe Guards officer, Contractor, Community

	and affecting human health.		Regular watering of the soil surface within project site and road approaches		Measure to pm where possible		
	Surface Soil erosion events increase leading to surface destabilization and blockages of drainages and land channels.	Short term to medium term	Surface managed with bunks, bunds and cover protection to minimize surface erosion	Contractor	Personal judgement of erosion on site	Visual observations, Consultation,	ECD, DFAT/ SIIP Safeguards officer
	Traffic levels increase leading safety risks	Medium to long term	Work on official working hours	Contractor	Vehicle trips per day	Daily recording	SIIP Safeguards officer, Contractor
Increasing air temperature	Continuous heat exposure for construction workers. Risks of fire. Risks to equipment, machines.	Long term	Ensure design of facilities adheres to accepted standards and building codes, takes account of increasing temperature with climate proofing systems. Temporary firefighting equipment are available on site Temporary shades are available for construction workers. Construction workers have heat protection wear during construction.	SIIP Contractor	Temperature readings from MET service Personal judgement of heat levels on site for daily activities Visual observations for heat protection facilities	Daily observations, Consultations and complaints Temperature measurements sought from MET when required or measured on site if need be.	ECD. SIIP, Safeguards officer
Air quality	Air pollution due to construction and related activities.	Medium to Long term	All working vehicles shall be serviced regularly to function efficiently.	Contractor	Visual observations on site	Visual Observations, consultations, complaints	ECD, SIIP, Safeguards officer

	Increase health risks such as air respiratory infections and lung diseases.		All working environments within site shall be cleaned and moistened regularly to prevent dust particles being stirred up by construction activities. Dust masks shall be provided to workers where dust levels are regularly high. A dust management plan will be formulated as part of the tenderer's OHS and EMP Plan. This will be regularly checked for compliance.		Quarterly measurements on air quality where possible.	Records of contractor	
Water quality	Degradation to any potential water source	Short to medium term	Any waste having potential to contaminate any water source shall be properly disposed-off in a designated site or land fill. Oils spillage kits will be kept on site to clean up any oil or chemical spillage on site. Any waste water will be directed to holding sites or drainage for safe disposal during the construction period.	Contractor, SIIP	Water quality monitoring on established sites under this PER - (quarterly) Visual observations in relevant areas	Records of monitoring results and visual observations	ECD, Contractor SIIP Safeguards officer
Fauna/ Wildlife	Loss of potential wildlife	Long term	All wildlife found within the project site will not be disturbed, hunted or harmed	Contractor	Visual observations	Records of contractor	Contractor, SIIP Safeguards officer
Flora	Loss of flora	Long term	A landscaping plan will be implemented to plant ornamental plants on the project site.	Contractor	Visual observations	Records of contractor	Contractor, SIIP Safeguards officer

			Any existing plants on site that will not be affected by the construction may be retained on site. Any other related activity components will limit destruction to flora e.g. sources of material sites or waste dumping sites)				
Construction and traffic noise	Increase and continuous noise disturbance to nearby residential communities	Long term	Noise control measures will be covered in the contractor's terms and conditions.	Contractor	Hearing observations on site during official working hours	Observation on site weekly Measuring noise level monthly -in dB using device	ECD, Contractor SIIP Safeguards officer
Cyclones	Damage to construction works due to strong winds or heavy rain or surface run off Risks to workers on site	Long term	BUHC constructed according to building codes to withstand strong cyclones. Construction workers always use PPE during construction. Construction work will be suspended during any strong cyclonic event affecting Honiara and Guadalcanal.	SIIP Contractor	Observations on site for any cyclone event	Records and regular observations on site for relevant issues Assessment reports on cyclone events	Contractor, SIIP Safeguards officer
Earthquake	Damage to construction work components Risks of injuries to construction workers	Long term	Construction activities managed according to standard construction management practice and takes into account earthquake events. Escape and safety procedures established to adhere to during such events.	SIIP, contractor	Observations and assessments for earthquake events	Records and regular observations on site for relevant issues Assessment reports on cyclone events	Contractor, SIIP Safeguards officer

			Construction workers always use PPE during construction. Allocated areas within project site used as gathering areas during earthquake events.				
Heavy rains	Surface erosion Sediment piling on site, drainage. Interference to construction work schedule	Long term	Temporary offices and shelters will be established for workers to shelter during heavy rains. Soil Surface protection systems established – plant debris. Bunks, bunds, nettings etc On site and near site drainage cleared at all times	Contractor	Visual observations on site for relevant issue	Records of contractor Assessment and Monitoring reports	Contractor, SIIP Safeguards officer
Flooding/ surface run off	Sediment piling on construction sites. Interference to construction works and schedule. Excess water flooding drainages and water course down to the main highway in coastal areas	Long term	Near off-site drains be cleared at all times to allow free and fast flow of excess waters to prevent any waters from pooling on project site and access roads.	Contractor	Visual observation on site to check o drainages. Visual observation during heavy rains events	Records of contractor or assessment reports Consultations	Contractor, SIIP Safeguards officer
Waste management	Soil/land contamination from liquid	Medium to long term	Waste Management rules will be formulated and observed. All construction wastes will be collected frequently and piled	Contractor	Visual observations	Visual observation Records of contractor	Contractor, SIIP Safeguards officer

	wastes and other substances Water contamination from waste substances Increase litter Increase risks to health Increase animal pests/disease carrying animals		on designated areas for safe removal and disposal at designated landfills. Re-usable materials will be separated for further use. Waste receptors placed on site for collection of relevant wastes.		Amount of waste produced	Consultations complaints	
Safety issues	Increase risks to workers health Increasing accidents resulting in injuries and damage to equipment or machines	Long term	Health and Safety rules will be fully adhered to as required under relevant legislation eg Health and Safety Act. All safety equipment such as PPEs will be used. All required safety rules shall be made known to all workers and be put up in notice boards for workers and visitors.	Contractor	Visual observation on site Number of incidents	Visual observations on site Records of contractor Assessment reports - Incident reports	Contractor, SIIP Safeguards officer
Population increase and Workers influx	Increasing number of people looking for work on site. Increasing number of roadside vendors	Medium to Long term	People movement near the project site will be managed according to needs. Roadside sellers will be discouraged. Security personnel deal with social problems on site and near site project areas	Contractor/ SIIP/HCC	Visual observations on site	Observation reports Consultations complaints	ECD/SIIP Safeguards officer

	especially beetle cigarette sellers. Increasing social issues in areas of project site						
OPERATION PHASE							
Type of project Activity	***Potential Impacts***	***Effect of impacts (Short/ medium/ long term/ permanent)***	***Mitigation measures***	***Cost of mitigation***	***Monitoring requirement/ Parameters/ Indicators***	***Means of verification and frequency***	***Monitoring responsibility***
Increasing Traffic movement	Gaseous emissions and increase dust concentration leading to poor air quality	Long term	Movement of vehicles within the site will be controlled to minimize dust and air pollution on site.	HCC/MHMS	Visual observations on dust conc, or measurements for pm using measuring device where possible.	Records of Visual observation, Consultation, complaints, monitoring device records – monthly/quarterly	HCC-MHMS, ECD, Community
			Moving vehicles will be allocated speed limits along access roads and within project site.	HCC/MHMS	Visual observations	Records of incidence/consultations/complaints	HCC-MHMS, ECD, Community
			All working vehicles shall be serviced regularly to ensure their efficiency and lessen air pollution within site and other areas.	SIG-MHMS-HCC for G vehicles	Visual observations	MHMS-HCC records for G-vehicles	HCC-MHMS,

			Dust masks shall be provided to workers where dust levels are regularly high	MHMS-HCC	Visual observations	Records of MHMS-HCC, Visual Observations	HCC-MHMS
Fauna/Wildlife	Loss of wildlife	Long term	Native fauna found within project site will not be disturbed	HCC-MHMS	Number of species Periodical counts	HCC records Visual counts Consultations	ECD, HCC-MHMS
Flora	Loss of flora	Long term	Establish and manage landscaping system flower beds and ornamentals	HCC-MHMS	Species in landscaping ornamental beds	Visual observations	HCC-MHMS
Surface run off and flooding during heavy rains	Increase surface run off leading to excess water and flooding of Naha valley drainage, land channels and water course downstream of catchment	Long term	All inner drainage systems well-designed to allow for free flow of excess water during heavy rains. All internal drains will be cleared at all times to allow for free and easy flow of surface runoff to outer drains or storm drains. Near off-site drains be cleared at all times to allow free and fast flow of excess waters to prevent any waters from pooling on project site and access roads. All guttering systems properly installed to direct rainwater to connected drainage or collection systems.	SIIP. MHMS-HCC	Visual observations on site	Records of HCC-MHMS Visual confirmation on existence of relevant facilities eg tanks	HCC-HMHS

			No liquid wastes from medical facilities will be disposed-off into open drains. Rainwater tanks will be used to collect excess rainwater for re-use and to reduce excess water from entering drainage systems/channels or water course down the catchment.				
Cyclone events ***(Designs caters for cyclones*)**	Cyclones leads to certain damages and many other risks	Short to long term	Cyclone emergency management procedures established to deal with such events which is common in the country. Cyclone and weather warnings from the MET Services monitored to invoke established procedures including evacuation, when necessary All worker are trained on first aid to attend to emergencies cases as a result of cyclones	SIIP, HCC-MHMS	Visual observations and assessments	Records of HCC-MHMS	SIIP, MHMS, HCC
Earthquake **(*Designs takes account of earthquakes*)**	Event leads to certain damages and many other risks	Short to long term	Emergency procedures established and took account of such events. Specific designated areas within site used as gathering areas during evacuation in earthquake events.	SIIP, HCC-MHMS	Visual observations and relevant assessments	Records of HCC-MHMS	SIIP, MHMS, HCC

			Nurses and medical staff to attend to emergencies cases as a result of earthquakes				
Elevated Noise levels	Increase noise leads to noise pollution – disturbance and nuisance (to the neighboring residential areas)	Long term	All BUHC vehicles shall be regularly serviced to control vehicle noise to acceptable standards**.** Speed limits will be observed within site, along access roads and surrounding areas. Sound proofing systems is installed within the Birthing Clinic	HCC-MHMS	Hearing observations on site with measurements in decibels where possible	Hearing observations, Consultation, complaints, use monitoring device	ECD, HCC-MHMS
Increasing air temperature	Increase risks to human and properties! Uncomfortable working environment	*Long term*	Use cooling (air condition or fans) systems inside BUHC. Install heat detectors and fire extinguishers in BUHC.	SIIP, HCC	Visual observations on cooling and fire safety systems	Visual observations HCC records Consultations	ECD, HCC-MHMS
Public access and safety	Increase risks to public safety	Long term	Adequate signage boards will be placed near the site to direct traffic and clients towards the project site. Proper signage boards will also be placed within site to indicate entrance, exit, loading and offloading areas for safety purposes. Gate access widened enough to allow easy approach, entry and exit for people and vehicles.	SIIP, HCC-MHMS	Existence of public safety systems on site	Visual observations HCC records Consultations	ECD, HCC-MHMS

			All internal systems designed for safe access to services and mobility within the facilities. Security facilities established outside and within the BUHC				
Occupational Health and Safety	Increase risks to human health and safety	Long term	Health and Safety rules will be fully adhered to as required under relevant legislation eg Health and Safety Act Rules and procedures formulated for OHS or adopt industry standard rules on OHS (especially for non-medical workers.) Fire detectors and fire extinguishers installed for fire incidences. Use PPEs for workers where required at all times. Security personal trained and use for safety responsibilities	HCC	Incidences of OHS issues	HCC reports Consultations Complaints	ECD, HCC-MHMS Community
Waste management	Increase risks to human health and natural well being	Long term	Waste Management rules/plan will be formulated and observed during operation phases. Waste production will be minimized as much as possible at all times. All medical wastes within BUHC managed separately from general wastes and stored	SIIP, MHMS-HCC	Visual observations Volume of waste produced	Records of HCC-MHMS Consultations Observation on site	ECD, HCC -MHMS, Safeguards officer

			refrigerated shipping container in fenced and roofed waste management zone for transfer to NRH Incinerator. Wash down zone allocated in allocated waste management zone. Specific designed and large enough area for storage of waste bins/receptors for safe removal to disposal site. Solid waste segregated and placed on segregated bins/receptors within allocated waste zone for collection during operation phase. Waste water from BUHC directed to soak holes. Waste water from outside surroundings directed to drainage, Toilets for all (staff and public, male/female) are part of the BUHC and connected to existing sewage system for use during operation phase. No solid or liquid chemicals of any sort shall be disposed off onto the soil within the project site or surrounding areas throughout the operation phase of the project.				

			Any oil or chemical spillage from vehicles, any other machines or equipment or any other sources within site shall be cleaned using oil spillage kits, cleaning detergents or other relevant cleaning procedures				
Employment	Increase benefits to workers and families or lack of	Long term	Effort will be made to employ workers of all genders as economically possible. Efforts will be made to recruit workers from nearby communities for suitable jobs. All required legislation relating to employment will be observed and adhered to Welfare of workers will be taken care of as much as possible or according to existing legislation and industry best practice	HCC	Employees information Employees working conditions and welfare	HCC reports Consultations Complaints	HCC-MHMS
Population increases and workers influx	Increasing social issues resulting from high/increasing population	Long term	All workers, patients, clients and visitors on site will be managed according to their specific needs and purposes. Roadside merchants or vendors discouraged within the site or nearby areas.	HCC	Number and categories of user of BHUC per month/quarter	HCC records Consultation	HCC-MHMS

			Illegal settlers in any areas of the BUHC not allowed and will be dealt with accordingly. Security services on a 24/7 basis apart from the medical staff throughout the phases of the project				
Health issues	Potential for negative impacts to health or risks to health increases including diseases	Long term	During operation, completed urban clinic will perform its normal functions for all health issues. All COVID 19 emergency requirements as laid down by the government/ NEOC will be adhered to as and when required. All further pandemic events be addressed under existing systems	HCC	Health incidence of workers and staff, nearby residences	Reports of HCC Consultations Complaints	HCC-MHMS
Gender equality	Can lead to discrimination against women	Long term	BUHC components have taken care of gender issues and needs in the design plans. Gender equality promoted throughout all phases of development of the project. Special conditions for female employees as required under legislation will be adhered to. All other relevant legislations and policies relating to gender	HCC-MHMS	Ratio of female to male workers/staff	HCC reports Consultation	HCC-MHMS

			issues will be observed and implemented where possible				
Alcohol and drug abuse	Increase health risks and personal and public safety	Long term	Alcohol consumption will be prohibited on site at all times. Use and sale of illicit drugs will be prohibited amongst staff and workers at all times. Applicable legislation relating to alcohol and drug abuse will be observed and applied at all times.	HCC-MHMS	Incidences or cases of alcohol and drug abuse	Reports of HCC Consultation complaints	HCC-MHMS Community
Privacy	Personal privacy especially for birthing mother	Long term	Western boundary fence design is upgraded to provide increased privacy for birthing mothers, neighbours, and facility users.	SIIP	Existence of structures to address privacy. Visual observations on site	Visual observations on site Consultations	ECD, HCC-MHMS
Grievance and Redress	Successful and effective management	Short term to long term	A Grievance Redress Mechanism will be developed and finalized to cater for grievances and other relevant issues throughout the phases of the project development. All issues and matters brought up under the GRM will be addressed promptly with feasible solutions where possible or addressed fully under the requirements of the established GRM..	HCC-MHMS	Number Issues and complaints raised	Operation report of HCC	SIIP, HCC-MHMS Community

Social commitments	Continuous community support	Long term	Efforts will be made where possible to attend to any social responsibilities such as requests from communities to assist in their social programmes.	HCC	Number of requests	Report of HCC Consultation	HCC-MHMS

13. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

Consultations on this project have been undertaken with certain stakeholders that are required to make decisions relating to various aspects of the project from its concept to the status where it is now and to its eventual completion and operation. For this PER, relevant consultations have been undertaken by the developer and project managers and the consultant as required.

Public consultations had been undertaken with specialized and relevant groups or stakeholders. The following groups were consulted:

- MHMS – *Permanent Secretary, Under Secretaries*
- MECDM – *Director of ECD, Chief Environment Officer*
- HCC – *Director of Health Services*
- RSIPF – *Fire Services, Naha Police*
- Naha Communities - *The Community Consultation was attended by 19 Community Leaders from Naha 1-4, including GG Valley, Senior Nurses from Naha, Vura and Kukum Clinic and officials from MHMS, HCC, and SIIP*
- People With Disability Association of Solomon Islands
- Individuals (affiliated with the area)

All information provided by the above stakeholders have been included in the relevant sections of the report. Other information contained in this report had been gathered by the consultants through:

a. Field assessment and reconnaissance on site and the surrounding project development area
b. Secondary data – relevant existing documents from government agencies, NGOs, UN agencies, scientific groups, consultant entities and individuals
c. Internet sources/web sites including SIG web pages
d. Existing maps on the site
e. National Legislation

In terms of the secondary information used for this assessment, the following have been major sources:

a. SI State of Environment Report 1993
b. SI State of Environment Report 2019
c. Hansell and Wall Lands report

d. NDS 2016- 2035
e. Didao PER 2011
f. SPREP Legislative Review
g. Project Technical Plans
h. Pacific –Australia Climate Change Science and Adaptation Planning Program
i. National Climate Change Policy 2012-2017
j. CBSI Annual Report 2018, 2019,2020,2022
k. Provisional Count 2019 Census result

Other information sources can be found in the References and Bibliography

14. DIFFICULTIES ENCOUNTERED

There are some difficulties encountered in carrying out the assessment. These include the following:

- Time frame allocated for formulation of PER may be limited compared to the work required under PER Minimum requirements as issued by the MECDM, especially in terms of organizing and carrying out public consultations as required under the EIS Guideline.
- Access to relevant existing information from public authorities is an issue.
- It is not easy to carry out public consultations as some expect payments for it.

15. CONCLUSIONS AND RECOMMENDATIONS

This development project has been assessed to be a significant medical infrastructure project located in a populated urban environment that had been subjected to physical and social changes as the capital city of Honiara grows. The location of the project is a well disturbed environment directly linked to the activities of a residential urban area environment.

The BUHC project which is made up of two medical facilities, the birthing clinic and the urban health centre, is located within the Naha valley formation surrounded by the higher ridges of Kola to the west, Panatina/Kombito to the east and Vura to the north. The soil is composed of the Honiara beds-Kombito Marl formation and consist mostly of sandstone, mudstone and conglomerates. The site used to be characterized by a gentle slope of about 30˚ (58%) but has now been levelled from the earlier phase of the proposed development of which construction works have been ceased. The project has been redesigned and re-engineered to provide a code compliant foundation and structural design for the two buildings, considering the mass of the whole structure of the buildings and the horizontal space that is required.

The total area of the project site 6545m² and the total area that will be taken up by the new buildings and the existing urban clinic is only 1145m² (22.1% of area*).* The site is therefore more than sufficient to cater for BUHC and its related essential services infrastructures within the project site. The project may be perceived as ordinary and simple medical facilities but are high level facilities and does involve a more high level technologies and industrial processes for its construction. It is generally considered though that it will not create much significant negative and deleterious environmental impacts through its development stages including its operational phase.

The development project is not only justified under existing national government policies but is itself a concrete manifestation of the efforts of government agencies to implement those polices, especially within the health sector. These major national government policies are the DCGA policy statement, the NDS 2016-2035, the National Health Strategic Plan 2016-2020, National Health Strategic Plan 2022-2031 and the MHMS Role Delineation Policy (RDP). This project is the first urban health centre to be delivered under the RDP. Apart from policies, national and HCC legislation also govern relevant aspects of the project and will guide its development to its operational phase.

The project site is a disturbed and already degraded area which has now been converted to a residential area under the HCC local planning scheme of the Honiara city. The specific project site had previously been dominated by alien invasive plant species and or re-growths after the work on the earlier phase of the project was ceased. These have now been cleared and only ornamentals, some fruit trees and cassava plots remain on site. The surrounding areas are characterised by a Honiara urban vegetation that is composed of large invasive trees such as *Broussonetia paperifera* (paper tree), *Samanea saman* (Rain tree), *Terminalia Cattapa* (Sea alomond – alite) large food trees such as *Mangifera mangus* (mango), *Cocos nucifera* (coconut), *Barringtonia edulis* (cut nut), numerous ornamentals and backyard crops such as bananas and cassava.

While the site is within a residential area, it is generally considered that such residential areas would not create significant negative impacts to the project except for safety issues and noise from residences and moving traffic. It will of course provide much positive impacts to them in terms of easy access to health services. There are very little physical impacts that the project could have on the residential communities' apart from risks from increasing traffic, noise from that increasing traffic and issues on air quality due to increasing traffic. Flooding is not a real issue except that excess rain water and surface run off are, and will need to be attended to. Issues relating to climate change and other natural disasters due to cyclones and earthquakes are real and significant for the project and the communities and it should only be right that these have been catered for in the designs and plans of the project.

Social issues exist within the project development area but most of these are considered to have low impacts and have always been manageable in such urban environments. The project itself will have significant positive impacts to nearby communities and the whole Honiara population including nearby Guadalcanal population in terms of the high quality of health services it will provide.

The project is located in a currently active urban clinic operational site and fits in well with all requirements of the HCC local planning scheme. The HCC has hence granted its Development approval and Building permit to the project. It will continue to monitor the project as it progresses.

Potential impacts identified to be significant or even less significant have been noted and their mitigation measures have been proposed. The management of the potential impacts have been formulated under an environmental management plan outline. The assessment therefore has been considered to provide good enough coverage and depth in accordance with the PER Minimum Requirements as issued by the MECDM under the Environment Act1 998 and Environment Regulation 2008.

Given the nature of the project within an altered and disturbed environment, and that the whole surrounding areas have been converted to a residential area and are now being subjected to related urban development activities, the proposed development should be positively considered for the site. It is considered that this assessment has made a fair effort in assessing the existing physical and socio-economic environment relevant to the project facilities, the project site and surrounding project development area. Further to that and importantly, this PER has outlined the mitigation measures and management of potential negative impacts that have been identified, to be implemented throughout the course of the projects development phases. It is the view of this assessment that all necessary issues relevant to the project have been adequately covered for a PER level of assessment. It is hence recommended that the Director of Environment and or Consent Authority consider this PER with the proponent's development application and grant a Development Consent for the project to proceed as proposed and planned.

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