Post Construction Rehabilitation and Revegetation Management Plan

Person Responsible	**HEC HSE Manager**

REV.	DATE	DESCRIPTION	PREPARED	CHECKED	APPROVED
1	31/12/2019	Version 1 issued for Lenders' Review	HEC	HEC	
2	30/04/2020	Version 2 issued for OE's Review	HEC		
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Revision Log

Rev.	Date (dd/mm/yyyy)	Revised Detail			
		Item	Page	Article	Description

CONTENTS

ACRONYMS

Name	Description
BMP	Biodiversity Management Plan
BOOT	Built, Own, Operate and Transfer
CESMP	Construction Environmental and Social Management Plan
CR	Critically Endangered
dbh	Diameter at breast height
DD	Data Deficient
DESCP	Drainage, Erosion and Sediment Control Plan
DIA	Direct Impact Area
EDCF	Economic Development Cooperation Fund
E&S	Environmental and Social
EN	Endangered
EPC	Engineering, Procurement and Construction
ESIA	Environmental and Social Impact Assessment
ESMP	Environment and Social Management Plan
ESS	Environmental and Social Safeguard (Specialist)
FCP	Forest Clearance Plan
FFMP	Flora and Fauna Monitoring Plan
FIAT	Forest Integrity Assessment Tool
GIIP	Good International Industry Practice
GRM	Grievance Redress Mechanism
HEC	Hyundai Engineering Corporation Limited
HSE	Health, Safety and Environment
IA	Implementation Agreement
IBAT	Integrated Biodiversity Assessment Tool
IUCN	International Union for Conservation of Nature
KBA	Key Biodiversity Area
K-water	Korea Water Resources Corporation
LC	Least Concern
LTA	Lenders Technical Advisor
masl	Metres above sea level
MMERE	Ministry of Mines, Energy and Rural Electrification
MW	Mega Watt
NT	Near Threatened
OE	Owner's Engineer (Stantec New Zealand)
PCRRMP	Post Construction Rehabilitation and Revegetation Management Plan
PO	Project Office
PPA	Power Purchase Agreement
RoW	Right of Way
RR	Restricted Range
SHE	Safety, Health and Environment
SIEA	Solomon Islands Electricity Authority (operational name: Solomon Power)
SIG	Solomon Islands Government
SSMP	Suspended Sediment Monitoring Plan
STMP	Spoil and Topsoil Management Plan
TBA	To be appointed
THL	Tina Hydropower Limited
TRHDP	Tina River Hydropower Development Project (the Project)
TSS	Total Suspended Solids
VU	Vulnerable

WMPSPP	Waste Management and Point Source Pollution Plan
WQMP	Water Quality Monitoring Plan

1 INTRODUCTION

1.1 PURPOSE AND SCOPE

The Tina River Hydropower Development Project (TRHDP or "the Project") is a hydropower development located in Central Guadalcanal, Solomon Islands, managed by a dedicated Project Office (PO) under the national Ministry of Mines, Energy and Rural Electrification (MMERE).

Tina Hydropower Limited (THL) was established by Korea Water Resources Corporation (K-water) and Hyundai Engineering Corporation Limited (HEC). THL will Build, Own, Operate and Transfer (BOOT) the Project under an Implementation Agreement (IA) and a Power Purchase Agreement (PPA) with the Solomon Islands Government (SIG) and Solomon Islands Electricity Authority, respectively. The BOOT concession is expected to last for a 30-year period, following commissioning.

HEC will be responsible for the Engineering, Procurement and Construction (EPC) of the Project, while THL will be responsible for the Operation and Maintenance contract. THL will sell electricity to the Solomon Islands Electricity Authority (SIEA) trading as Solomon Power, the state-owned power utility, for the duration of the concession. At the end of the concession, the hydropower infrastructure will be transferred to the SIG or SIEA.

The present management plan, Post Construction Rehabilitation and Revegetation Management Plan (PCRRMP; C4), is a sub-plan of the Construction Environmental and Social Management Plan (CESMP; P1) prepared for the Project.

The purpose of this PCRRMP is to outline the management measures required to avoid or minimise impacts of forest clearing operations on environmental values through rehabilitation and revegetation of cleared unbuilt sites. There will be two stages of rehabilitation, including:

- Stage 1: Upon completion of the construction phase
- Stage 2: Upon decommissioning of the hydropower facility

This PCRRMP only provides for Stage 1 and it will be updated prior to commencement of Stage 2 to include Stage 2 management measures and approach. It applies to all areas to be rehabilitated and revegetated after construction of the TRHDP, notably at the dam site, powerhouse, access road, and at the widened Black Post Road.

Information presented in the PCRRMP is based on the Environmental and Social Impact Assessment (ESIA) (August 2017) and Environmental Impact Statement (EIS) (July 2019).

1.2 DEFINITIONS

Biodiversity Values	Biodiversity values means the values attached to particular biodiversity attributes by relevant local, national and international stakeholders, such as species of conservation concern and ecological features in the landscape of importance to stakeholders.
EPC Contractor	The engineering, procurement and construction contractor for the TRHDP; Hyundai Engineering Corporation Limited (HEC)
Employer / Owner	Tina Hydropower Limited (THL); the Project Owner, which will take over operation of the hydropower facility once it is constructed.
Employee(s)	Any person(s) who is/are directly employed by the PO, THL or HEC to work on the Project and who receives, or is entitled to receive, remuneration.
Habitat	Habitat is defined as a terrestrial, freshwater, or marine geographical unit or airway that supports assemblages of living organisms and their interactions with the non-living environment.
Natural Habitats	Natural habitats are areas composed of viable assemblages of plant and/or animal species of largely native origin, and/or where human activity has not essentially modified an area's primary ecological functions and species composition.
Employee(s)	Any person(s) who is/are directly employed by the PO, THL or HEC to work on the Project and who receives, or is entitled to receive, remuneration.
Stakeholder	Individuals or groups who are affected or likely to be affected by the project (project-affected parties); and may have an interest in the Project (other interested parties).
Subcontractors	All companies, persons working directly for these companies, or employed by an employment agency, that are under contract to carry out work for HEC, as part of the construction workforce.
Worker(s)	Person(s) engaged in Project activities, including both employees and contractors.

1.3 BACKGROUND

1.3.1 Tina River Hydropower Development Project (the Project)

The Project consists of a 53 meter high Roller Compacted Concrete dam (from riverbed to dam crest) in the central area of Malango Ward of Central Guadalcanal, located 20 km southeast of Honiara, at an elevation of approximately 122 meters above sea level (masl) and roughly 30 river km from the sea. It also incorporates a 3.3 km tunnel to a

powerhouse and a tailrace at elevation 73 masl, centreline elevation, according to Technical Proposal. The reservoir formed by the dam will extend upstream approximately 2.6 km and will have a surface area of about 0.31 km^2 at an elevation of 175 masl. The powerhouse will be located 5.4 km downstream from the dam on the left bank of the Tina River, and water will be diverted to the powerhouse from the reservoir through the underground tunnel. Initially, the powerhouse will have 3 turbine/generator units, each with a capacity of 5 MW, allowing a maximum discharge of about 18 m^3/s and a minimum discharge of 2.4 m^3/s. An environmental flow of 1 m^3/s will be maintained between the dam and the powerhouse tailrace, a distance of 5.7 km.

1.3.2 Project Area Characteristics

1.3.2.1 Soils

Soils that cover the steep slopes of the construction area, adjacent to the Tina River, are shallow and unstable. They are comprised of colluvial rock debris. However, in stable areas, soils are deep and leached. Based on field observations, topsoils close to the proposed access road that will connect to the dam site are primarily composed of organic red-brown clay loam, or clay silt, with underlying weathered sandstone. Organic matter is primarily restricted to the first 10cm of the topsoil. These soils possess moderate to high fertility, resulting in rapid regeneration of vegetation following disturbance, as long as the topsoil remains undisturbed. Conversely, weathered soils observed in disturbed forested areas often become lateritic, are poor in nutrients, and do not facilitate rapid plant regeneration. Along Black Post Road, soils are sandy and have low organic matter content, which does not allow for rapid regeneration.

1.3.2.2 Vegetation

Several vegetation communities occur at the Project site. Descriptions for each area to be cleared are listed in Table 1-1**Error! Reference source not found.** and shown in Figure 1-1**Error! Reference source not found.**.

Table 1-1: Vegetation Communities

Community	Description	Area cleared (ha)
Undisturbed moist lowland forest	Refers to forested areas that have undergone little disturbance from human activities. These forest areas are in pristine condition and have a high ecological value. They are home to a wide variety of species and the intactness of the forest supports great biodiversity. From Sengue upstream, the TRHDP area is solely made of lowland forests. Primary forest (undisturbed forest) become increasingly dominant upstream as access for logging becomes more difficult. Primary forest is characterized by tall canopy trees. However, regrowth species are also common due to occasional cyclones which make canopy uneven. Most fruit trees are found in lowland forests. Indicator species include: *Ficus*	9.5

Community	Description	Area cleared (ha)
	sp., *Dysoxylum excelsum* and *Cyathea* sp. (Tree Fern). This habitat covers the majority of Tina River's catchment at altitude below 600 m, but reaches to the dam site in parts.	
Disturbed secondary forest	Refers to forested areas that have undergone relatively recent disturbance by human activities, such as timber extraction. These forest areas are not in pristine condition and have a moderate ecological value. These forests are dominated by regrowth species such as *Ficus* sp., *Pometia pinnata* and *Calophyllum* sp. Shrubs include the *Macaranga* species. Common nonligneous species include *Alpinia purpurata*, *Calamus* sp. These are indicator species. This habitat becomes important from Choro moving downstream. Regeneration in the Solomon Islands is fast as long as soil remains available. In disturbed forests, logging roads are quickly colonized by regrowth species of shrubs, plants and trees.	29.7
Remnant forest colonised by pioneer species	This habitat refers to forested areas that have undergone extensive disturbance with remaining large trees such as *Canarium* nut trees left on purpose. These forest areas are not in pristine condition and have moderate ecological value. They are home to a variety of species but are highly modified landscapes by people. Increasing light has modified plant composition under the canopy.	21.9
Riparian vegetation	Riparian refers to habitats along and adjacent to Tina River and other waterways. These habitats are of high ecological value because they are home to many unique species that are dependent on the water ecosystems such as aquatic insects and amphibians. Riparian habitats at a greater distance from settlement areas are in pristine conditions. This habitat is typical along rivers such as Tina River. It is made of many epiphytic plants and orchids, vines (climbers and creepers shrubs) as well as fern trees that are indicator species. Many medium sized trees and shrubs are present.	21.6
Cliff vegetation	Cliff refers to habitats on and adjacent to very steep areas (vertical slopes), usually adjacent to the river. They are of high ecological value because they house unique species that may use the cliffs as feeding and breeding habitats. They are of a relatively pristine nature because cliff areas are hard to be modified by local peoples. Tree fern (*Cyathea)*, ficus, palm, epiphytic orchids and ferns are common on cliffs. Other indicator species include: *Pholidota* sp., *Macaranga* sp., *Timonius timon*, and *Alpinia purpurata*.	16.1
Garden	Garden refers to human cultivated habitats such as food crops. These habitats are of low ecological value as they are human created landscapes. However, they do provide certain feeding habitats for some species, mainly opportunistic species, insects and reptiles.	4.6
Fallow	Refers to habitats that were cultivated in the past but have been left uncultivated in recent years. These are areas similar to remnant forest however, they have undergone complete cultivation. They are of low ecological value because they host a minimal number of species.	6.4
Grassland	Grassland refers to habitats that are dominated by grasses and cover the lower lying hills toward the plain. These are natural habitats formed from the locally dryer climate and less fertile soils. Since human density is higher in grassland, and plant species of concern are rarer, they have moderate ecological value. However, they support unique wildlife and bird species that are adapted to open spaces not found in forests. The most common species (indicator species) identified during plant survey	6.1

Community	Description	Area cleared (ha)
	were *Pennisetum polystachyon*, *Pueraria lobata*, *Sida rhombifolia* and *Mimosa pudica*. The invasive species *Mikania micanthra* is also present. Grassland dominates the landscape along the existing Black Post road, future access road to the project site and where the transmission line will be installed. In the Tina River catchment, this habitat is only present at its northernmost end.	

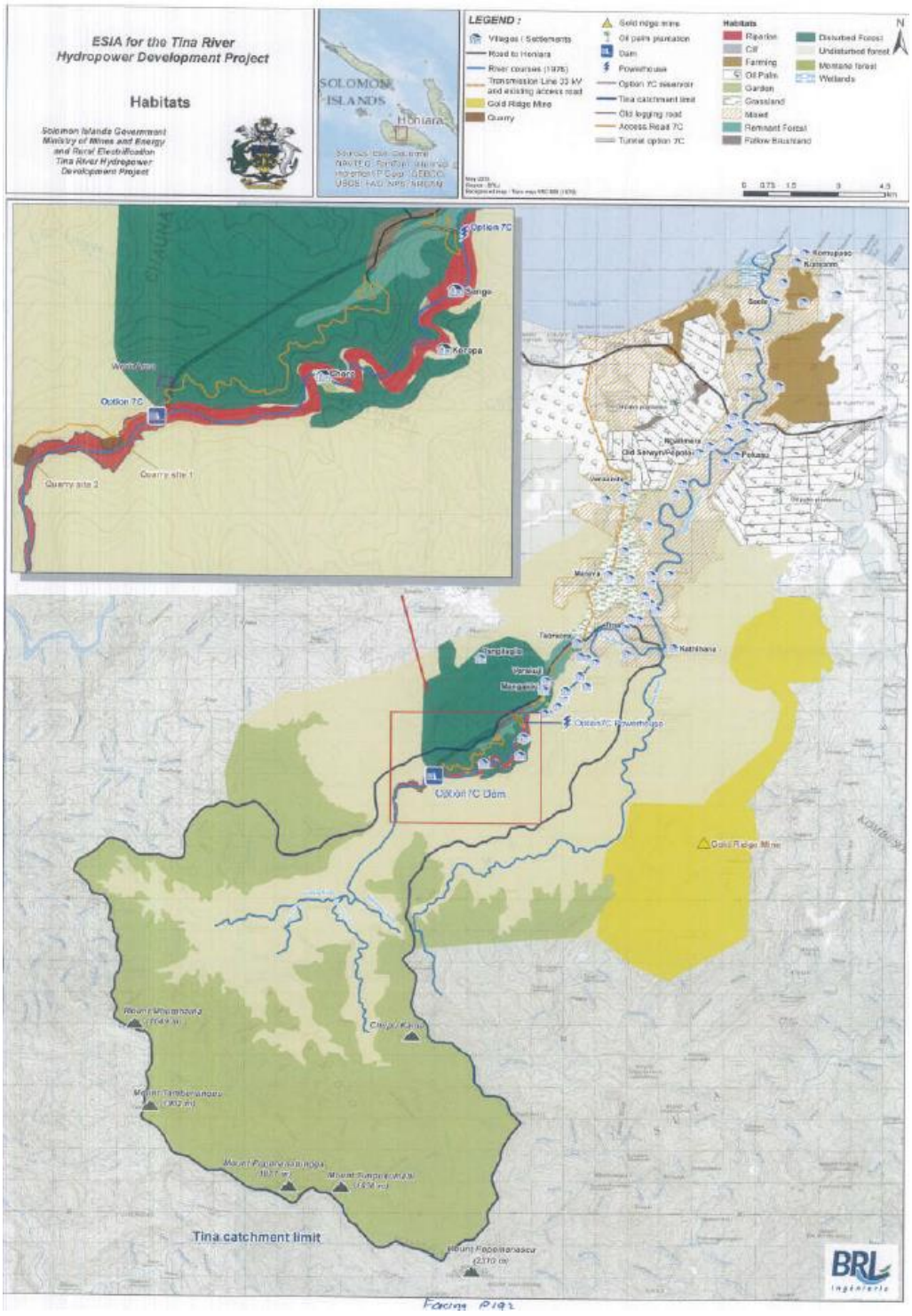

Figure 1-1: Habitat/Vegetation Communities

1.3.2.3 Biodiversity Values

Located on central Guadalcanal in the Solomon Islands, the TRHDP is located in an overall setting that is recognised as one of the most biologically important regions on earth in terms of species richness and endemism. Within the TRHDP area itself, there

are undisturbed montane forests in the upper catchment that are a Key Biodiversity Area (KBA) on the basis of a unique assemblage of restricted range species, several of which are listed as Critically Endangered (CR) or Endangered (E) under the International Union for Conservation of Nature (IUCN) Red List. It is considered to be Critical Habitat in the ESIA.

Natural habitat extends to the area of the proposed dam, although at lower altitudes, many areas are disturbed or partly cleared due to human settlements and commercial logging activities. The majority of habitat within the proposed TRHDP footprint consists of such disturbed habitat (Figure 1-1). Of the entire upper Tina River catchment (12,500 ha), the footprint of the TRHDP constitutes 397 ha (about 3%). Within this footprint, 31 ha of undisturbed habitat (undisturbed forests and riparian habitat) that could be considered Critical Habitat would be cleared (less than 1% of the TRHDP footprint and 0.04% of the Tina River upper catchment). Nevertheless, the reservoir, dam and powerhouse areas provide important habitat with 159 flora species and 60 fauna species recorded during baseline surveys, including restricted range species and species listed as threatened under the IUCN Red List. This includes IUCN Red List plant species as shown in Table 1-2. A complete list of IUCN Red List flora and fauna species is provided in Appendix A, while a complete list of plant species encountered during baseline surveys is provided in Appendix B.

The Tina River itself is considered to be a relatively pristine, low nutrient watercourse. A total of 59 fish species were recorded during baseline surveys.

Table 1-2: IUCN Red List Plant Species

Scientific Name	Common Name	IUCN Red List[1]	Presence
Intsia bijuga	Borneo Teak (tree)	VU	Recorded on site
Oryza schlechteri	Wild Rice (herb)	EN	Not recorded but site within distribution range
Pterocarpus indicus	Papua New Guinea Rosewood (tree)	EN	Recorded on site

[1] EN = Endangered; VU = Vulnerable

1.3.3 Clearing and Rehabilitation Requirements

The TRHDP will result in the permanent clearance of an estimated total of 112 ha of vegetation from all project sites (Table 1-3). Most of the clearing will involve forests along the alignment of the access road. Riparian and cliff habitats will be removed or inundated to establish the reservoir. The remaining clearance will be for the dam, powerhouse and tunnel entrance/exit, quarries, temporary topsoil and spoil storage areas, and work area. The required extent of vegetation clearance will be reviewed

and minimised during the preparation of the detailed project design due in December 2020.

Table 1-3: Estimated clearing area

Item		Area (ha)
Dam site/ Intake	Dam/Diversion	1.24
Powerhouse / Outlet	P/H, Penstock	0.82
	Surge tank	0.07
	Switchyard	0.23
Soil stock piling area	No.1	8.31
	No.2	14.61
	No.3	8.11
	No.4	27.12
	No.5	1.34
Office area / BP		0.28
Access road	LOT1	3.9
	LOT2	13.19
	LOT3	3.79
Reservoir Area		28.7
Total		**111.71**

The number indicated in this table is the value expected by HEC.

Vegetation on temporary topsoil storage sites will be cleared to establish the stockpile, but eventually regenerated by TRHDP using native vegetation species once the stockpile has been used to revegetate areas. According to Appendix Q in ESIA, modified habitat area will not be cleared during the project, whereas around 31 ha of critical habitat around will be cleared (for dam and reservoir constructions) during the project.

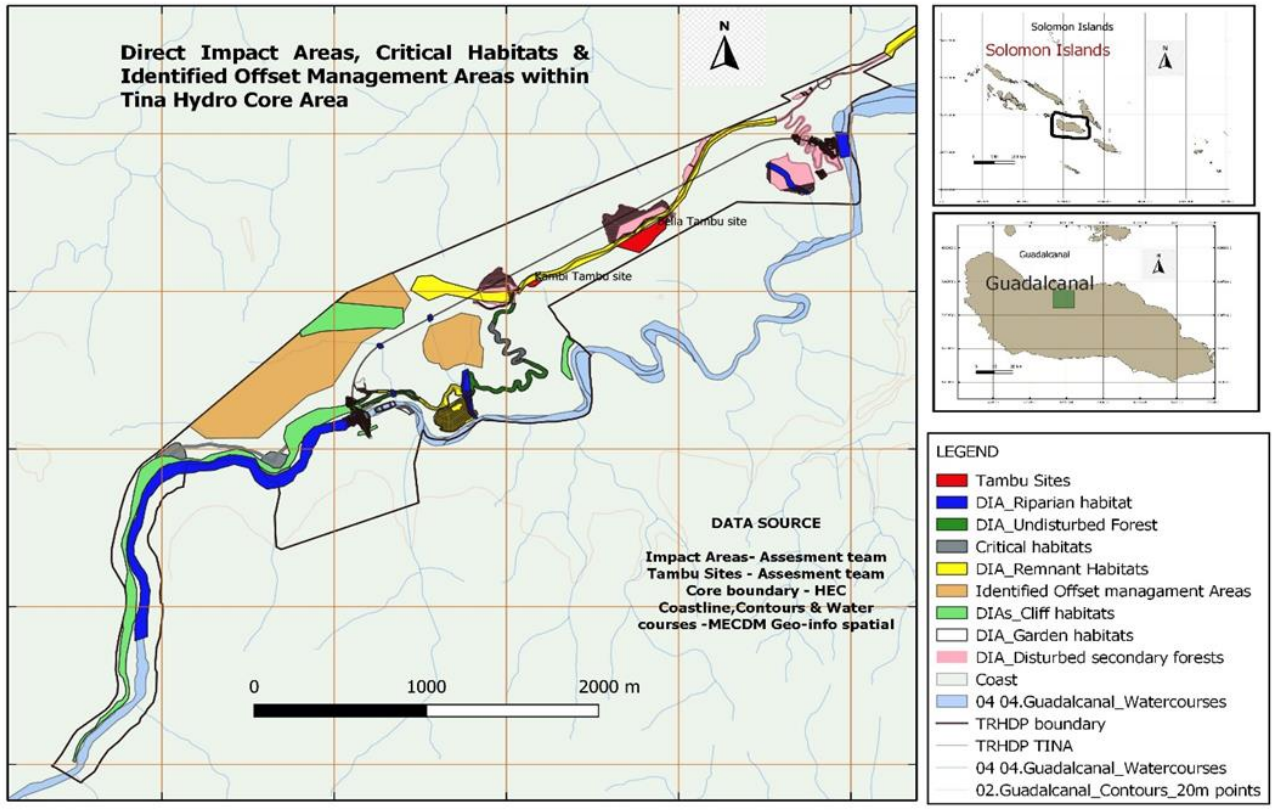

Figure 1-2: A general site plan illustrating cleared areas, protected trees and areas to be cleared

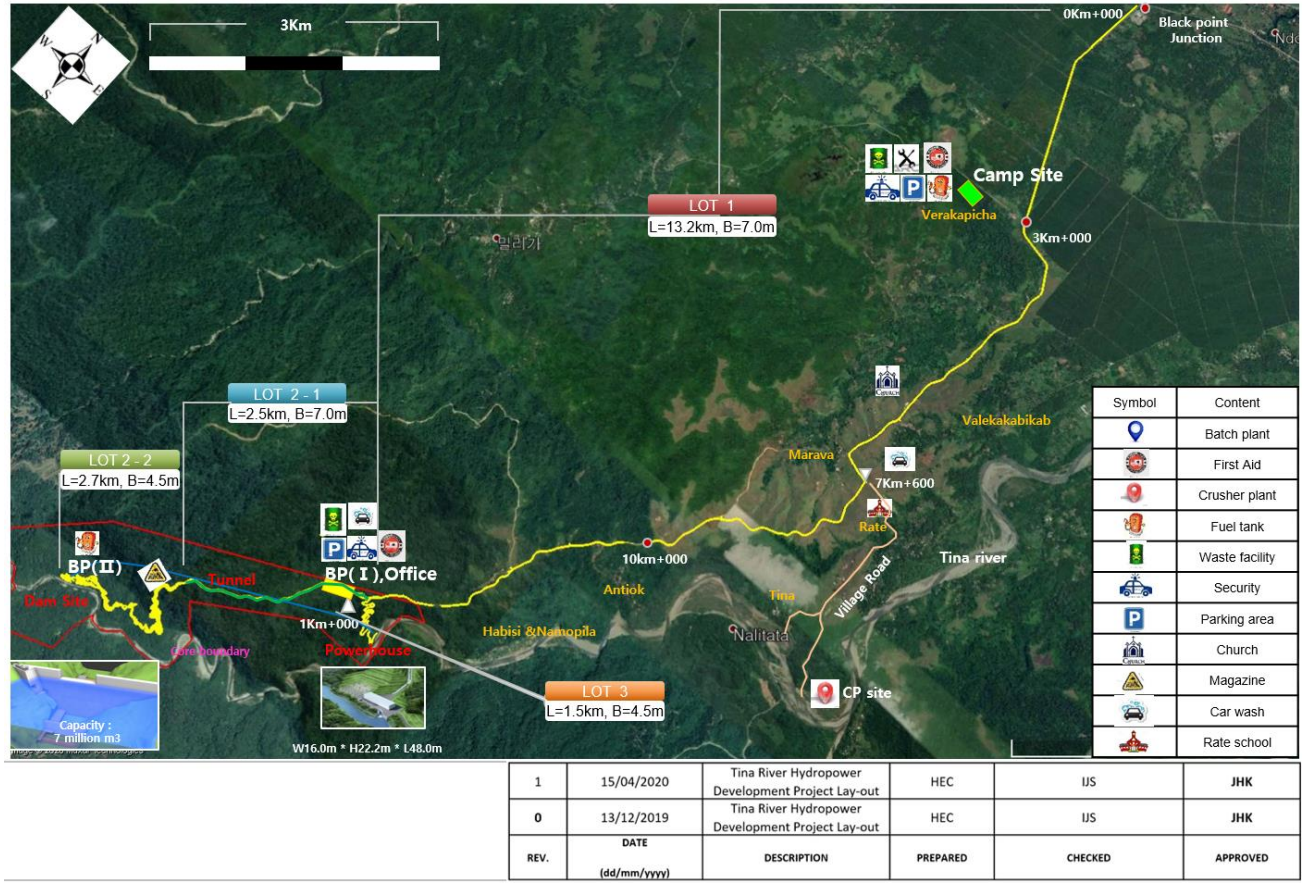

Figure 1-3: A site plan illustrating designated storage areas

Most clearing will be permanent for the life of the Project to make space for buildings and infrastructure. Rehabilitation and revegetation in these areas will primarily be along the edges of work spaces, around buildings and along road embankments, at culverts, etc. Major areas to be rehabilitated include around 60 ha of temporary soil stock piling area toward the end of the construction phase .

1.3.4 Impacts Addressed

1.3.4.1 Erosion and Sedimentation

During forest clearing, increased Total Suspended Solids (TSS) concentration (both base values and peaks) will occur within the Tina River due to disturbance of the river bed, river banks, and accessible construction sites from heavy forest clearing machinery, and increased load of soil and organic particles following. Soils underlying cleared vegetation are exposed to rain impact, resulting in runoff and erosion. The increase in turbidity is likely to temporary affect the river far downstream of the dam area. Increased suspended matter will cause deposit of fine particles (silting) of the streambed and banks in sections of slow velocity downstream of the dam.

1.3.4.2 Impacts on Biodiversity

The ESIA has identified the following threats to Biodiversity Values:

- Habitat loss. A total of 115.54 hectares of habitat will be permanently removed to provide space for the Project. As result of clearing, other associated key threats to biodiversity are triggered, such as edge effects, fragmentation and indirect habitat loss due to hydrological changes.
- Edge effects on natural habitat in habitats to be retained within the project area as well as in areas outside of the project area. Edge effects identified relate to invasive species establishment and increase in predatory pressure due to cleared areas acting as grounds for predatory hunting.
- Loss of biodiversity and habitat alteration due to human harvesting of flora, fauna and wood due to creation of roads and cleared areas which will facilitate human transit.
- Colonisation by invasive species. It has been recognized that cleared areas, in particular the transmission line corridor are likely to promote invasive species establishment.
- Loss of biodiversity values due to pollution (e.g. use of herbicides) associated with the Project construction and operational activities.
- Habitat fragmentation, barrier effects and loss of habitat linkability to terrestrial and aquatic fauna due to road construction and river regulation.
- Decrease in population size and longevity due to mortality associated with noise, vibration, light and vehicle strikes.

Clearing 115 ha of vegetation within the footprint of the TRHDP will result in the loss of habitat for native flora and fauna. However, most will be habitat that has been disturbed in the past. Only 31 ha of undisturbed forest and riparian habitat will require clearing, although other natural habitat, such as grassland and cliffs, will also be removed through inundation at the reservoir.

Clearing of habitat will result in the direct loss of terrestrial flora and fauna. Fauna particularly affected include smaller species with a substantial part of their home range within the cleared habitat. Aquatic biota is impacted through changes in the water quality and sedimentation potentially resulting from erosion (see above). Indirect impacts on fauna may also result from increased habitat fragmentation and barriers to movement.

Although a range of feral and invasive species have been recorded from the TRHDP, vegetation clearing would provide additional opportunity for further influx of such species, resulting in competition with native species. This is particularly so for invasive flora species, which often invade cleared areas faster than native species thereby preventing or delaying the re-colonisation of cleared areas by native flora in the absence of management measures.

To compensate for the loss of biodiversity, the Project proposes to contribute to the conservation of the Tina River upper catchment. A number of key measures will be implemented to protect the upper catchment in order to achieve a net gain offset. These will be outlined in the Biodiversity Management Plan (BMP; P2).

1.4 LINKS WITH OTHER MANAGEMENT PLANS

As a sub-plan of the overall C-ESMP for the TRHDP, this PCRRMP links with a range of other sub-plans that are part of the C-ESMP. The principal links are presented in Table 1-4.

Table 1-4: Links with other plans

Management Plan	Relevance
Construction Environmental and Social Management Plan (CESMP) (CESMP;P1)	Refer to this plan for presentation of organizational charts, detailed description of the audit process, description of process to amend the management plans.
Biodiversity Management Plan (BMP; P2)	Refer to this plan for mitigation strategies to preserve biodiversity. This includes details on key measures to protect the upper catchment and achieve a net gain offset.
Forest Clearance Plan (FCP; C3)	Refer to this plan for mitigation strategies to apply when clearing vegetation.

Management Plan	Relevance
Spoil and Topsoil Management Plan (STMP; C9)	Refer to this plan for management of spoil and topsoil generated during Project construction.
Drainage, Erosion and Sediment Control Plan (DESCP; C10)	Refer to this plan for mitigation measures to limit transport of sediments to the Tina River.

1.5 APPLICABLE CODES AND STANDARDS

The following are the key standards applying to the implementation of the PCRRMP:

International treaties and standards

- Asian Development Bank (2009) Environmental Safeguard Policy Safeguard Requirement 1;
- World Bank Environmental and Social Performance Standard 3: Resource Efficiency and Pollution Prevention (2012);
- World Bank Operating Procedure 4.03: Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts 2013;
- World Bank Operating Procedure 4.03: Performance Standard 6, Biodiversity Conservation and Sustainable Management of Living Natural Resources (2013);
- Environmental Act 1998 and Environmental Regulation; and
- Economic Development Cooperation Fund (EDCF) Safeguard Policy (2016)

HEC policies and procedures

- HEC-AH-H04-H02, Health, Safety, and Environment (HSE) Management of Subcontractors;
- HEC-AH-H04-H09, HSE Monitoring and Measurement Procedure; and
- HEC-AH-H04-H13 HSE Audit Procedure.

2 ROLES AND RESPONSIBILITIES

While HEC will be responsible for most tasks outlined in this plan, THL will be directly responsible for the revegetation and restoration during the operation and maintenance phase of the project, while Solomon Power will be responsible for revegetation within the transmission line corridor. Table 2-1 provides the key roles and responsibilities.

Table 2-1: Key Roles and Responsibilities

Position	Responsibilities
HEC Project Manager (*Mr Eu Man Moon*) THL E&S Manager (after construction)	• Ensure that adequate resources are provided to successfully implement this PCRRMP. • Ensure that all HEC project managers and subcontractors understand and fulfil their PCRRMP responsibilities.
HEC Construction Manager (*Mr Yoo Jae Bong*) THL E&S Manager (after construction)	• Ensure that the HEC HQ Design Team integrates E&S mitigation measures into the final project design. • Participate in site inspections to plan and confirm the detailed design of E&S site measures. • Review and approve detailed site plans and method statements incorporating E&S measures. • Ensure that all personnel involved in construction activities, including subcontractors and vendors, are adequately trained and informed on the requirements of the PCRRMP. • Participate in site inspections in the early stages of works at each site with the HEC HSE Manager, subcontractors and THL. • Review and approve HSE reports. • Audit subcontractor performance.
HEC HSE Manager (*Mr Dae Yong Kim*) THL E&S Manager (after construction)	• Maintain this PCRRMP. • Ensure that all personnel including subcontractors and vendors are adequately trained and informed on the requirements of this PCRRMP. • Lead site inspections with the HEC Construction Manager to plan and confirm the detailed design of E&S site measures. • Prepare detailed site plans integrating E&S measures into final design drawings and method statements and submit these to the HEC Construction Manager. • Lead weekly site inspections with subcontractors and THL during construction. • Prepare weekly and incident HSE Performance Reports. • Audit subcontractor E&S performance.
HEC E&S Supervisor	• Undertake field inspections to monitor rehabilitation and revegetation, reporting any issues directly to the HEC HSE Manager on a daily basis.

Position	Responsibilities
(*Ernest Kolly*) THL E&S Manager (after construction)	• Contribute to weekly and incident HSE reports prepared by the HEC HSE Manager. • Ensure the HEC E&S team conducts all monitoring and reporting as set out in the ESMPs. • Provide support to HEC HSE Manager in updating this PCRRMP as necessary. • Assist in worker training on environment protection, and rehabilitation and revegetation success.
HEC Emergency Supervisor (*TBC*) THL E&S Manager (after construction)	• Manage emergency procedures relating to rehabilitation and revegetation.
HEC Training Supervisor (*Mr Patrick Kekete*) THL E&S Manager (after construction)	• Train HEC staff and subcontractors on rehabilitation and revegetation management with the assistance of the HEC HSE Manager.
Owners Engineer (OE) – *Stantec New Zealand*	• Review PCRRMP for compliance with the E&S Standards and GIIP. • Monitor and audit project delivery and HEC activities in accordance with the detailed project design, method statements, PCRRMP, related MPs, and detailed site plans. • OE Site Engineer (*Vilive Anise and/or William Waddell*) will undertake regular site supervision, and report any E&S non-compliances to the HEC HSE Manager, THL E&S Manager and OE Environmental & Social Safeguards (ESS) Lead (*Jessica Grinter – Off Shore*). • Audit HEC performance with respect to the requirements of the EPC Contract, and health, safety, environmental and social obligations (including but not limited to the E&S Standards, and Schedule 7 of the EPC Contract). Auditing will include a site visit conducted every six months from commencement of construction, for the duration of the construction phase, by the OE ESS Lead at minimum.
THL E&S Manager (*to be confirmed; currently Mr Jihun Lee, CFO is primary contact*)	• Review PCRRMP compliance with the E&S Standards and GIIP. • Participate in daily site inspections in the early stages of works at each site with HEC and subcontractors. • Participate in weekly site inspections with HEC and subcontractors during construction (following early works). • Prepare monthly E&S performance reports, advising HEC of any non-conformances and required corrective actions. • Audit HEC compliance with the PCRRMP.
PO E&S Monitoring team (with Lenders	• Monitor that HEC and THL have:

Position	Responsibilities
Technical Advisor - LTA)	○ complied with all requirements, guidelines, procedures, timetables and other specifications set forth in the PCRRMP at all times ○ obtained, maintained and complied with all applicable laws, regulations, permits, licences and consents. ○ Audit HEC and THL E&S performance.
Subcontractors HEC soil expert & Subcontractor - Rehabilitation and Revegetation Expert (Soil expert) Subcontractor - Terrestrial Ecologist-*Kevin Sese; Myknee Sikolo* *Conservation specialist (see BMP; P2)*	• Implement all rehabilitation, revegetation and environmental controls measures set out in the PCRRMP • Maintain E&S control measures in good working order, and modify these controls as needed. • Notify HEC of any E&S incidents and proposed corrective actions, and record these in an incident log. • Undertake the agreed corrective actions in a timely manner. • Undertake all revegetation and restoration works as per this PCRRMP, unless specified otherwise • Baseline survey in restoration area • Topsoil management and soil testing • Preparation of area revegetation plans • Establish and operate nursery in cooperation with villagers • Monitoring of revegetation and restoration • Terrestrial Ecologist to undertake baseline surveys in restoration area and reference areas

**Solomon Power to prepare its own plans for revegetation and rehabilitation as part of the Transmission Line EIS.*

3 SOIL AND SPOIL MANAGEMENT

The availability of appropriate soils is a primary requirement in rehabilitation and revegetation. Excavated soil from construction sites will be re-used for restoration of construction work areas no longer required as the TRHDP moves into operation. Importation of soil from outside work areas will be prohibited, thus minimising the importation of weeds and plant pathogens into the TRHDP area. Stockpiling of soils and spoils will be kept to a minimum to avoid colonization by invasive species. A Spoil and Topsoil Management Plan (STMP; C9) is prepared as part of the project to assess the amount of spoils from road cuts, the need for road embankment and future use of excess soil. In addition, a Drainage, Erosion and Sediment Control Plan (DESCP; C10) will be prepared outlining the preparation of soil surfaces (slopes, drainage etc.) for revegetation. The information below represents a brief review of topsoil management, which is crucial to revegetation efforts.

Excavated soils and spoils from the access road (the major source of soil for the TRHDP) and nearby areas will be stockpiled in an area roughly 60 ha in size, which will be developed with limited encroachment on natural habitats. The precise location of this area will be determined and demarcated by the Terrestrial Ecologist and the THL site manager.

To ensure good soil management and revegetation, the HEC will implement the following mitigation measures during any earthworks conducted in forested areas where rich organic topsoil is present.

- Salvaging topsoils with high organic content, and mineral soils (i.e., subsoil not capable of supporting plant growth) - prior to commencing construction of the access road, HEC will be required to do soil coring to assess the depth of organic soil in the right-of-way in cleared forested areas, from Mangakiki to the dam, quarry sites, powerhouse and tunnel exit. This will determine the depth of soil stripping that is required. Collection of soil cores, and the management of soil stripping, will be done under the supervision of a soil expert. The aim is to conserve the topsoil for future use in rehabilitation of disturbed areas and to reuse subsoil for road embankments. Measures taken during earthworks to protect waterbodies are presented in the STMP and DESCP for the TRHDP.

- Storage of topsoil – topsoils with a high organic matter content and good potential for plant regrowth will be stored within a soil stockpile area. Topsoil storage will be a minimum of 50 m away from all water bodies on a flat terrain, and close to work areas. Stockpiles will be compacted and covered with geofabric tarps to avoid unwanted plant growth and to avoid erosion of the stockpiles. Another option is to seed soil stockpiles with cover crops such as Mucuna, Pueraria and Meremia along with vetiver grass (*Chrysopogon zizanioides*) to maintain the organic content of piles. In either case, to minimise soil compaction, stockpiles will not exceed 5 m in height. Stockpiles slopes will be determined by stability study at the design stage and will generally not exceed a horizontal to vertical ratio of 2H:1V, and will be surrounded by sediment control structures, such as deeply anchored sediment fences, ditches, or berms around the stockpiles. In addition, appropriate drains will be installed at all stockpiles and disturbed areas, including those adjacent to road alignments, to enable sediment control structures, such as settling ponds, to prevent sediment laden runoff flowing into water bodies. Stockpiles of topsoil will be maintained at a pH of greater than pH5.5, since a lower pH may lead to reduced organic matter content. With pH below 5.5, many essential nutrients may leach from the topsoils, and toxic elements may be released, which will affect future plant regeneration. If necessary, agricultural lime could be spread onto the stockpiles to maintain a stable pH level. Testing of soil for suitability and remediation is to be undertaken by the Rehabilitation and Revegetation subcontractor (soil expert) on a monthly basis in representative locations of the stockpiles, with records to be audited by the THL E&S Manger.

Stockpiles will be monitored throughout the construction phase as per STMP. An estimated ten conical stockpiles each 5 m high and 50 m wide will be necessary to store 327,900 m^3 of topsoil. It is recommended that spoils be stored in the remnant forest habitat to minimize forest clearing and because this habitat is located close to the access road (see Figure 1-2 and Figure 1-3).

4 REVEGETATION OF CLEARED AREAS

Rehabilitation and revegetation is used to significantly reduce erosion. It should be undertaken progressively by the rehabilitation and revegetation subcontractor immediately following completion of construction and associated works . Early completion of soil surface grading activities will allow for prompt revegetation for erosion control. Bioengineering techniques such as the use of wattles, coir rolls, live staking, hydromulching, and brush layering can both provide vegetation and structural stability on slopes, thereby reducing erosion potential in the long term. Mulch or straw can be used to stabilise areas temporarily in areas where final grading is delayed.

All plant materials used for revegetation (seed, seedlings, cuttings, saplings, stakes) should preferably be sourced from native species growing within the Project area or nearby areas. An indicative list of plant species present within the Project area is presented in Annex B. Any other species used, such as plants used for food or other specific purposes, should be species already well known to the area, and be non-weedy (see also the Biodiversity Management Plan (BMP; P2) for invasive species control). A nursery set up and operated by the revegetation/restoration subcontractor and local villagers will be established for the propagation of seedlings and saplings, and for the preparation of appropriate seed mixes. The subcontractor in cooperation with the Project Biologist and suitably experienced people from local villages, should determine an appropriate list of plant species to be used for revegetation.

4.1 TIMING

Collection of seed will occur well in advance of revegetation, to ensure adequate quantity of seed is available. Timing of collection will need to take account of seed setting seasonality of species targeted for revegetation/restoration. Early collection will ensure that target species can be represented in the seed mix. Seed are to be stored appropriately (e.g. in dry/cool location) prior to revegetation operations.

4.2 AREA REVEGETATION PLANS

As noted above, revegetation should be undertaken in all previously cleared areas on a progressive basis by the subcontractor as soon as practicable. Plans are to be prepared as soon as possible by the subcontractor for each discrete area in advance of revegetation, outlining the specific revegetation methods to be used, planting densities, time lines, as well as materials (including plant species) and human resources required.

4.3 SURFACE PREPARATION

Soil surfaces should be roughed up during grading in order to allow for penetration of water into the soils, water retention, and hence facilitate revegetation. This may be undertaken by running a tracked vehicle on slopes, creating divots perpendicular to

the slope length. The soil surface should be scarified to a minimum depth of 8 cm before topsoil is placed on the surface. Areas that have been subject to heavy traffic should be ripped to facilitate drainage and root growth into the deeper sections of the soil profile.

4.4 CLEARED AREA REVEGETATION

Revegetation of cleared surfaces can be conducted as part of a phased construction program, where revegetation is undertaken immediately following completion of construction and associated works. The phased approach reduces the sediment load in temporary sediment retention structures and reduces erosion from cleared or graded areas by reducing the length of time that soil is exposed to rainfall and surface run-off flows. However, it is important that all activities that can impact on soil surfaces, including spreading of topsoil prior to revegetation, are completed to prevent disturbance to newly revegetated sites. Otherwise, revegetation may be impeded or fail, and may need to be re-done.

Any planting should be timed to ensure that re-vegetation is sufficiently established to withstand the impacts of major rainfall. Therefore, re-vegetation should ideally be completed before the onset of the wet season. It is recommended that materials used for re-vegetation, such as seed, cuttings, seedlings, be collected or propagated during the preceding dry season.

4.4.1 Seeding

Surfaces exposed temporarily for over 30 days, or during seasonal rains, can be revegetated using fast growing grasses that, once established, can protect the soil surface against the impacts of rainfall splash or surface water erosion.

Where surfaces are exposed for 12 months or longer, a permanent cover should be established. Permanent seeding can be used in combination with jute or coir matting to reduce soil erosion during the establishment stages.

The seed mix applied should be appropriate for the area, and consist of species native to the TRHDP and nearby areas, or consist of seed for exotic species specifically bred for erosion control and that are sterile during the adult stage (e.g. vetiver grass), thus avoiding future self-seeding of exotic species which may result in a weed infestation. Seed mixes consisting of native species should be tested for viability prior to application. Suitable grass species are to be selected and propagated by rehabilitation and revegetation subcontractor in consultation with local villagers.

Seed should be applied using broadcast seed spreaders, seed drills, or other methods that ensure even and controlled distribution of seed. Mulch should be applied post seeding to protect the soil and seed mix from erosion and to improve the early growth environment for seedlings.

Slopes over 3H:1V should be hydro-mulched. This process involves the application of a slurry consisting of seed mulch, safe/organic fertiliser, tackifiers and water to slopes. The slurry is kept agitated inside a tank on the back of a vehicle, and sprayed on the slope surface using a pressurised hose. Hydro-mulching is appropriate for steep slopes, and for irregular surfaces, with large clods, stones or exposed rock.

The success of all seeding operations should be monitored weekly, and re-seeding may need to be considered where growth of seedlings is impeded or where it has failed.

4.4.2 Wattles

Wattles consist of a bunch of twigs or branches interlaced with twigs or branches to create an elongated cylindrical structure. Wattles are installed in shallow horizontal trenches along contours of slopes, secured with stakes to assist in the prevention of rill and gully erosion along the slope. Installation should commence at the foot of the slope, working upwards using intervals between wattles of 3-6 m for slopes up to 4.5H:1V, and 1-1.5 m intervals for steeper slopes (up to 1.5H:1V). The space between wattles is filled with soil, ensuring that the top of the wattle cylinder remains visible. Wattles will be inspected weekly during the three months after revegetation, and re-installed should wattles have shifted.

4.4.3 Coir Rolls

Coir rolls and mats are made of appropriate fibre materials, such as coconut fibre, particularly used to stabilise stream banks and drainage channels. Rolls are installed parallel to the bank, ensuring that the top of the roll extends 5 cm above the water surface. Rolls will be tied end to end, and staked down to prevent dislodging. Coir matting is recommended to be installed adjacent to the coir rolls to stabilise the riparian zone. Plant seedlings will be planted in the top of the rolls and within coir matting, at spacing of 10 cm. Coir rolls and matting will be inspected weekly during the first three months after revegetation, and re-installed should coils and mats have shifted.

4.4.4 Live Staking

Live stakes may be used to secure coir rolls, mats, and wattles. They may also be installed among riprap, gabions, or in open soil. The live stakes are intended to resprout and develop into shrubs and trees with deep root systems that assist in the stabilisation of slopes.

Live stakes should be selected from appropriate native species growing in similar habitat in adjacent areas. Stakes should be straight, and usually made of material older than one year of age, sufficiently strong to be able to be driven into the ground for a distance of 0.3-0.5 m. Stakes should be cut cleanly, avoiding splitting of stakes. Cutting equipment should be clean to minimise the risk of pathogen infection, and stakes are

soaked in water for 24 hours prior to installation into the ground. To minimise damage to the stakes, a pilot hole may be drilled or created using a metal rod prior to insertion of the stake to protect the stake from splitting when hammering in. When installing stakes, the exposed section of the stake should have several bud scars to ensure sufficient opportunity for resprouting from these.

4.4.5 Brushlayering

Brushlayering is similar to the use of wattles, but with loose branches packed between layers of soil to assist in the reinforcement of the slope and resist sliding movements. Protruding branches are intended to resprout and result in deeply rooted vegetation. The technique is useful particularly in the repair of gullies and existing steep fill slopes.

5 RESTORATION OF DEGRADED FOREST

This section outlines the restoration of degraded forest. Restoration efforts will be aimed at protecting the existing habitat and promoting natural regeneration processes by removing weeds, carrying out enrichment planting and thinning of forest stands to reduce stem density. Tree planting will be used to complement protection and assisted natural regeneration where the proportion of seedlings and saplings is low, or where the diversity of tree species is lower than in adjacent undisturbed forest.

5.1 PRE-PLANTING SURVEYS

A baseline survey by the Terrestrial Ecologist will be undertaken to determine the current (post-development target) conditions of all areas to be rehabilitated and revegetated, including the restoration site. Parameters assessed will include identifying the species composition of the principal vegetation layers (particularly the canopy), and structural parameters, such as height and cover of the canopy and emergents, basal area and tree diameters, presence and abundance of recruitment, presence and abundance of weed species, terrain, soil conditions etc. This baseline survey will also help to identify which strategies are suitable for specific areas within the habitat restoration site, including the size and location of tree planting areas.

In addition to a baseline survey of the restoration site, a "reference survey" will be carried out on a nearby natural site that can act as a proxy for the desired outcome of the habitat restoration. The reference survey will provide valuable data that would inform the detailed planning of the habitat restoration e.g. the species composition, and the mix of pioneer species and forest-adapted species.

5.2 SUCCESSION PLANTING

In areas where canopy cover is still relatively intact, succession planting is not required. However, in more modified or degraded areas, including areas with bare earth, pioneer species will be planted to accelerate the re-establishment of canopy cover. This will be followed by the planting of climax species under the shade of the pioneer species. Increasing canopy cover facilitates the growth of climax species that are shade-dependent and also reduce the presence of herbaceous weeds, including invasive species. Canopy cover encourages other natural processes that support forest regeneration (e.g. improvement in micro-climate conditions, increase in bird activity for seed dispersal).

5.3 SEEDLINGS VS. ADVANCED PLANTING MATERIALS

There are a number of approaches with regard to planting methods for restoration. These include the use of seedlings that are germinated from seeds and grown in

nurseries, the use of advanced planting materials, such as saplings, and the use of live stakes.

In general, planting using seedlings requires a higher level of maintenance as it may require the usage of fertilisers and physical protection against predators e.g. fencing or netting and resources required for monitoring.

In many cases, it may be more feasible or cost-effective to use advanced planting materials. Once planted, they can provide canopy cover relatively rapidly and are more resilient compared to younger seedlings. Advanced planting materials are able to restore the forest structure more rapidly in terms of multiple canopy layers, providing shade for herbaceous flora, and allowing for climbing plants and epiphytes to re-establish. Moreover, advanced planting materials are quicker to flower and fruit, therefore accelerating the in-migration of wildlife that are pollinators and seed dispersers such as various insects, birds, bats and small mammals.

As noted under Section 4.2, live stakes are frequently used for revegetation purposes. That method is also available for restoration plantings; however, it may not be suitable to propagate all species targeted for restoration using this method. Nevertheless, it is likely that a number of tree and shrub species suitable for restoration can be planted in this relatively cost effective manner.

5.4 RESTORATION PLANTING PATTERN

Tree planting is usually conducted in a particular planting pattern depending on site conditions. In areas that have lost most or all of their original tree cover, line planting is commonly used. Line planting allows for higher efficiency as it provides easy access for workers and machinery. The inter-rows may also facilitate wildlife movement. Two key variables in line planting are the line direction and line spacing i.e. distance between the tree rows. The planting density to aim for will depend on the outcome of the reference survey. At this stage it is estimated that trees should be planted in rows 1.5-2 m apart to encourage faster canopy closure and to prevent exposure of younger trees to fire risks and competitive aggressive grasses. The rationale for this planting density is that the trees will be close enough to ensure that weeds are shaded out and canopy closure can be achieved within 2 – 3 years after the commencement of restoration work.

5.5 RESTORATION SPECIES SELECTION

As a key principle, species to be used for habitat restoration efforts will be native to the TRHDP and surrounding areas. Regarding the number of species that should be planted at restoration sites, a minimum of 10% of the species richness present at the reference ecosystem will be targeted for enhancement. As noted in Section 4, the subcontractor, in cooperation with villagers, will establish a nursery for the

propagation of seedlings and saplings, and for the preparation of appropriate seed mixes. The Terrestrial Ecologist, in consultation with suitably experienced people from local villages and Dr Lavery's report (Annex D to the BMP) recommends that ngali nuts trees, hollow bearing trees and dense epiphytes are the key resources for priority species (*Uromys and Pteralopex*), will recommend an appropriate list of plant species to be used for revegetation.

6 MAINTENANCE REGIME

Summary of measures for rehabilitation is described in Table 6-1.

Table 6-1: Summary of Measures for Rehabilitation

Activity	Summary of Management Measures	Responsibility	Timing
1. General			
1.1 Data Collection	Pre-disturbance data will be collected to identify any specific rehabilitation requirements necessary for each area to meet the objectives.	HEC	From commencement of construction
2. Site or Project Area Development			
2.1 Pre-clearing	The following tasks shall be completed prior to clearing taking place: • Boundaries of each area will be surveyed and marked. • Surface topography, hydrological and soils information will be recorded for each site including: - physical and topographical - groundwater - fauna and flora (including ecological communities, significant habitats) - topsoil properties - storage location	HEC	Before site disturbance
2.2 Clearing and stripping	During clearing and stripping of each area the sequence of tasks will be: • Vegetative material will be either burnt or disposed of in an appropriate area. • Dust from soil stripping and earthworks will be managed where practicable, non-saline water will be used for dust suppression, if required. • Topsoil will be stripped as close to the construction date as practicable. • Where practicable recovered topsoil will be used for direct lay or stockpiled separately on a suitable storage site for later rehabilitation	HEC	Duration of site clearing and preparation activities

Activity	Summary of Management Measures	Responsibility	Timing
	- soil and vegetation stockpiles will be placed so as to avoid the need for any further disturbance until required for rehabilitation. - topsoil will be stored in low-profile dumps less than 2 m in height to avoid compaction. - topsoil stockpiles will be identified with appropriate signage. - subsoil or rock material may be used for construction.		
3. Rehabilitation			
3.1 Rehabilitation	When the disturbed area is available for rehabilitation, then the following tasks will be completed: • Topsoil from a similar vegetation community will be respread at no greater depth than originally removed; if required topsoil may be spread more thinly. • If seeds of species in the target vegetation communities are available, they should be re-spread.	HEC	After construction
4. Monitoring and Maintenance			
4.1 Monitoring	Monitoring of rehabilitated and related areas will: • Use techniques that demonstrate the performance of rehabilitation • Commence on completion of rehabilitation • Provide information that will be used for rehabilitation management.	HEC	Post rehabilitation
4.2 Maintenance	• Where monitoring indicates that an area of rehabilitation is failing to meet the objectives, it will be investigated and a maintenance or remediation strategy developed. • Where weeds are identified, they will be eradicated.	HEC	During the monitoring period

Table 6-2 summarises the main activities that constitute the maintenance regime that will be undertaken by the subcontractor, comprising activity, methods, frequency and inputs. The maintenance regime that will be undertaken is based on the understanding that for habitat restoration the key activity to be conducted is tree planting. Seeding is appropriate in previously cleared areas to be revegetated.

Table 6-2: Maintenance Regime

No.	Activity	Timing	Site area	Methods	Frequency	Inputs
1	Additional seeding and/or planting in cleared area revegetation Additional planting to replace dead trees in restoration area	During the rehabilitation	Clearance area	In-filling of gaps with new planting material (seed/seedlings/ saplings)	When required	• Labour • Planting materials • Machinery and tools
2	Removal of weeds and invasive species	After the rehabilitation	Revegetation area	Manual remove/slashing/ pressing	Every three months or when required	• Labour • Machinery and tools
3	Prevention of damage to plants due to wildlife or livestock predation	After the rehabilitation	Revegetation area	Nets or other barriers around young seedlings	At planting of seedlings and saplings	• Labour • Fencing/netting materials
4	Application of fertiliser	During and after the rehabilitation	Revegetation area	Organic fertilisers, such as manure, can be used as a cheaper alternative to chemical fertilisers	Critical period for application is when seedlings/ saplings are less than 1.5 m tall	• Organic or chemical fertilisers
5	Monitoring	After the rehabilitation	Revegetation area	Monitoring methods discussed in Section 1	Dependent on monitoring method	• Labour • Monitoring equipment
6	Cutting of vegetation around transmission lines	After the rehabilitation	Revegetation area around transmission lines	Manual cut/ cutting equipment	When the height of the vegetation around the transmission lines is 1.5 m	• Labour • Monitoring equipment

7 RISK ASSESSMENT AND MANAGEMENT

A risk assessment was conducted to identify the project activities which might present a hazard or risk relating to the ongoing impacts of vegetation clearance undertaken during the Project, and assess the potential impacts which may arise. This PCRRP essentially exists to address those impacts. A range of mitigation measures and management approaches were identified, to achieve a reduction in the initial perceived risk. The objective in implementing these measures and approaches is to reduce the level of residual risk to a lower (and acceptable) level.

The following tasks were undertaken to analyse and evaluate risks and identify potential impacts:

- Identify all activities and sub-activities associated with construction of the Project;
- Assess the likely impact of the activity on the environment, safety and security of workers and the public, and social/cultural aspects of the Project setting;
- Determine the possible consequences if each impact were to occur;
- Assess the likelihood of each impact occurring in the absence of any controls;
- Consider the severity of impact/s;
- Determine a risk level based on a 5 X 5 risk assessment matrix.
- Document current and future mitigation measures that need to be implemented to bring the level of risk down to an acceptable level (including consideration of the findings of the Environmental and Social Impact Assessments (ESIAs) dated August 2017 and July 2019); and
- Re-evaluate to determine the residual risks once the mitigation measures have been implemented.

HEC and THL applied a modified version of the Risk Ranking Table from the IFC EHS Guidelines (Table 2.1.1) to assess the environmental, health and safety, security and social risks which could be encountered due to construction activities.

The initial risks identified for each activity; associated impacts, and residual risks (after implementation of mitigation measures) have been captured in a 'live' risk register, which is maintained on Project Space, the online document management system administered by HEC for the Project. The activities and impacts presented in ESMPs are consistent with those listed in the risk register. The register will be used by HEC, THL and the OE as a tool to monitor the effectiveness of mitigation measures in reducing risk across the Project, and will be regularly reviewed and updated as the Project progresses.

Table 7-1: 5 X 5 Risk Assessment Matrix

Likelihood	Consequences				
	Insignificant Negligible impacts to a minimal area of low environmental or social significance, managed by internal control procedures	**Minor** Minor or minimal short-term impacts to the environment and social areas	**Moderate** Significant impacts to the wider environment or social areas, where short-term restoration works are needed	**Major** Major, persistent and/or extensive impacts to the environment or social areas where longer term remediation is required (> 6 months)	**Catastrophic** Catastrophic and irreversible environmental damage to social areas or environment
A. Almost certain Very high likelihood the risk will occur (>75%)	Moderate	High	Extreme	Extreme	Extreme
B. Likely High likelihood the risk will occur (51 - 75%)	Moderate	High	High	Extreme	Extreme
C. Possible Medium likelihood the risk will occur (21 - 50%)	Low	Moderate	High	High	Extreme
D. Unlikely Low likelihood the risk will occur (5 - 20%)	Low	Moderate	Moderate	High	High
E. Rare Very low likelihood the risk will occur (<5%)	Low	Low	Low	Moderate	Moderate

Mitigation measures were selected to achieve the following:

- In the cases where risk level was assessed as a Moderate or High – reduce risk to Low;
- In the cases where risk level was assessed as Low – ensure risk level does not increase; and
- In the cases where risk level was assessed as Extreme – modify the project to avoid critical risk activities.

The impacts associated with construction of the Project, and particularly in relation to the scope of this Plan, are included in Table 7-2, along with assigned mitigation measures / management approaches. The table also outlines the monitoring actions that will be applied to continually evaluate the effectiveness of these measures and approaches for the duration of construction.

Table 7-2: Mitigation / Management and Monitoring Procedures

#	Project Activity/Impact	Management		Monitoring & Reporting	
		Mitigation Measure	Responsibility / Timing	Monitoring & Reporting Activity	Responsibility / Timing
1	Data collection	• Pre-disturbance data will be collected to identify any specific rehabilitation requirements necessary for each area to meet the objectives.	HEC From commencement of construction	• Daily visual monitoring during clearance and rehabilitation activities • Weekly joint site inspections	• HEC E&S Supervisor • HEC Construction Manager, HEC HSE Manager, THL and Subcontractor
2.	Pre-clearing	The following tasks shall be completed prior to clearing taking place: • Boundaries of each area will be surveyed and marked. • Surface topography, hydrological and soils information will be recorded for each site including: - physical and topographical - groundwater - fauna and flora (including ecological communities, significant habitats) - topsoil properties - storage location	HEC Before any disturbance	During activities	• HEC E&S Supervisor • HEC Construction Manager, HEC HSE Manager, THL and Subcontractor
3.	Clearing and stripping	During clearing and stripping of each area the sequence of tasks will be: • Vegetative material will be either burnt or disposed of in an appropriate area. • Dust from soil stripping and earthworks will be managed where practicable, non-saline water will be used for dust suppression, if required. • Topsoil will be stripped as close to the construction date as practicable. • Where practicable recovered topsoil will be used for direct lay or stockpiled separately on a suitable storage site for later rehabilitation - soil and vegetation stockpiles will be placed so as to avoid the need for any further disturbance until required for rehabilitation. - topsoil will be stored in low-profile dumps less than 2 m in height to avoid compaction. - topsoil stockpiles will be identified with appropriate signage. - subsoil or rock material may be used for construction.	HEC Duration of site clearing and preparation activities	Daily visual monitoring during site clearing and preparation activities	• HEC E&S Supervisor • HEC Construction Manager, HEC HSE Manager, THL and Subcontractor
4	Clearing forests and other habitats - risk of erosion and movement of sediment	• Ensure appropriate erosion control measures are implemented including wattles, coir rolls, live staking and brush layering where appropriate during construction and are left in place to protect revegetation/rehabilitation works until plants are well established. Undertaking revegetation and mulching works progressively as work is completed to minimise erosion of exposed soil. The interval between clearing and revegetation should be kept to an absolute minimum.	HEC Clearing and rehabilitation and revegetation process	• Wattles, coir rolls and matting will be inspected weekly during the three months after revegetation, and re-installed should these installations have shifted. • Joint weekly site inspections during works (THL and HEC; weekly HSE performance reports prepared by HEC HSE Manager) • Monthly site inspections • (quarterly revegetation reports prepared by HEC HSE Manager)	• HEC Construction Manager, HEC HSE Manager, THL • Report progress in HEC monthly reports • While rehabilitation/revegetation activities are underway • Activities summarised by THL E&S Manager in Quarterly Safeguards report to the PO
5	Increased habitat fragmentation - migration of the native fauna	Promote natural regeneration process to expand the existing forest habitat and thus allow the native fauna to remain and live within the THHDP or nearby areas (instead of migrating to other regions) by: • removing weeds and carrying out enrichment planting • succession planting to increase canopy cover where required	HEC During the rehabilitation and revegetation process	• Log the completion of the weed removal activity on a daily basis • Record the number of trees planted on a daily basis • Record the number of seed kg/seedlings/sapling available for planting on a daily basis • Measure and record tree canopy cover	• HEC E&S Supervisor, HEC Construction Manager, HEC HSE Manager, • Activities summarised by THL E&S Manager in Quarterly Safeguards report to the PO

#	Project Activity/Impact	Management		Monitoring & Reporting	
		Mitigation Measure	Responsibility / Timing	Monitoring & Reporting Activity	Responsibility / Timing
				• Measure the tree diameter at breast height (dbh) • Count the number of revegetation failure occurred every month • Record if any fire has occurred and count the number of cases every month	
6	Invasive flora species out-complete native species in colonizing in the cleared areas	• Use soil prepared with high organic content that has been salvaged and stored for use during revegetation. • Encourage the native flora to re-colonise and to avoid a fierce competition with other invasive species by: - Reusing the excavated soil for revegetation which has a high organic content and mineral soils - Prohibiting the importation of soil from outside which might contain weeds and plant pathogens - Only replanting the native flora to allow the native species to be re-colonized easily	HEC During the rehabilitation and revegetation process	• Record the mass of the salvaged topsoil • Record the concentration of the organic compound contained in the salvaged topsoil • Record the mass of the excavated soil to be reused for revegetation • Log the species being replanted • Measure the abundance of invasive species in the area	HEC E&S Supervisor, HEC Construction Manager, HEC HSE Manager,
7	Rehabilitation	When the disturbed area is available for rehabilitation, then the following tasks will be completed: • Topsoil from a similar vegetation community will be respread at no greater depth than originally removed; if required topsoil may be spread more thinly. • If seeds of species in the target vegetation communities are available, they should be re-spread.	HEC	Weekly visual monitoring	HEC E&S Supervisor, HEC Construction Manager, HEC HSE Manager, THL and Subcontractor
8.	Monitoring	Monitoring of rehabilitated and related areas will: • Use techniques that demonstrate the performance of rehabilitation • Commence on completion of rehabilitation • Provide information that will be used for rehabilitation management.	HEC During monitoring period	As required/specified	HEC E&S Supervisor, HEC Construction Manager, HEC HSE Manager,
9	Maintenance	• Where monitoring indicates that an area of rehabilitation is failing to meet the objectives, it will be investigated and a maintenance or remediation strategy developed. • Where weeds are identified, they will be eradicated. • Additional seeding and/or planting in cleared area revegetation • Additional planting to replace dead trees in restoration area • Removal of weeds and invasive species • Prevention of damage to plants due to wildlife or livestock predation. • Application of fertiliser. • Cutting of vegetation around transmission lines	HEC Post rehabilitation	As required/specified	HEC E&S Supervisor, HEC Construction Manager, HEC HSE Manager,

8 MONITORING, EVALUATION AND REPORTING

A monitoring, evaluation and reporting plan will be in place to track progress in the implementation of habitat restoration activities, and assess whether the restoration objectives are achieved. Regular monitoring will provide up-to-date information on the site conditions, and trigger interventions and/or adjustments to the habitat restoration plan as required. This plan will be prepared and implemented by the rehabilitation and revegetation subcontractor, to be reviewed by the Environmental and Social Supervisor, and audited by the THL E&S Manager.

The three types of monitoring methods are:

- Operational Monitoring – This focuses on the activities of the habitat restoration, management actions and responsibilities, and to ensure their proper implementation. These activities will be monitored at a high frequency,
- Strategic and Effectiveness Monitoring – This focuses on the objectives of the revegetation and habitat restoration and measures the progress of the activities with respect to these objectives. The measurements will be indicators pertaining to the objectives, such as vegetation cover and biodiversity.
- Threats Monitoring – This aims to evaluate the presence of threats that can adversely impact the success rate of revegetation and habitat restoration. The indicators will be developed from an assessment that identifies potential threats to the revegetation and restoration.

Monitoring actions to track implementation of the management measures have been illustrated in Table 7-2 above.

Seeded areas will be monitored on a weekly basis for the first two months after establishment, monthly thereafter. Planted seedlings/saplings will be monitored 1 – 2 weeks after installation to assess immediate mortality, which could be due to transplant shock or mishandling during the planting process. In addition to tree mortality, monitoring the condition of planted trees regularly can give an early indication of tree health. Tree health can be measured by assigning a simple health score to each tree and recording descriptive notes. Measurement of tree diameter at breast high (dbh) is for trees that have developed a diameter of 10 cm or more.

Photographs at permanent plots and from the same angle before planting and at regular intervals (e.g. every 6 months or annually) in order to get an overall visual indication of the effects of revegetation and tree planting will be undertaken at all major revegetated and restored sites. Within the restoration area, permanent plots will be established at a density of at least one photo point per hectare. This may be varied dependent on the size of the patch being rehabilitated.

There are a growing number of resources and tools available that can be used for monitoring habitat restoration efforts. For example, the Forest Integrity Assessment Tool (FIAT) tool by the HCV Resource Network (HCVRN 2019) can be used as a rapid way of monitoring change in habitat quality over time.

The subcontractor's contract will be comprehensive and will contain a clause to the effect that it will be responsible for ensuring revegetation is to be completed as per this PCRRMP and ESIA requirement. Also, HEC will liaise with the subcontractor to identify suitable methods first.

HEC (pre-construction and during construction) and THL (operation) HSE Managers will be responsible for managing revegetation and restoration (including corrective actions) outside of the rehabilitation and revegetation subcontractor's contract (if any).

9 AUDITING

HEC will be subject to internal and external audits. The internal audit will be conducted by the HEC Headquarter to the onsite team according HEC's corporate internal HSE Audit Procedure (HEC-AH-H04-H13).

The internal examinations regularly performed by the on-site HEC staff are referred as inspections. External audits will be conducted by the E&S Manager from THL, E&S Safeguards Manager from the PO, and the Owner's Engineer (OE).

The detailed structure and content of the auditing process is presented in the Project Construction Environmental Social Management Plan (CESMP; P1). Table 9-1 presents a summary of the process.

Table 9-1: Summary of auditing process

Auditor	Auditee	Frequency
THL E&S Manager	HEC	Every three months
PO E&S Safeguards Manager and Monitoring team (with LTA as third party)	HEC and THL	Every three months (site visit might be every six months)
HEC Headquarter HSE Team	HEC on-site team	Every six months
HEC HSE Manager	Subcontractor	Every three months
HEC HSE team (with THL)	On-site workers	Every week
OE	HEC	Every six months

External and Internal auditors shall notify by email the HEC Project Management Team (Project Manager, Construction Manager and HSE Manager) about upcoming audit events. This will provide a mechanism to communicate the schedule, activities and objectives of the audits. If urgent, the Project Site may be notified via phone or fax.

The audit process involves reviewing on-site activities to assess compliance with the management plans and / or HEC internal standards. The auditor will review all records of previous audits and evaluate historic compliance and the use of appropriate corrective actions.

Findings from the audit will be summarised in an audit report. A copy of the resulting audit report is to be made available upon request for reference and, where necessary, implementation of any identified corrective actions.

The key performance indicators to be considered when auditing this management plan are:

- Number of non- compliances recorded;
- Number of non-compliances resolved;
- Number of incidents recorded;
- Monitoring is up to date and available; and
- Number of training sessions completed.
- The other key performance indicators have been mentioned in Table 7-2 of this management plan

The key performance indicators in the rehabilitation and revegetation management are stated in Table 7-2 (under Monitoring & Reporting Activity).

All reports are to be maintained at the project site for the entire construction period.

10 REFERENCES

HCVRW – HCV Resource Network (2019) Forest Integrity Assessment Tool (FIAT) Manual. Available from: https://hcvnetwork.org/library/forest-integrity-assessment-tool/

Kanowski, J., C.Catterall, K.Freebody, A.N.D. Freeman, D.A. Harrison (2010) Revegetation Monitoring Toolkit. Produced for Reef & Rainforest Research Centre

ANNEX A – SPECIES PRESENT OR POTENTIALLY PRESENT WITHIN THE PROJECT AREA; LISTED ON THE IUCN RED LIST

Table A.1: Species at the TRHDP site listed on the IUCN Red List (from IBAT1 search and Appendix Q in ESIA) IUCN and CITES2 Status

Scientific Name	Common Name	IUCN status[1]	CITIES status	Observed	Habitat
Plants					
Intsia bijuga	Borneo Teak	VU	-	Yes	Lowland rainforest
Oryza schlechteri	Wild Rice	EN	-	-	Landslips and beside rivers in shade or partial sun (70-340m asl)
Pterocarpus indicus	Papua New Guinea Rosewood	EN	-	Yes	This large tree species can grow up to 40 m in height. It grows within lowland rainforests as an emergent, canopy or subcanopy tree. The species is a pioneer and can occur in both primary and less commonly in secondary forests. The tree grows on all soils types and is most frequent along tidal creeks, rocky shore and some coastal sites.
Amphibians					
Litoria lutea	Solomon Island's Treefrog	VU/RR	-	-	This species is arboreal, and found in tropical rainforest. It possibly breeds in swamps in forests. In Bougainville it has been observed laying eggs on the vertical surface of trees above water-filled tree holes; the tadpoles then fall into the water.
Conufer malukuna	Malukana Webbed Frog	DD/RR	-	-	Known to occur at 760 m. Not observed since 1968. No surveys done.
Mammal					
Uromys imperator	Emperor Rat	CR/RR	-	-	It seems as though this was a largely terrestrial species that was at one point found throughout much of Guadalcanal, including the dry northern lowlands and areas close to the coast. Later reports suggest that the species became restricted to mossy montane forest (Flannery 1995)

[1] IBAT Integrated Biodiversity Assessment Tool

[2] CITES Convention on International Trade in Endangered Species of Wild Fauna and Flora

Scientific Name	Common Name	IUCN status[1]	CITIES status	Observed	Habitat
Pteralopex atrata	Guadalcanal Monkey-faced Bat	EN/RR	-		There is little known about the habitat and ecology of this species. Flannery (1995) observed animals feeding upon unripe mangoes in an old garden. The most recent record was a subadult male captured in September 2015 on the edge of primary forest adjacent to a garden area with fruiting trees, including mangoes, ngali nuts (Canarium indicum), a stem-fruiting fig (Ficus sp.), and coconut palms. A large adult animal had been observed in the same location hanging from the fig in November 2014 (T. Lavery pers. comm). The species is probably dependent on undisturbed, old growth forests, and seems to roost in tree hollows. Its roosting habits likely render it subject to similar hunting and roost destruction threats faced by P. anceps on Bougainville (S. Hamilton pers. comm.), and also make it vulnerable to commercial logging.
Uromys porculus	Guadalcanal Rat	EN/RR	-		This species is known only from the holotype. However, it is considered that Guadalcanal has not been adequately surveyed for this species.
Uromys rex	King Rat	EN/RR	-	-	This arboreal species has been recorded from primary tropical moist forest, including relict patches of native forest.
Pteropus rayneri	Solomon's Flying Fox	NT/RR	II	Yes	This species often roosts in large colonies, but is also commonly seen roosting in small groups of 5-12 individuals or singly underneath caves and limestone overhangs, within the hollows of strangler figs (Ficus spp.) and concealed within the dead overhanging leaves of Pandanus. Favoured colony sites are close to the coast and among mangroves or swamp vegetation. The species is estimated to have a generation time of five to six years (S. Hamilton and T. Leary pers. comm).
Melonycteris fardoulisi	Fardoulis' Blossom Bat	LC/RR	-		It has been recorded from primary montane tropical forest (Mount Makarakomburu, Guadalcanal) and in many other habitat types (e.g., lowland forest, disturbed areas).
Melonycteris woodfordi	Woodford's Blossom Bat	LC/RR	-		It is known from primary tropical forest, but is also commonly found in disturbed habitats including secondary forest, rural gardens, and coconut plantations (Bonaccorso 1998, Flannery 1995). It roosts in foliage in small groups or individually and likely forages over a relatively small home range (S. Hamilton pers. comm.).

Scientific Name	Common Name	IUCN status[1]	CITIES status	Observed	Habitat
Reptiles					
Cyrtodactylus salomonensis	Solomons Bent-toed Gecko	NT	-	-	It appears that the species can persist in moderately disturbed habitats. This is a strictly arboreal species, most commonly found on the larger forest trees where at night it comes down from the canopy to within a few meters of the ground (M. McCoy pers. comm. October 2011).
Loveridgelaps elapoides	Solomons Black-banded Krait	VU/RR	-	-	Cryptozoic, sheltering under fallen leaf litter and fallen timber and tends to be crepuscular or nocturnal (McCoy 2006). It appears to be limited to primary forest (M. McCoy pers. comm. December 2011). It may be that this species has a diet consisting exclusively of snakes (M. McCoy pers. comm. December 2011). Its main prey appears to be blind snakes.
Tribolonotus schmidti	Schmidt's Crocodile Skink	LC/RR	-	-	This small 'crocodile skink' is "cryptozoic in habit and generally lives in moist conditions under fallen timber in forest areas. .... and is dependent upon cool, moist conditions...it is probably mostly diurnally active...feeds mainly on small insects and their larvae....and gives birth to a single young" (McCoy 2006).
Birds					
Aplonis brunneicapillus	White-eyed Starling	VU/RR	-	-	It has been recorded breeding colonially in both lowland swamp and hill forest. It is not known whether it usually nests in isolated trees or whether colonies were originally in closed forest (Coates 1990). Foraging birds have been recorded in forest, forest edge and secondary growth, feeding on fruit, sometimes in flocks (Beecher 1945, Finch 1986, Gibbs 1996, Marki et al. 2014).
Columba pallidiceps	Yellow-legged Pigeon	VU/RR	-	-	It has been recorded only in primary or tall secondary forest, with most records from hills up to c.650 m, but also in lowlands and one recent record at 1,300 m (Dutson 2011). It appears to be principally a subcanopy species, often seen feeding on fruiting gaivou trees at Hauta (Buckingham et al. 1995, R. James in litt. 1999), but its long stout legs suggest that it is partly terrestrial, and is thought to be partially nomadic. It is not exclusively a ground feeder, and congregates in gaiwou trees (Lauraceae, possibly a Litsea species) when they are fruiting. Between 1995 and 1996, it was common to see up to five Yellow-

Scientific Name	Common Name	IUCN status[1]	CITIES status	Observed	Habitat
					legged Pigeons feeding in a fruiting gaiwou tree. While occasionally seen in lowland coastal forest, it was most frequently seen in hill forest between 400 and 600 m altitude in the Bauro area.
Ducula brenchleyi	Chestnut-bellied Imperial Pigeon	VU/RR	-	-	It is usually recorded in primary forest but also occurs in fruiting trees in degraded forest and gardens (Cain and Galbraith 1956, Buckingham et al. 1995, R. James in litt. 1999). Recent records have been from sea-level to 700 m, but has been reported by local villagers on Guadalcanal as occurring in mist-forest (Cain and Galbraith 1956, Buckingham et al. 1995). It appears to be nomadic (G. Dutson pers. obs. 1997-8, J. Waihuru verbally 1998, R. James in litt. 1999): at Hauta, birds congregate to feed on banyan figs for about a week until the fruit is finished and then disperse, often over large distances (Cain and Galbraith 1956, J. Waihuru verbally 1998, R. James in litt. 1999).
Eurostopodus nigripennis	Solomons Nightjar	VU/RR	-	-	Occurs in forests and woodland alongside beaches and is confined to coasts, occurring from sea level to 300 m. (Holyoak 2001, Cleere 2010). Often roosts and nests on sandy beaches, but not lagoon beaches, as well as beside mature lowland moist forest (Dutson 2011). Breeding is thought to take place between October and December (Cleere 2010).
Haliaeetus sanfordi	Solomon Sea-Eagle	VU/RR	II	Yes	It prefers forested coasts (G. Dutson pers. obs. 1997-1998, Read 2013) where it scavenges and kleptoparasitises Osprey Pandion haliaetus (Blaber 1990, Webb 1992, G. Dutson pers. obs. 1997-1998). Some pairs also hunt far inland and others, especially on the eastern islands, appear to have entirely inland ranges where they prey largely on northern common cuscus Phalanger orientalis and perhaps arboreal rats and fruit bats (Buckingham et al. 1995, Olsen 1997, J. Hornbuckle in litt. 1999). It has been observed along primary rainforest lined rivers and over peaks in montane forest at elevations of 1,100 m, away from freshwater lakes (Pikacha et al. 2012). This species makes significant use of primary forests (Buckingham et al. 1990) but also hunts over open habitats such as deforested areas where it is reported to scavenge dead mammals including feral dogs (G. Dutson pers. obs. 1997-1998).
Charmosyna margarethae	Duchess Lorikeet	NT/RR	II	-	It is usually found in lower montane forest, it occurs from sea-level to 1,350 m and in coconut plantations (Cain and Galbraith 1956, Diamond 1975b, Schodde 1977, Buckingham et al. 1995, G. Dutson pers. obs. 1997-1998). It may be nomadic and reliant

Scientific Name	Common Name	IUCN status[1]	CITIES status	Observed	Habitat
					on a combination of habitats at different altitudes. It feeds on pollen, nectar and some small fruits such as Schefflera.
Edolisoma holopolium	Solomon Cicadabird	NT/RR	-	-	It occupies the canopy of hill and lowland forest from sea-level to 950 m.
Hypotaenidia woodfordi	Guadalcanal Rail	NT/RR	-	-	It had been assumed to be a species of lowland forest, as supported by records from Guadalcanal in patchy forest (Webb 1992, G. Dutson pers. obs. 1998). It may nest at any time of the year (Hadden 2002) and may do so near to streams (Webb 1992). It is said to be omnivorous (Webb 1992) and has been observed wading into streams to feed (Hadden 2002).
Ninox granti	Guadalcanal Boobook	NT/RR	II	-	It inhabits forest, including edges and patches of forest, up to 1,500 m, with some roosting in thickets (Dutson 2011).
Reinwardtoena crassirostris	Crested Cuckoo-Dove	NT/RR	-	Yes	It inhabits primary forest in the hills to a maximum of 1,500 m, more usually to 1,000 m (Cain and Galbraith 1956, Schodde 1977, Coates 1985, Webb 1992, D. Gibbs in litt. 1994, Buckingham et al. 1995, G. Dutson pers. obs. 1997-1998, R. James in litt. 1999) and is considered a frugivore (Davies et al. 2015).
Symposiachrus barbatus	Solomons Pied Monarch	NT/RR	-	-	It occurs in primary and old-growth closed-canopy secondary forest to at least 1,200 m (Cain and Galbraith 1956, Schodde 1977, Coates 1990, Webb 1992, Buckingham et al. 1995, Dutson 2011). It is rare in flat lowland forest and heavily degraded forest (Dutson 2011).
Accipiter albogularis	Pied Goshawk	LC/RR	II	-	Range of forests, including moist lowland and montane forests, as well as degraded and urban areas
Aplonis grandis	Brown-winged Starling	LC/RR	-	Yes	Moist lowland forest as well as degraded and urban areas
Cacatua ducorpsii	Solomons Corella	LC/RR	II	Yes	Dry and moist lowland forest
Centropus milo	Buff-headed Coucal	LC/RR	-	Yes	Moist lowland forest, dry and moist shrubland, and degraded forests and gardens

Scientific Name	Common Name	IUCN status[1]	CITIES status	Observed	Habitat
Ceyx nigromaxilla	Guadalcanal Dwarf Kingfisher	LC/RR	-	Yes	Occurs in forested habitats, not necessarily near watercourses and may tolerate secondary forest and plantations as noted in other Ceyx (del Hoyo et al.2001).
Chalcopsitta cardinalis	Cardinal Lory	LC/RR	II	-	Moist lowland and mangrove forest as well as plantations
Coracina welchmani	North-melanesian Cuckoo-Shrike	LC/RR	-	-	Moist montane and lowland forests, mangroves, savannah and arable land
Corvus woodfordi	White-billed Crow	LC/RR	-	Yes	The species is found in forest and some degraded forest habitats to an altitude of 1,000 m, occasionally 1,250 m.
Dicaeum aeneum	Midget Flowerpecker	LC/RR	-	Yes	Wide range of forest, shrublands, grasslands, and disturbed habitats
Ducula pacifica	Pacific Imperial Pigeon	LC/RR	-	-	Moist lowland and montane forest, dry and moist shrubland
Gymnophaps solomonensis	Pale Mountain-pigeon	LC/RR		-	Moist lowland and montane forest
Lorius chlorocercus	Yellow-bibbed Lory	LC/RR	II	Yes	Moist lowland and montane forest, dry and moist shrubland, plantations and degraded habitat
Micropsitta finschii	Green Pygmy Parrot	LC/RR	II	Yes	The species occurs in lowland forests to about 1,000 m
Monarcha castaneiventris	Chestnut-bellied Monarch	LC/RR	-	Yes	Moist lowland and montane forest and dry forest and shrubland
Myiagra ferrocyanea	Steel-blue Flycatcher	LC/RR	-	Yes	Moist lowland and montane forest, mangroves, gardens, degraded forests
Myzomela melanocephala	Black-headed Myzomela	LC/RR	-	Yes	Moist lowland forest, rural gardens
Pachycephala orioloides	Oriole Whistler	LC/RR	-	-	Moist lowland and montane forest, dry forest, savannah, mangroves, swamps
Petroica pusilla	Pacific Robin	LC/RR	-	-	Lowland moist and dry forests, gardens, degraded forest, savannah, urban environments, plantations
Ptilinopus solomonensis	Yellow-banded Fruit-Dove	LC/RR	-	-	Moist lowland and montane forests, degraded forests, rural gardens

Scientific Name	Common Name	IUCN status[1]	CITIES status	Observed	Habitat
Rhipidura cockerelli	White-winged Fantail	LC/RR	-	-	It occurs in primary and closed secondary forest and forest edge to about 1,150 m.It is fairly uncommon and intolerant of degraded forest
Todiramphus leucopygius	Ultramarine Kingfisher	LC/RR	-	-	Moist lowland forest, moist and dry shrubland, plantations, rural gardens
Zosterops rendovae	Grey-throated White-eye	LC/RR	-	-	Moist lowland and montane forests, moist shrublands
Insects					
Lieftinckia lairdi	Dragonfly	EN	-	-	Freshwater /Swamps

1 CR = Critically Endangered; E = Endangered; VU = Vulnerable; NT = Near Threatened; LC = Least Concern; DD = Data Deficient; RR = Restricted Range

ANNEX B – PLANT SPECIES RECORDED AT THE PROJECT SITE

Table B.1: List of Plant Species Recorded at the TRHDP Site

Scientific Name	Common Name
Acacia auricauliformis	Acacia
Acalypha grandis	Acalypha
Actinodaphne solomonensis	Actinodaphne
Alpinia oceanica	Ginger
Alpinia purpurata	Ginger
Alpnia purpurata	Ginger
Alstonia scholaris	Milky Pine
Alstonia spectabilis	Milky Pine
Areca catechu	Beetle Nut
Areca macrocalyx	Beetle Nut
Artocarpus altilis	Bread Fruit
Astronidium novae-georgiae	Astronidium
Astronidium salomonensis	Astronidium
Barringtonia procera	Cut Nut
Barringtonia sp	Cut Nut
Boerlagiodendron sp.	
Brachiaria mutica	Para Grass
Broussonetia papyrifera	Paper Mulberry
Brownlowia argentata	Brownlowia
Calamus hollrungii	Ratan
Calamus stipitatus	Ratan
Calamus vestitus	Ratan
Calanthe longifolia	Terrestrial Orchid
Calophyllum paludosum	Calophyllum
Calophyllum peekelli	Calophyllum
Cananga odorata	Ylang ylang, Cananga
Canarium indicum	Ngali nut
Canarium salomonense	Small Ngali Nut
Carica papaya	Pawpaw, Papaya
Cassia alata	Cassia
Celtis philippinensis	Celtis
Citrus limon	Bush lime
Cocos nucifera	Coconut
Colocasia esculenta	Taro
Cominsia gigantea	Cominsia
Commelina diffusa	Commelina
Costus speciosus	Costus
Crinum asiaticum	Crinum, Lilly
Cryptocarya medicinalis	Cryptocarya
Cucurbita sp	Cucurbita

Scientific Name	Common Name
Cyathea brackenridgei	Cyathea, Tree Fern
Cyathea vittata	Cyathea, Tree Fern
Cyathocalyx petiolaris	Cyathocalyx
Cycas seemanii	Cycad
Cyrtosperma johnstonii	Wild taro
Dendrocnide inerme	Poison or Stinging tree
Dioscorea alata	Yam
Diplazium esculentum	Edible Fern
Donax canniformis	Donax
Drymophloeus salomonense	Drymo Palm
Dysoxylum excelsum	Dysox
Elaeis guineensis	Oil Palm
Elaeocarpus sphaericus	Elaeocarpus
Elatostema salomonense	Elatostemma
Euodia elleryana	Euodia
Euodia solomonensis	Euodia
Euphorbia hirta	Milky Weed
Ficus benjamina	Fig
Ficus chrysochaete	Fig
Ficus copiosa	Fig
Ficus longifolia	Fig
Ficus septica	Fig
Ficus variegata	Fig
Ficus virgata	Fig
Ficus wassa	Fig
Flagellaria gigantea	Flagellaria
Flueggia flexuosa	Flueggia
Gymnostoma papuana	Casuarina
Heliconia solomonensis	Heliconia
Hemigraphis reptans	Hemigraphis
Hernandia peltata	Hernandia
Heterospathe minor	Heterospathe palm
Heterospathe salomonensis	Heterospathe palm
Homalomena alba	Homalomena
Hornstedtia lycostoma	Sweet Ginger
Hoya guppyi	Hoya
Hydriastele macrospadix	Gulubia palm
Intsia bijuga	Kwila, Iron wood
Ipomoea batatas	Potato
Ipomoea illustris	Ipomoea
Kleinhovia hospita	Kleinhovia
Leea indica	Leea

Scientific Name	Common Name
Licuala lauterbachii	Licuala palm
Ludwigia octovalvis	Primrose
Macaranga dioica	Macaranga
Macaranga fimbriata	Macaranga
Macaranga similis	Macaranga
Macaranga tanarius	Macaranga
Mangifera indica	Mango
Manihot esculenta	Casava
Medinilla cauliflora	Medinilla
Melastoma affine	Melastoma
Merremia peltata	Merremia
Metroxylon salomonense	Metroxylon Palm
Mikania micrantha	Mile-a-minute
Mimosa invisa	Sensitive Weed
Mimosa pudica	Sensitive Weed
Mucuna elegans	Mucuna
Musa sapientum	Banana
Mussaenda cylindrocarpa	Mussaenda
Myristica fatua	Myristica
Nastus obtusus	Bamboo
Neonauclea orientalis	Nauclea
Nephrolepis biserrata	Fishbone Fern
Nephrolepis hirsutula	Fishbone Fern
Palaquium firmum	Pencil Cedar
Pandanus compressus	Pandanus
Pandanus sp	Pandanus
Paraserianthis falcata	Albizia
Parinari glaberrima	Tita tree
Paspalum conjugatum	T - grass
Pennisetum polystachyon	Mission grass
Pennisetum purpureum	Elephant Grass
Pholidota sp	Orchid
Phragmites karka	Reed
Piper betle	Piper
Piper wichmanii	Piper
Pipturus argenteus	Pipturus
Planchonella firma	Planchonella
Planchonella thyrsoidea	Planchonella
Pleomele angustifolia	Pleomele
Plerandra solomonensis	Plerandra
Polyscias guilfoylei	Polyscias
Polyscias sp	Polyscias

Scientific Name	Common Name
Pometia pinnata	Pometia, Taun
Premna corymbosa	Premna
Pterocarpus indicus	Rose wood
Ptychosperma salomonense	Ptychosperma palm
Pueraria lobata	Pea
Rhopaloblaste elegans	Palm
Rhus taitensis	Rhus
Rubus moluccanus	Wild Raspberry
Samanea saman	Rain tree
Saurauia purgans	Saurauia
Schizomeria serrata	Schizomeria
Schizostachyum tessellatum	Small Bamboo
Selaginella rechingeri	Selaginella
Semecarpus forstenii	Semecarpus
Sida rhombifolia	Sida
Solanum torvum	Egg Plant
Spathodea companulata	African Tulip
Spathoglottis plicata	Groung Orchid
Starchytapheta jamaicensis	Blue Rat's tail
Stenochlaena palustris	Climbing Fern
Sterculia conwentzii	Sterculia
Syzygium myriadena	Syzygium
Syzygium onesima	Syzygium
Syzygium tierneyana	Syzygium
Tapeinochilus solomonense	Ginger
Terminalia brassii	Brown Terminalia, Swamp Oak
Terminalia calamansanai	Yellow Terminalia
Terminalia sp	Terminalia
Theobroma cacao	Cocoa
Timonius timon	Timonius
Trema orientalis	Trema
Trichospermum psilocladum	Trichospermum
Uncaria appendiculata	Water rope
Viola odorata	Violet
Vitex cofassus	Vitex, Vasa