Palau Public Utility Corporation (PPUC)
Ministry of Public Infrastructure & Industries (MPII)
Republic of Palau

PREPARATORY SURVEY REPORT
ON
THE PROJECT FOR
UPGRADING POWER GRID
IN THE REPUBLIC OF PALAU

AUGUST 2022

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

YACHIYO ENGINEERING CO., LTD.

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PREFACE

Japan International Cooperation Agency (JICA) decided to conduct the preparatory survey and entrust the survey to Yachiyo Engineering Co., Ltd.

The survey team held a series of discussions with the officials concerned of the Government of Palau, and conducted field investigations. As a result of further studies in Japan, the present report was finalized.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

Finally, I wish to express my sincere appreciation to the officials concerned of the Government of Palau for their close cooperation extended to the survey team.

August, 2022

Hiroo TANAKA

Director General,

Infrastructure Management Department

Japan International Cooperation Agency

SUMMARY

① Overview of the Country

The Republic of Palau (hereinafter referred to as "Palau") is located east of the Philippines at the westernmost tip of the Micronesian region, and has an area of 488 km^2, about the same size as Yakushima Island, and second only to Kiribati (720 km^2), the Federated States of Micronesia (701 km^2), and Guam (541 km^2) in the Micronesian region. It consists of 200 islands of various sizes, including those called "rock islands," and has one of the most extensive exclusive economic zones of any Pacific island nation. However, because the country's land is scattered over a vast area, the domestic market is small and geographically distant from international markets, which poses development difficulties. In addition, as a small island nation, Palau is forced to rely entirely on imports for energy resources, food, and consumer goods, making it vulnerable to changes in the external economic environment. In particular, it relies on diesel power generation for the majority of its power generation facilities, which poses challenges from the perspective of energy security.

② Background of the Project

Palau has a population of approximately 96 % in Koror Island, a cluster of industries centered on tourism, and Babeldaob Island, where the capital city of Melekeok is located. The power demand of Koror Island and the southern part of Babeldaob Island accounts for approximately 85 % of the total power demand of the two islands. The annual power demand of the two islands is 84.8 GWh, with a peak demand of about 12.4 MW (2017), and it is supplied from Malakal Power Plant in Koror and Aimeliik Power Plant in Babeldaob via a 34.5 kV transmission line running north-south across the island.

Babeldaob Island and Koror Island have three substations with circuit breakers: Aimeliik, Airai, and Malakal. In the event of an accident on the 34.5 kV transmission line between Aimeliik and Malakal, the circuit breakers at Malakal and Aimeliik will be activated and the entire section will be blacked out.

Thus, Palau is currently facing a situation where power outages become longer in the event of an accident or disaster. It is considered to be of utmost importance to develop a power grid improvement plan that will contribute to improving the reliability of power supply, by reducing the frequency of accidents and minimizing the time and sections of power outages in the event of an accident.

Based on the background, the Government of Palau has requested the Government of Japan on the Project for Upgrading Power Grid.

③ Outline of the study findings and Project contents

In response to the request, JICA dispatched the Survey Team to Palau from August 29 to September 27, 2021 (first field survey) in order to reconfirm the contents of the request and discuss the contents for implementation with related agencies on the Palau side (the line ministry of the Executing Agency: Ministry of Public Infrastructure & Industries (MPII), the Executing Agency: Palau Public Utility Corporation (PPUC)), and survey the Project sites and gather related materials and data.

On returning to Japan, the Survey Team examined the necessity, social and economic impacts and

validity of the Project based on the field survey materials and compiled the findings into the draft preparatory survey report.

As the study findings, the Team prioritized the candidate project components for the list of projects requested by the PPUC as shown in the table below. Components 1 through 5 are considered highest priority components that contribute to achieving the upper goal. As for the " Components 3: Construction of Koror Substation", the component has a high priority as it was proposed in the "Power System Priority Plan 2021-2025" developed by PPUC and in the JICA Master Plan. However, the component was out of scope due to difficulties in selecting a candidate site for construction on the Palau side.

Prioritization of the Project Components

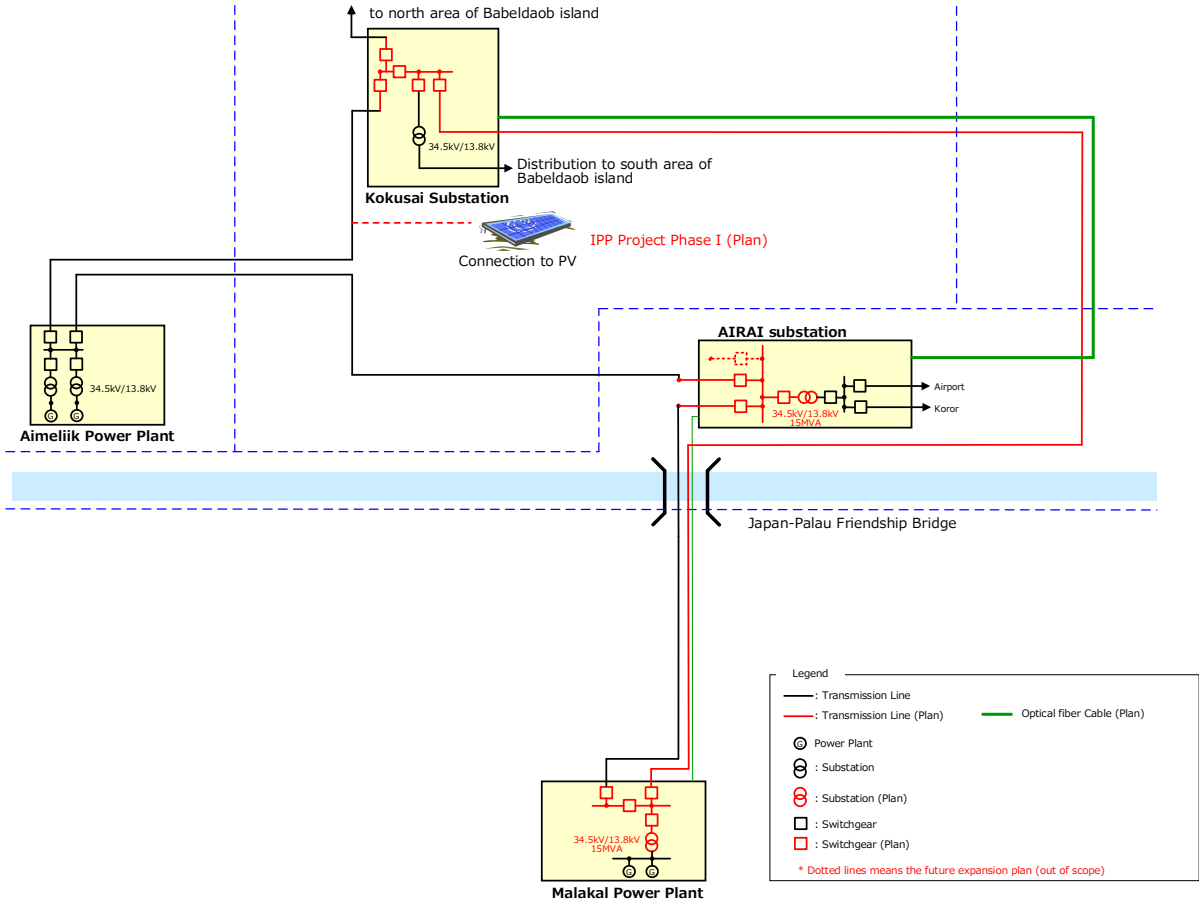
Priority	Component
1	34.5kV transmission line (Malakal - Kokusai line)
2	-Expansion of Malakal Power Plant -Expansion of Kokusai Substation -13.8kV distribution line (Connection point)
3	Construction of Koror Substation
4	Renewal of Airai Substation
5	Upgrading the Transformer of Malakal power plant
6	Digger Derrick Truck
7	Construction of Ngchesar substation
8	Automation of Malakal Power Plant Generator Operation
9	Operation guidance for grid monitoring and control (technical Assistance)

In addition, JICA dispatched the Survey Team to Palau from June 19 to June 27, 2022 (second field survey) in order to explain and discuss the draft preparatory survey report (outline explanations) and reach a basic agreement with the Palau side.

The Project plan compiled based on the survey findings targets the procurement and installation for the improvement of substation facilities, and the construction of new substations and related facilities. The Outline of the Basic Plan is as follows;

Outline of the Project Components

Main components	Quantity
<u>Procurement and Installation</u>	
1. Construction of 34.5 kV transmission line (Malakal – Kokusai line)	
(a) 34.5 kV overhead line	About 32.0 km
(b) 34.5 kV underground cable	About 3.0 km
(c) 34.5 kV transmission line (JP Bridge)	About 0.3 km
(d) 34.5 kV underground cables (to the transmission line outlets of Malakal, Airai and Kokusai Substations)	1
2. Construction of 13.8 kV distribution line (up to the existing connection point)	
(a) 13.8 kV overhead line and underground cable (up to the distribution line outlets of Malakal Power Plant)	1
3. Expansion of Malakal Power Plant	
(a) 15 MVA 34.5/13.8 kV transformer	1 unit
(b) 34.5 kV switchgear (indoor)	4 lots
4. Renewal of Airai Substation	
(a) 15 MVA 34.5/13.8 kV transformer	1 unit
(b) 34.5 kV switchgear (indoor)	3 lots
5. Expansion of Kokusai Substation	
(a) 34.5 kV switchgear (indoor)	5 lots
<u>Supply</u>	
1. Maintenance tools for procured materials and equipment	1
2. Replacement parts and consumables for procured materials and equipment	1
<u>Construction</u>	
1. New substation building	3 buildings
2. Civil engineering work	1



④ Project implementation schedule and cost estimation

In the case where the Project is implemented under the Government of Japan's Grant Aid scheme, the total cost of the Project will be (*confidential*). The costs to be borne by the Palau side will be 1,538,587 US$. The contents and costs to be borne by the Palau side are as given below:

1) Before the Bid (Relocation of all existing underground cables, etc): 525,987 US$
2) During the Project Implementation (Rerouting of 66 kV existing transmission line to gantry with support structure, etc): 455,420 US$
3) After the Project (Allocation of maintenance cost, etc): 557,180 US$

The implementation schedule for the Project (after the Contract with Successful Bidder) will be approximately 23 months.

⑤ Project Evaluation

As shown below, this project will contribute to the realization of Palau's development plan and energy policy, and will also benefit the general public, and is therefore considered to be a highly appropriate project for cooperation. In addition, the Palau side has sufficient personnel and budget plans, so there is no concerns with the implementation of this project and its operation and maintenance after implementation.

(1) Quantitative impacts

1) Performance Indicators	Reference value (2021) Actual value	Target value (2027) (3 years after the start of service)
Transformer capacity (MVA)	51.05	61.05 (+10)
Reduction of transmission loss (MWh)	0	If not be implemented: 68,200 To be implemented: 65,540 Difference: 2,660
Reduction in CO_2 emissions (t-CO_2/year) -due to reduction of transmission loss	0	1,921
Reduction in CO_2 emissions (t-CO_2/year) -due to reduction of solar PV facilities by IPP Project (For reference)	0	9,709 *
SAIDI (Duration of power outage) (minutes/year/household)	1,621	1,169
SAIFI (Frequency of power outage) (times/year/household)	30.82	23.67

Remarks: The transformer capacity (MVA) is the difference between Airai Substation (5 MVA) and Malakal Power Plant (5 MVA), for a total increase of 10 MVA. The other given conditions and basis for calculation of quantitative effects are detailed in Appendices 9 and 10.

* If the solar PV facilities by the IPP Project cannot be commissioned into operation, the effect of reduction in CO_2 emission is estimated to decrease.

(2) Qualitative impacts

Current status and problems	Measures to be taken in the Project (Projects subject to cooperation)	Effectiveness of the plan and degree of improvement
In Palau, there is only a single transmission line from Malakal Power Plant to Aimeliik Power Plant, and the Airai Substation is connected to the line by T-branch. Since it is not possible to disconnect only the faulted section from the grid, the restoration time in the event of a fault will be longer.	Construction of 34.5 kV transmission line and 34.5/13.8 kV substation.	The construction of the 34.5 kV transmission line will reduce the area and duration of power outages in case of failure, thus reducing the burden on PPUC staff.
In Palau, while the demand for electricity is increasing, the transmission and substation facilities are significantly lacking in capacity and aging, which is a major factor in supply instability.	Construction of 34.5 kV transmission line and 34.5/13.8 kV substation.	The construction of the 34.5 kV substation will improve the reliability of power supply throughout Palau and the economic activities are promoted.
As the construction of PV power generation facilities is carried out by IPP, the current grid will have insufficient transmission capacity, such as the transformer at Airai Substation will estimate to overload (approximately 307%) in 2027, and even if the PV power generation facilities including IPP Phase 2 are operated, the supply will have to be cut off.	Construction of 34.5 kV transmission line and 34.5/13.8 kV substation.	The IPP will be able to supply the full capacity of the generated electricity even if the construction of solar power generation facilities is implemented.

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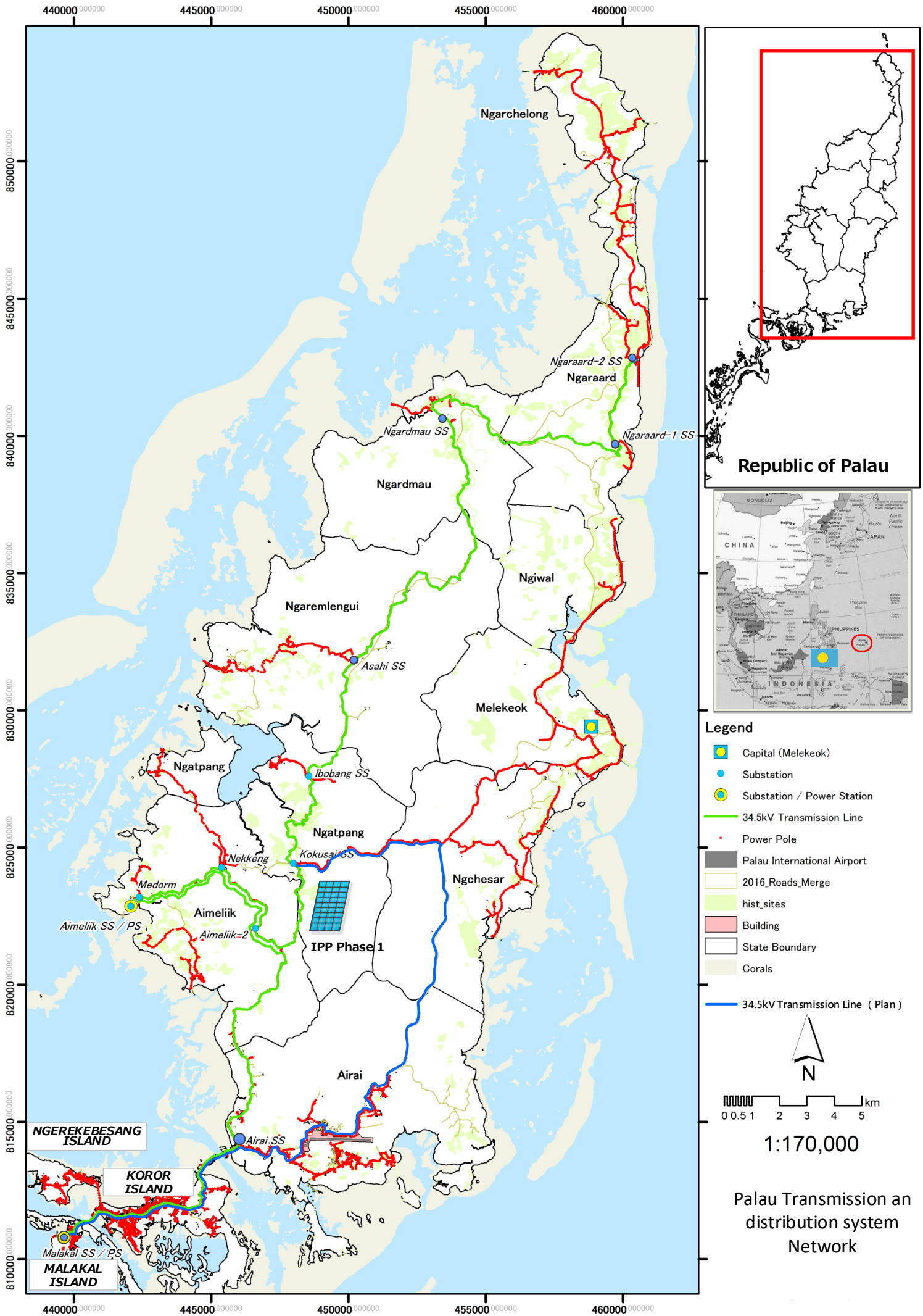
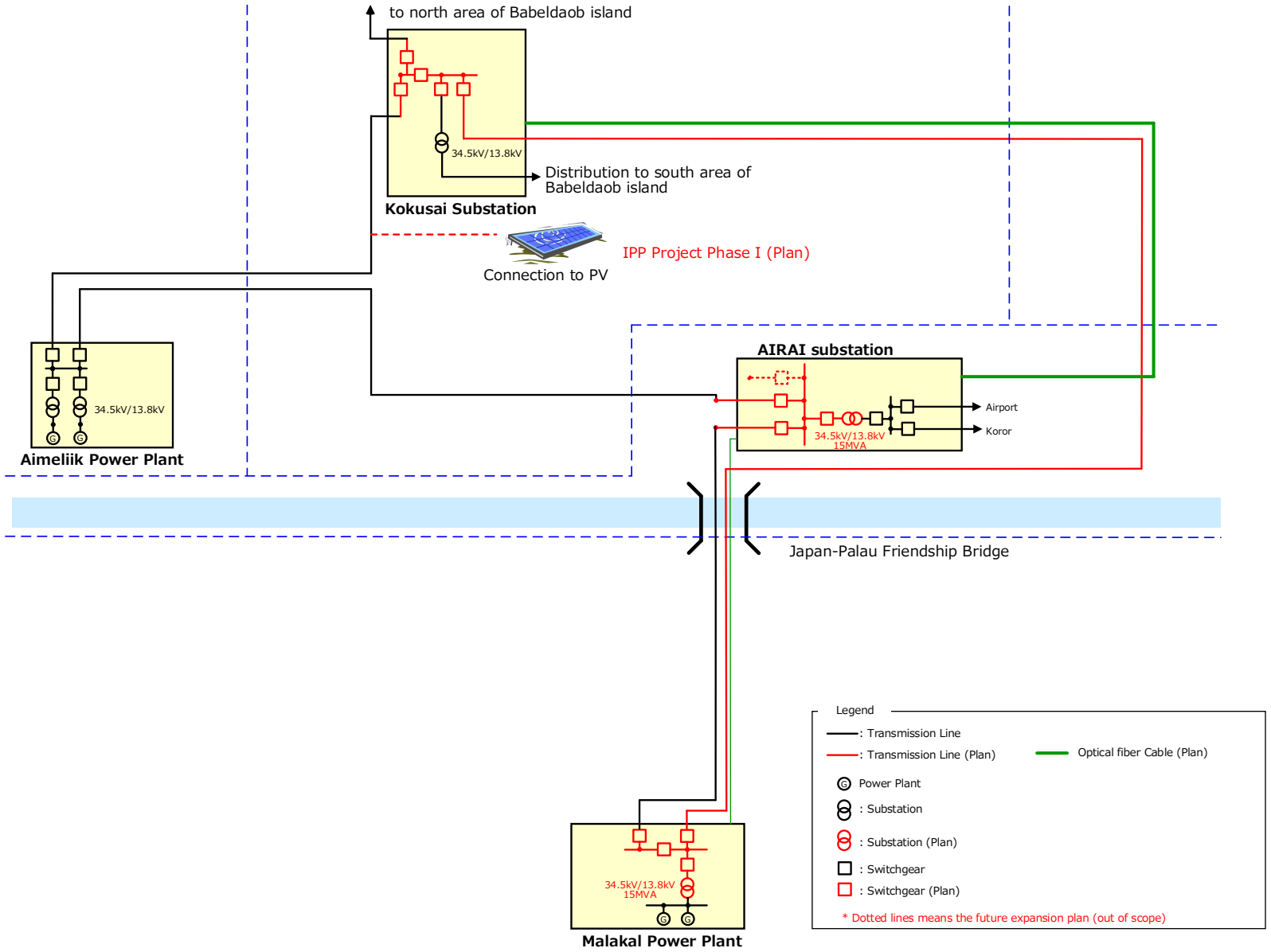


Location Map of the Project Site



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Abbreviations

ADB	Asian Development Bank
ANSI	American National Standards Institute
ARAP	Abbreviated Resettlement Action Plan
ASEAN	Association of Southeast Asian Nations
BPW	Bureau of Public Works
CX	Categorical Exclusion
E/N	Exchange of Notes
EA	Environmental Assessment
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EQPB	Palau Environmental Quality Protection Board
EU	European Union
G/A	Grant Agreement
GDP	Gross Domestic Product
GIS	Geographic Information System
IEC	International Electrotechnical Commission
IPP	Independent Power Producer
JEC	Japanese Electrotechnical Committee
JICA	Japan International Cooperation Agency
KB Grid	Koror – Babeldaob Grid
M/D	Minutes of Discussions
MOF	Ministry of Finance
MPII	Ministry of Public Infrastructure & Industries
NDC	Nationally Determined Contribution
NESC	National Electrical Safety Code
O&M	Operation and Maintenance
OJT	On the Job Training
PEA	Palau Energy Administration
PPUC	Palau Public Utilities Corporation
PWSC	Palau Water and Sewage Corporation
SAIDI	System Average Interruption Duration Index
SAIFI	System Average Interruption Frequency Index
SCADA	Supervisory Control And Data Acquisition
SWS	Swedish Weight Sounding Test
TOR	Terms of Reference
UNDP	United Nations Development Program
VAT	Value Added Tax

CHAPTER 1 BACKGROUND OF THE PROJECT

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1-1 Current Status and Issues in the Sector

1-1-1 Overview

The Republic of Palau (hereinafter referred to as "Palau") has a population of approximately 96 % in Koror Island, a cluster of industries centered on tourism, and Babeldaob Island, where the capital city of Melekeok is located. The power demand of Koror Island and the southern part of Babeldaob Island accounts for approximately 85 % of the total power demand of the two islands. The annual power demand of the two islands is 84.8 GWh, with a peak demand of about 12.4 MW (2017), and it is supplied from Malakal Power Plant in Koror and Aimeliik Power Plant in Babeldaob via a 34.5 kV transmission line running north-south across the island.

The power supply configuration in Palau is almost entirely dominated by diesel power generation, with only 1.6 % of the total power generation from renewable energy, which sources is coming from grid-connected solar PV facilities (2019). The government of Palau revised the National Long-Term Energy Policy in 2015 and formulated the “Palau Energy Roadmap” in 2017. In the policy and roadmap, the government aims to increase the share of renewable energy to 45 % of the total electricity generation by 2025, and it has declared this goal as a Nationally Determined Contribution (NDC) under the Paris Agreement.

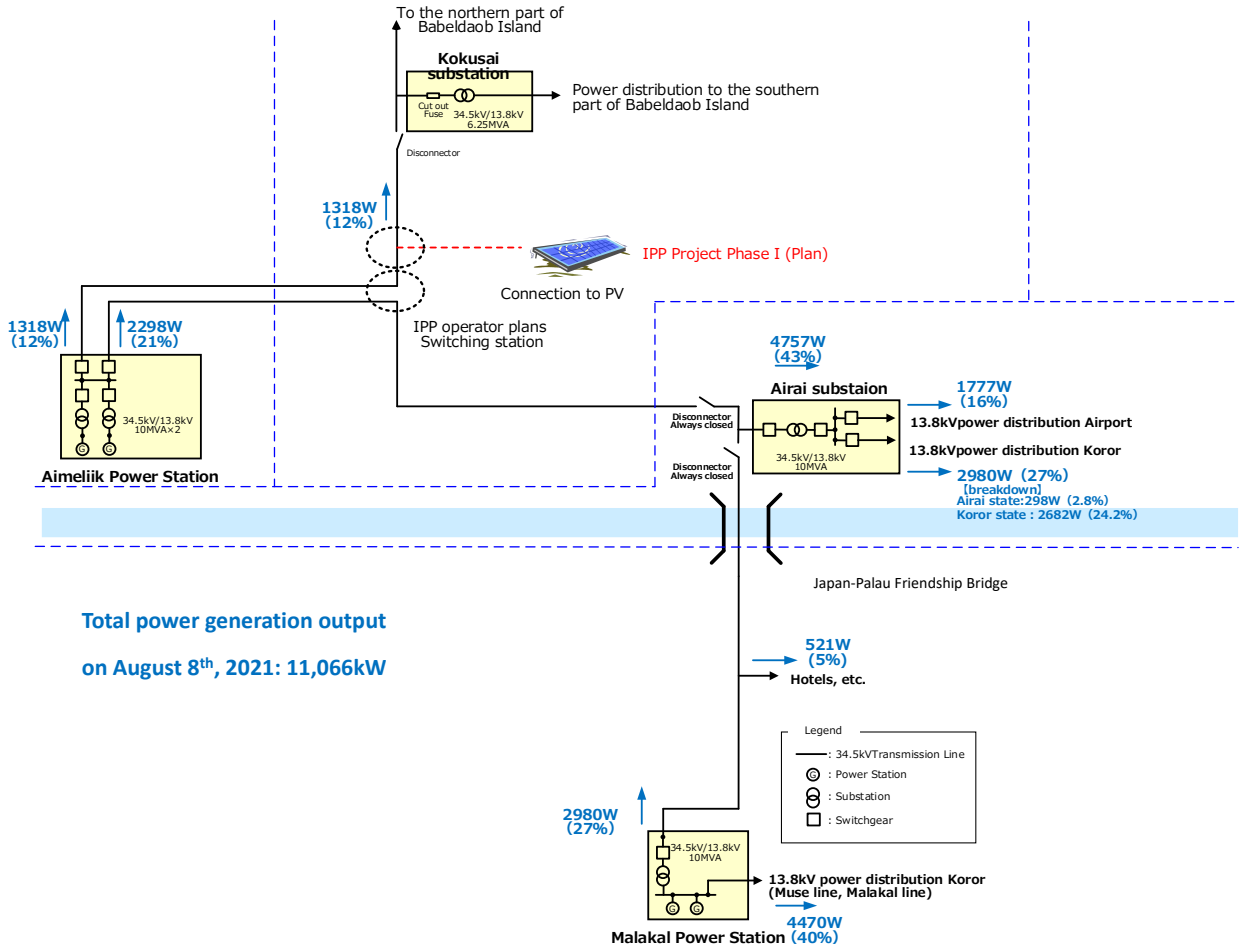
The Government of Palau is promoting the construction of solar PV facilities and the introduction of battery storage through a power purchase agreement with an independent power producer (IPP). The aim is to increase the share of renewable energy to 20 % in Phase 1 of the IPP Project by 2022 and to 45 % in Phase 2 of the IPP Project by 2025. The “Capacity Plan” developed by the Palau Public Utilities Corporation (hereinafter referred to as "PPUC") in 2020, based on the master plan developed for the "Project for Study on Upgrading And Maintenance Improvement of National Power Grid in the Republic of Palau” by JICA (2018-2019) (hereinafter referred to as "JICA Master Plan"), states that the expansion of transmission and substation facilities is essential for the implementation of Phase 2.

In May 2021, PPUC announced the "Electrical Power System Prioritization Plan 2021-2025", which summarizes the expansion of power systems that should be implemented in parallel with the IPP Project, other developments that PPUC should prioritize, and countermeasures.

However, there are concerns about the stable power supply in the future because there are not enough transmission and distribution facilities to meet the national energy ratio targets. There are also concerns that unstable power supply will greatly hinder economic development and the improvement of people's living standards.

In response, the Government of Palau requested an assistance for “the Project for Upgrading Power Grid (hereinafter referred to as “the Project”)" from Japan.

1-1-2 Current System Configuration and Power Demand



Source: JICA Preparatory Survey Team

Figure 1-1-2.1 Configuration of Major Power Plants and Substations in Koror and Babeldaob Island

Figure 1-1-2.1 shows the configuration of the main power plants and substations on the islands of Koror and Babeldaob. The actual power generation output on August 8th, 2021 for both islands was 11,066 kW[1], with Aimeliik Power Plant supplying 1,318 kW (12 %) to the northern region and 2,298 kW (21 %) toward Airai Substation and Malakal Power Plant. On the other hand, Malakal Power Plant supplies 2,980 kW (27 %) of electricity to Koror area and Airai Substation. Malakal Power Plant supplies 4,470 kW (40 %) of electricity directly to Koror area via a 13.8 kV distribution line. Malakal Power Plant supplies 7,450 kW (67 %) of power to central Palau, and 4,757 kW (43 %) of power flows to Airai Substation, which is connected by a T-branch from the 34.5 kV transmission line between Malakal and Aimeliik Power Plants. The main electricity consumer in Palau is in Koror Island, where 7,152 kW (64 %) of electricity is consumed.

Of the substations in Palau, only Malakal and Aimeliik Power Plants, and Airai Substation have circuit transmission line breakers, and Malakal and Aimeliik Power Plants are connected by a single 34.5 kV

[1] This actual generation is based on generation at the Aimeliik Power Plant and Malakal Power Plant, and does not include generation from grid-connected PV power generation facilities (1.6% of total generation capacity).

transmission line. A SCADA system has been installed at Malakal and Aimeliik Power Plants, and Airai Substation to adjust the power supply and demand, enabling Malakal Power Plant to monitor the output status of Aimeliik Power Plant and the power flow status (voltage, frequency, power factor, etc.) of Airai Substation, and to operate the 13.8 kV switchgear at Airai Substation. The current issues related to power supply configuration and power supply reliability are summarized as follows:

- Low supply reliability in case of failure due to having only one transmission line from Malakal Power Plant to Aimeliik Power Plant.
- Since Airai Substation is pulled in by a T-branch, it is not possible to disconnect only the faulted section from the grid, so the restoration time in the event of a fault will be longer.
- Even though the power demand of Koror Island is about 70 %, there is no substation; electricity is distributed from Airai Substation in Babeldaob Island and Malakal Power Plant in Malakal Island. In the event of an accident at Malakal Power Plant or a problem with the JP Bridge[2], it would be difficult to supply electricity to Koror state, which is the major demand area.

1-1-3 Effects of Accidents

As shown in Figure 1-1-2.1, Babeldaob Island and Koror Island have three substations with circuit breakers: Aimeliik, Airai, and Malakal. In the event of an accident on the 34.5 kV transmission line between Aimeliik and Malakal, the circuit breakers at Malakal and Aimeliik will be activated and the entire section will be blacked out. In such a case, 48 % of Palau's total electricity supply would be disrupted. After the accident, line operators would visually check the accident section and operate the disconnecting switch near Airai Substation to restore power to some areas, but it would take a long time to narrow down the scope of the power outage.

Table 1-1-3.1 shows SAIDI and SAIFI for the past five years, indicating a very large number of power outages from October 2020 to September 2021, with SAIDI being about four times the average of the past four years, and SAIFI being about twice the average. Both have worsened in the most recent year's data, with the most recent situation being a 36-minute long island-wide blackout from 3:55 AM to 4:29 AM on August 30, 2021. In addition, one of the main reasons behind the extremely long power outage time in 2021 is the impact of Typhoon Surigae, which approached on April 14-16, 2021. More specifically, the main causes were strong winds (instantaneous maximum wind speed: 28 m/s) and heavy rains (maximum rainfall: 140 mm/day) caused by the typhoon, which resulted in the collapse of trees, and ground faults or short-circuit accidents due to broken transmission and distribution line or contact with transmission and distribution line.

Thus, Palau is currently facing a situation where power outages become longer in the event of an accident or disaster. It is considered to be of utmost importance to develop a power grid improvement plan that will contribute to improving the reliability of power supply, by reducing the frequency of accidents and minimizing the time and sections of power outages in the event of an accident.

[2] The new Koror-babekdaob Bridgr was named "Japan-Palau Friendship Bridge" on its opening ceremony on January 11, 2002.

Table 1-1-3.1 SAIDI and SAIFI in the Past Five Years

Period	SAIDI	SAIFI
October 2016 - September 2017	661	21.94
October 2017 - September 2018	372	13.23
October 2018 - September 2019	418	17.02
October 2019 - September 2020	789	20.14
October 2020 - September 2021	1621	30.82
[Reference] Japan (2015-2019 average)*.	71	0.16

* Report on Electricity Quality - FY2019 Results - (December 2020, Japan Electric Power Industry Relations Promotion Organization)

Source: PPUC

1-2 Natural Conditions

1-2-1 Summary of the Survey Result

(1) Transmission Line Route Survey

1) Topography

The terrain of Babeldaob Island and Koror Island is rugged and has unique characteristics in each area. The area where the transmission line route survey was conducted is divided into the following 5 sections and outlined:

a) Central Part of Babeldaob Island (Kokusai - The junction of three roads)
b) Middle East of Babeldaob Island (The junction of three roads - North of airport)
c) Southern Part of Babeldaob Island (North of the airport - Near Airai Substation)
d) In Koror Island
e) In Malakal Island

a) Central Part of Babeldaob Island (Kokusai - The junction of three roads)

The entire area consists of hilly mountainous terrain, with the roadside (along the transmission line route) located near a gently undulating ridge at an elevation of 30 to 150 m. Comparing the west side and east side of the transmission line route, the west side is monotonous with few ups and downs, while the east side has more ups and downs as it crosses more valleys.

b) Middle East of Babeldaob Island (The junction of three roads - North of airport)

This section of the road runs in a north-south direction, passing through mountain slopes at elevations of 50 to 100 m. Therefore, there is a lot of cut and fill in the valleys (streams). Many of the cut slopes are longer than 5 m in height. Unstable slopes, such as collapses of cut-slopes and landslides, have been observed, making this section the most important section of the transmission line route.

c) Southern Part of Babeldaob Island (North of the Airport to Near Airai Substation)

The road passes through an open hilly area. There are few cut-slopes in this section, and even if there are, they are small-scale (less than 2 m), and there are no large-scale unstable slopes. However, due to weathering, there are areas where even small cut-slopes are prone to collapse,

and surface slides and small collapses are observed.

d) In Koror Island

Most of the line passes through downtown and residential areas spread out on hills 10 to 60 m above sea level. There is little cut and fill, and the terrain is small and mostly stable. Unstable slopes are not found along the roads.

e) In Malakal Island

The site is located at a low elevation of 0 to 15 m above sea level. Therefore, there is no collapsed terrain, and the area is stable.

2) Geological Risk Assessment along Transmission Line Route

a) Central Part of Babeldaob Island (Kokusai - The junction of three roads)

Two small collapses and one surface landslide were observed. In the surface landslide, loose sediment with advanced gully erosion is distributed in a layer thickness of 30 to 40 cm. Because of the water catchment topography, the surface sediment is washed away with the flowing water during heavy rains. Existing utility poles are installed to avoid this unstable slope.

b) Middle East of Babeldaob Island (The junction of three roads to North of Airport)

Many collapses and landslides are distributed in the area. It was confirmed that embankments had been constructed where the road crosses the stream. As there is no deformation of the road or shoulder, it is considered to be stable, but a method to avoid the slope area should be considered. Although it is possible to install poles avoiding small collapses of a few meters in width, the Team prioritized avoiding slope areas where small collapses are concentrated. In addition, it should be noted that it is assumed that labor will be required for drilling at the time of installation at the base of fresh and hard volcanic rocks. Examples of confirmed collapse terrain are shown in Figure 1-2-1.1.

	
Photo 1: New cut-earth collapse This is a collapsed cut-earth terrain where the base rock and soil are exposed. The new utility poles will be installed along the road on the opposite side of the cut and collapsed terrain.	**Photo 2: Landslide situation** A landslide about 30 m wide and 60 m deep was confirmed. New utility poles will be installed along the road on the opposite side of the landslide.

Source: JICA Preparatory Survey Team

Figure 1-2-1.1 Collapsed landform in the Middle-Eastern Part of Babeldaob Island (The junction of three roads to Northern Part of the Airport)

c) Southern Part of Babeldaob Island (North of the Airport to Near Airai Substation)

The section of the road that passes through a residential area and leads to the JP Bridge is heavily trafficked. On the unstable slopes in this area, three landslides and one new small-scale collapse were observed. One of the landslides has caused a road surface displacement of more than 30 cm, as shown in Figure 1-2-1.2, and requires attention. Although the assumed location of the utility poles is on the opposite side of the road, it should be noted that the poles should be installed at a distance long enough from this point to avoid a causal relationship.

	
Photo 1: Panoramic view of the landslide Cracks were observed in the road surface along the longitudinal direction.	**Photo 2:Close-up view of the landslide** Displacement of more than 30 cm in some areas, requiring attention to the location of utility poles.

Source: JICA Preparatory Survey Team

Figure 1-2-1.2 Landslide in Southern Babeldaob

Based on the above survey of the transmission line route, 21 geological risks were identified along the 30 km transmission line, and field discussions were held to change the locations of the poles. In particular, there were locations where landslides and large-scale collapses may

have occurred within one year, making the area dangerous. Table 1-2-1.1 shows the results of the geological risk survey and the measures taken.

Table 1-2-1.1 Results of Geological Risk Survey

Geological risks	Quantity	Activity	Scale	Support
Landslide	6	High	Width 30 to 100 m	On the other side of the road, increase the distance between utility poles
Large-scale collapse	2	High	Width 10 to 20 m	Opposite side of the road
Small-scale collapse	4	High	Width several meters	Shift the position of utility poles
Remains of collapsed area	8	Stable	Width 10 to 30 m	Shift the position of utility poles
Hole (sinkhole)	1	Stable	Width 1 m (depth 1.5)	Shift the position of utility poles

Source: JICA Preparatory Survey Team

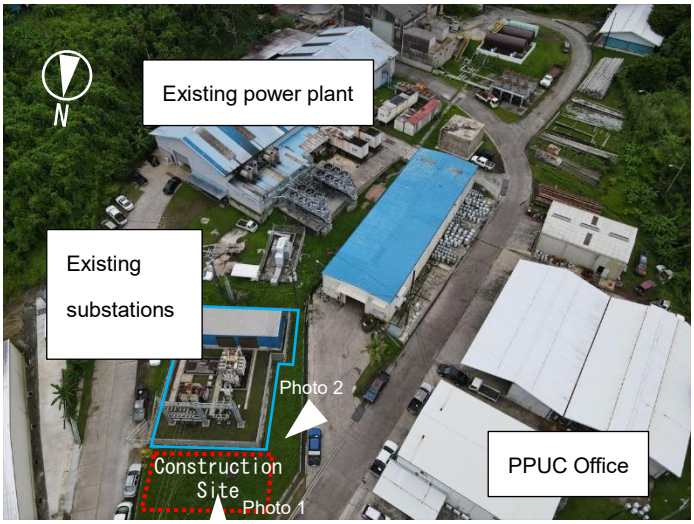
(2) Topographical Survey

Topographical Surveys were conducted at four sites: the existing Malakal Power Plant site, new Koror Substation site[3], existing Airai Substation site, and existing Kokusai Substation site. The topographical survey of existing Airai Substation site was added as a result of discussions with PPUC, as it became necessary to conduct outline design for the renewal work.

1) Site for Existing Malakal Power Plant

The site at the existing Malakal Power Plant is located in the southern part of Koror Island, and the substation is surrounded by PPUC's power plant, office and garage. The land is owned by Koror state and the substation is managed by PPUC. The site for the substation is a triangular-shaped area on the north side of the existing substation, which is generally flat with some undulations. There is limited space for the two existing poles and two guy wires. Therefore, the plan includes a consideration of relocating the existing poles.

[3] After discussion between JICA Preparatory Survey Team and PPUC, the parties confirmed that the new Koror substation will be excluded from the scope of the Project.



Panoramic view of existing Malakal Power Plant and the planned construction site

It is created from images taken by PPUC using a drone. The proposed construction site is located to the north of the existing substation and is currently vacant.

Photo 1: Panoramic view of the expansion site (taken from the north)

The site for the expansion is triangular in shape. There is a height difference of about 50 cm to 1.0 m from the surrounding road.

Photo 2: Panoramic view of the expansion site (taken from the south)

Two existing utility poles are standing, and a guy wire is running from each pole. The need to relocate them will be studied and planned.

Source: JICA Preparatory Survey Team

Figure 1-2-1.3 Site at Existing Malakal Power Plant

2) Site for new Koror Substation

The proposed site for Koror Substation[4] was a part of a quarry located at the northern end of Koror Island, as shown in Figure 1-2-1.4. The owner of the land is Koror state, which has used the land free of charge to a local company as a quarry for Palau limestone, and the land was provided by Koror state as a planning site for Koror Substation.

[4] After discussion between JICA Preparatory Survey Team and PPUC, the parties confirmed that the new Koror substation will be excluded from the scope of the Project.

The site is large enough for the construction of Koror Substation (about 2,700.0 m^2). The land is relatively flat, but there is a slight difference in level of about 1.2 m. Development work is needed to make the site flat for the substation. The south side of the site is surrounded by mangroves and was originally a small rocky hill 30 m high, but due to mining, it is now 2.0-4.0 m above sea level. On the other hand, according to the records of Typhoon Surigae, which caused damage to Palau, an estimated storm surge of 1.5 m occurred on April 16, 2021, when a high tide coincided with the typhoon. In light of this situation, the Team will consider the installation of a breakwater to prevent flooding along the southern coast of the construction site.

For the construction work at this site, the Team will consider (1) building an access road for vehicles to enter the site from the road, and (2) carrying out land development work with land clearing. Since it is important that the foundations of the substation equipment be supported by stable ground, an appropriate land development plan should be developed based on the results of topographical survey and soil investigations.

Panoramic view of the quarry and the site for Koror Substation

It is created from an image utilizing a drone owned by PPUC. The proposed construction site is at an unknown elevation, but was originally a small mountain that was used for mining. It is currently used as an aggregate stockyard by a local builder.

Photo 1: Difference in level from the road side

It is a view looking east from the construction site. Due to mining, there is a level difference between the road and the site (from about 4 m to 2 m) and the rock surface is exposed.

Photo 2: Aggregate stockyard

The current elevation was formed by mining a small mountain. The construction site is relatively flat, but there are level differences of about 1.2 m in some place.

Source: JICA Preparatory Survey Team

Figure 1-2-1.4 The Site for Construction of Koror Substation

3) Site for Existing Airai Substation

The existing Airai Substation site is located in the southern part of Babeldaob Island. The land is owned by Airai state and PPUC is managing the substation. The substation is planned to be renovated due to the age of its equipment. Although the area inside the substation is flat, the land is 4.5 m higher than the side facing the road, and access road is sloped. Proper planning should be made to ensure smooth access of construction vehicles and equipment to the site.

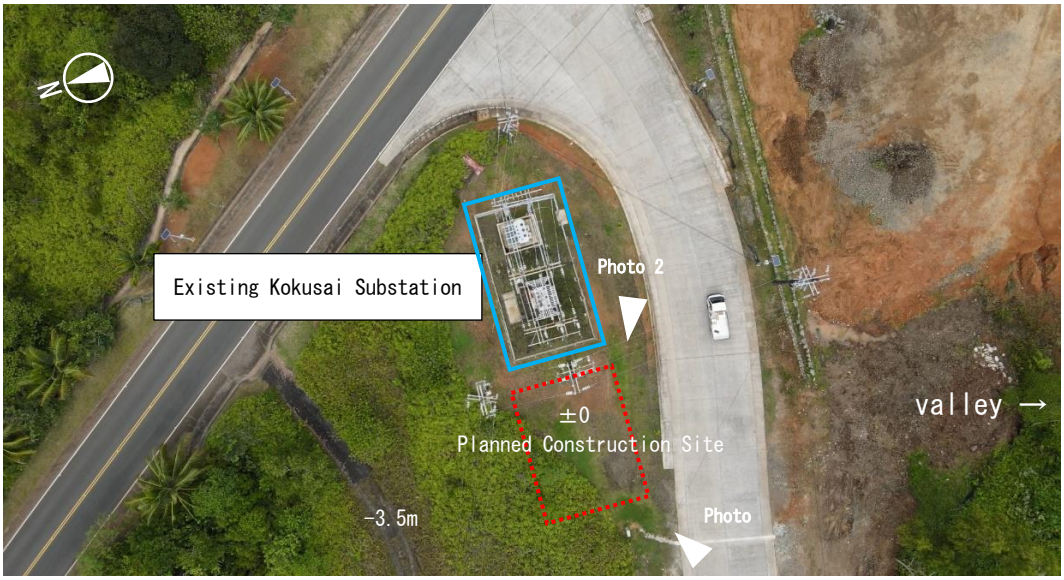
	
Photo 1: Current state Existing Airai Substation is about 35 years old and is deteriorating, and renovation work is planned.	**Photo 2: Elevation condition with roadside** The site is 4.5 m higher than the front road, and the ramp on the left side of photo (2) is used to enter the site. The access for construction vehicles should be taken into consideration.

Source: JICA Preparatory Survey Team

Figure 1-2-1.5 Site at Existing Airai Substation

4) Site for Existing Kokusai Substation

The site at the existing Kokusai Substation is located in the central part of Babeldaob Island. The land is owned by Ngatpang state and PPUC manages the substation. The proposed construction site is located on the west side of the existing substation on a flat land. There is a public park on the south side of the road, and the adjacent terrain is low like a valley. The north side of the proposed construction site is about 3.5 m lower than the site. These differences in elevation and the results of the soil investigations were taken into consideration when planning the expansion.



Panoramic view of the existing Kokusai Substation and the construction site

It is created from an image using a drone owned by PPUC. The construction site is located to the west of the existing substation and is currently vacant.

Photo 1: Panoramic view of the expansion site (taken from the southwest)

There is a telephone line buried in the site approximately 2 m away from the road boundary. Attention should paid to the proper equipment placement.

Photo 2: Panoramic view of the expansion site (taken from the southeast))

The land is flat, but the north side is about 3.5m lower, so attentions should be given to the difference in elevation.

Source: JICA Preparatory Survey Team

Figure 1-2-1.6 Site at the Existing Kokusai Substation

(3) Soil Investigations

The geology of Palau is dominated by Cenozoic Paleogene Eocene (34-56 million years ago) agglomerates (mainly basaltic to andesitic volcanic conglomerate tuff, spalliferous lava, and lava), with some Airai sandstone lignite beds. Along the coast, Pleistocene (0.01-2.6 million years ago) limestone (equivalent to Ryukyu limestone in Japan) is distributed in small cliffs of several meters. Newer limestones, coral reef sands and present-day corals are distributed along the coast.

1) Soil Investigations Results

Palau does not own borehole survey equipment and relies on survey companies in Guam or the Philippines when surveys are required. Since it was difficult to conduct the borehole investigation due to the impact of COVID-19 and the switchgear building to be constructed in a small scale, soil investigations shown in Table 1-2-1.2 were conducted in this field survey.

Table 1-2-1.2 Soil Investigations Results

Survey Site	Field survey and topographic interpretation	Survey at the location			Soil testing at laboratory
		Trench survey	Plate loading test	SWS test*1	Physical test*2
Koror Substation (new construction)	○	1 location	1 location	8 locations	4 samples
Malakal Power Plant (expansion)	○	—	—	3 locations	—
Kokusai Substation (expansion)	○	—	1 location	6 locations	—
Park around JP Bridge (Koror state)	○	—	—	2 locations	—
Park around JP Bridge (Airai state)	○	—	—	3 locations	—
Transmission line	○	Conducted risk assessment by topographical interpretation and field survey, as described in 1-5-2-1-(1).			

※1 SWS test: Swedish Weight Sounding test

※2 Physical test: sieve analysis, consistency limit, water natural content, specific gravity test

※3 After discussion between JICA Preparatory Survey Team and PPUC, the parties confirmed that the new Koror substation will be excluded from the scope of the Project.

Source: JICA Preparatory Survey Team

The following is a summary of the results of the soil investigations at each survey location:

- Koror Substation[5] is based on crushed limestone fill, and the SWS test showed that the equivalent N value was more than 50 at 0-1.8 m, and the plate loading test showed an equivalent N value of 10-30.
- Malakal Power Plant has undulations in the distribution of the base rock and some of the bedrock is exposed, but the ground can be designed with a concrete mat foundation, and the SWS test confirmed an equivalent N value of 3 to 5 at 0 to 1.5 m below the ground surface.
- Kokusai Substation is based on an embankment made of weathered basalt aggregate soil. The SWS test showed an equivalent N value of 3 to 5 at 0 to 1.0 m below the ground surface, and the plate loading test showed an equivalent N value of about 4. Since the scale of the facility is small, the ground can be designed with a concrete mat foundation.
- Airai Substation is based on limestone, and the rock fragments are hard and stable for substation foundation. The SWS test showed an equivalent N value of 6 to 17 at a depth of

[5] After discussion between JICA Preparatory Survey Team and PPUC, the parties confirmed that the new Koror substation will be excluded from the scope of the Project.

0.5 m below the ground surface.

- The soil survey around the JP Bridge was conducted as part of the feasibility study for the proposed construction of transmission line towers in the adjacent park. This survey was conducted within the area permitted by Koror state and Airai state. No basement rock exposure was observed in “Koror State Park”, but basaltic andesite (self-cracking lava) exposure was observed in the lower part of the garden house at the northern end of “Airai State Park”.

  In the SWS test, well consolidated fill with an average converted N value of 10 is distributed up to 1.5 m below the ground surface, and base rock is distributed underneath. In the park on the Airai state side, very well consolidated fill with an average converted N value of 36 is distributed up to 1.4 m below the ground surface, and base rock is distributed below the fill.

  On the other hand, the SWS test can estimate the upper surface depth of the basement rock, but it cannot determine the lithology (degree of weathering, fracture state, etc.) of the rock mass. Since the results of several tests were almost the same, the depth of the basement rock can be judged to be about 1.5 m. It was necessary to consider conducting a standard penetration test to accurately clarify the depth of the rock. However, as a result of subsequent discussions with PPUC, the proposal to laying within the JP Bridge was accepted instead of the proposal to build steel towers.

1-2-2 Earthquake

The most recent recorded earthquake of magnitude 6.1 occurred off the coast of Angaur in December 2020. Palau's 10-year earthquake record (Table 1-2-2.1) does not show any record of earthquakes of magnitude 7.0 or higher.

Table 1-2-2.1 Decade of Earthquake Records in Palau

Date of occurrence	Magnitude	Epicenter
Dec. 23, 2020	6.1	Angaur state
Feb. 12, 2018	5.0	Angaur state
Nov. 15, 2017	5.0	Ngchesar state
Jan. 25, 2016	5.1	Kayangel state
Nov. 30, 2014	4.9	Angaur state
Jul 28, 2014	5.6	Ngaraard state
Nov. 16, 2013	4.7	Melekeok state
Apr. 03, 2013	4.5	Peleliu state
Oct. 23, 2011	5.3	Ngarchelong state

Source: Earthquake Track

1-2-3 Air Temperature

The average temperature in Palau ranges from 27.4ºC to 28.0ºC, and does not fluctuate significantly throughout the year. The highest average maximum temperature is 31.0°C in April and November, and

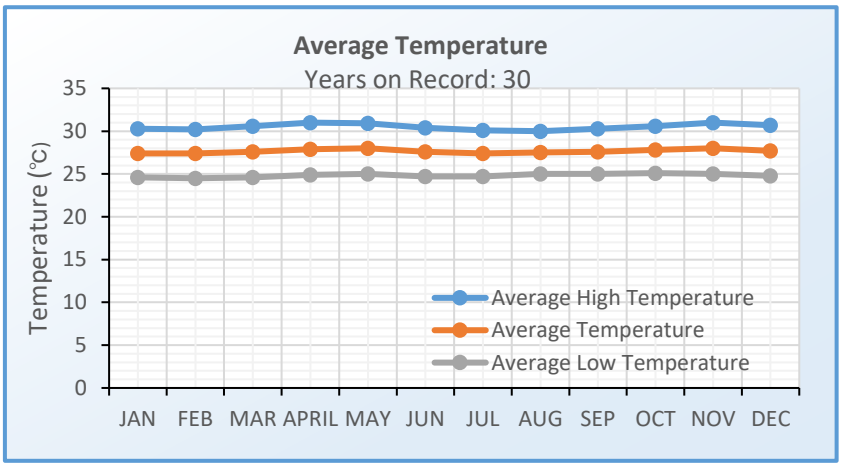
the lowest average minimum temperature is 24.5°C in February. The average temperature in Koror state is shown in Table 1-2-3.1 and Figure 1-2-3.1.

Table 1-2-3.1 Average Temperature in Koror State (30-Year Average)

Unit: ℃

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average high temperature	30.3	30.2	30.6	31.0	30.9	30.4	30.1	30.0	30.3	30.6	31.0	30.7
Average temperature	27.4	27.4	27.6	27.9	28.0	27.6	27.4	27.5	27.6	27.8	28.0	27.7
Average minimum temperature	24.6	24.5	24.6	24.9	25.0	24.7	24.7	25.0	25.0	25.1	25.0	24.8

Source: weatherbase



Source: Prepared by the JICA Preparatory Survey Team based on weatherbase data

Figure 1-2-3.1 Average Temperature in Koror State (30-Year Average)

1-2-4 Rainfall

Palau is an island country with an oceanic tropical climate, having a rainy season (May-October) and a dry season (November-April). Variations in monthly average rainfall in Airai state from 2011 to 2020 are shown in Table 1-2-4.1 and Figure 1-2-4.1. The minimum rainfall was 199.76 mm in March and the maximum was 451.68 mm in July. The total rainfall during the year was 3,882 mm and during the rainy season was 2,328 mm.

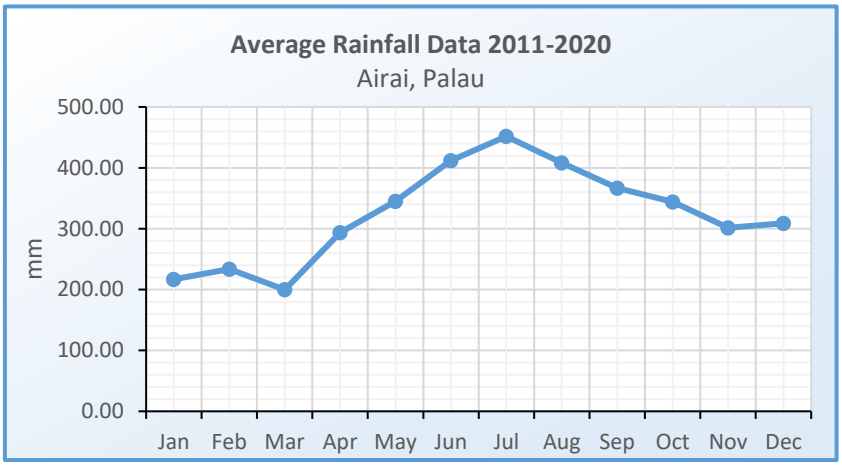
Table 1-2-4.1 Average Rainfall in Airai State (2011-2020)

Unit: mm

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rainfall	216.74	233.60	199.76	293.55	345.09	412.10	451.68	408.22	366.96	344.33	301.24	308.75

Note: Blue indicates the rainy season.

Source: weatherbase



Source: National Weather Service, ROP, Palau

Figure 1-2-4.1 Average Rainfall in Airai State (2011-2020)

1-2-5 Humidity

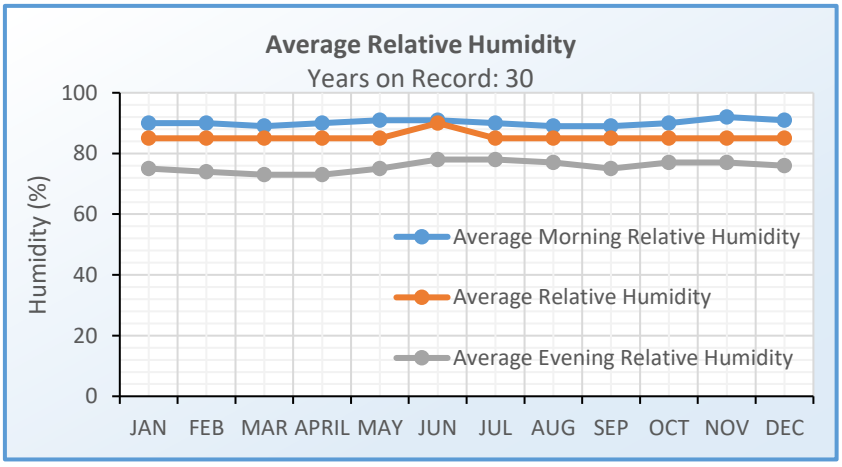
The 30-year average monthly humidity in Koror state is high, ranging from 85 % to 90 %, and does not fluctuate significantly throughout the year. The average humidity in Koror state is shown in Table 1-2-5.1 and Figure 1-2-5.1.

Table 1-2-5.1 Average Humidity in Koror State (30-Year Average)

Unit: %

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Morning average	90	90	89	90	91	91	90	89	89	90	92	91
Average	85	85	85	85	85	90	85	85	85	85	85	85
Afternoon average	75	74	73	73	75	78	78	77	75	77	77	76

Source: weatherbase



Source: Prepared by the team based on weatherbase data

Figure 1-2-5.1 Average Humidity in Koror State (30-Year Average)

1-2-6 Wind Speed

The average wind speed in Koror state ranges from 9.5 to 12.6 km/h (2.63 to 3.5 m/s) and is almost constant throughout the year. The maximum wind speed is 107.8 km/h (29.94 m/s) in July. The average wind speed in Koror state is shown in Table 1-2-6.1 and Figure 1-2-6.1.

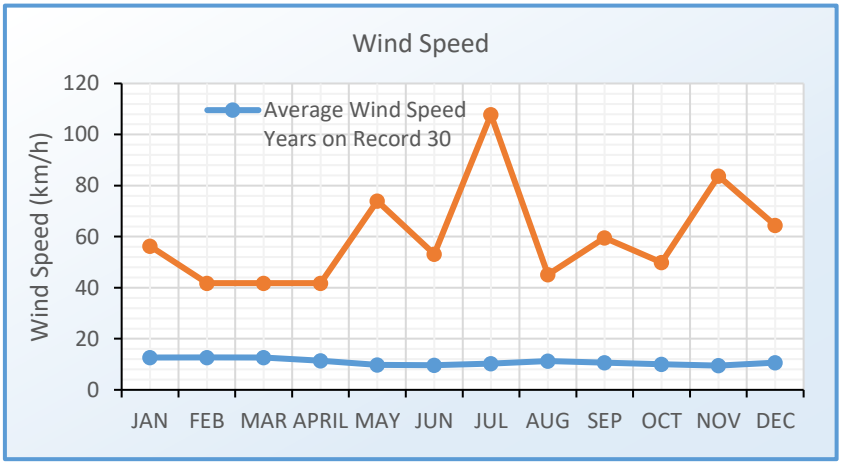
Table 1-2-6.1 Average Wind Speed in Koror State (30 and 23 Year Average)

Unit: Km/h

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average wind speed (30 years)	12.6	12.7	12.6	11.4	9.8	9.7	10.3	11.3	10.6	10	9.5	10.6
Maximum wind speed* (23 years)	56.3	41.8	41.8	41.8	74	53.1	107.8	45.1	59.5	49.9	83.7	64.4

*Maximum wind speed per hour

Source: weatherbase



Source: Prepared by the team based on weatherbase data

Figure 1-2-6.1 Average Wind Speed in Koror State (30-Year and 23-Year Averages)

1-3 Environmental and Social Considerations

1-3-1 Overview

(1) General Schedule

The procedures for environmental and social considerations in the Project consist of (1) environmental impact assessment, (2) preparation of an Abbreviated Resettlement Action Plan (ARAP), and (3) implementation of the ARAP.

As shown in 2-2-4-2 below,

- Environmental impact assessment is not necessary
- The ARAP has been completed by local sub-consultant in March 2022.
- Implementation of ARAP will be completed by December 2022, before notice of the bidding documents.

(2) Policy on Land Acquisition and Resettlement

No resettlement will be caused by the Project.

The existing substation sites (Malakal, Kokusai, and Airai) are all used free of charge from the state government, so no new land acquisition will occur.

Regarding the location of power poles, the state lands can be used at no cost, but private lands are needed compensation, so the ARAP has been prepared by the sub-contract.

1-3-2 Environmental Impact Assessment

(1) Overview of Business Components that have Environmental and Social Impacts

The Project components for this cooperation are as shown in Table 1-3-2.1.

Table 1-3-2.1 Project Components for Cooperation

	Project Components	
1	Renovation of existing substations	Malakal Power Plant Kokusai Substation Airai Substation
2	Power line	34.5 kV overhead transmission line approx. 32.0 km 34.5 kV underground transmission line approx. 3.0 km 34.5 kV transmission line (across JP Bridge) approx. 0.3 km

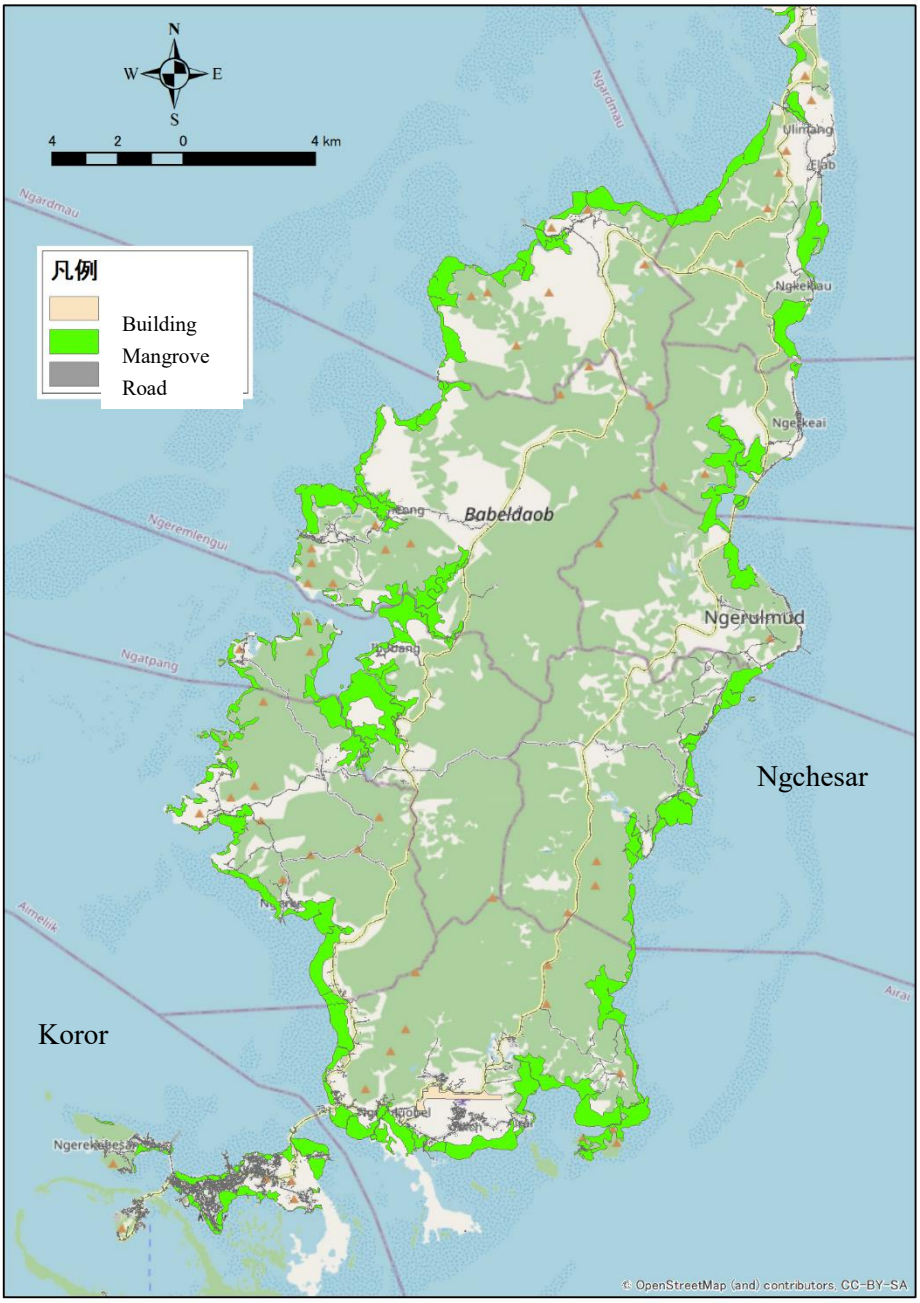
Source: JICA Preparatory Survey Team

(2) Base Environmental and Social Conditions

1) Land Use

The Project area for this cooperation is within the states of Airai, Ngchesar, and Ngatpang.

As shown in Figure 1-3-2.1, buildings are concentrated in Koror state, while the states of Airai, Ngchesar and Ngatpang have extensive mangroves along the coast.



Source: PALAU AUTOMATED LAND AND RESOURCE INFORMATION SYSTEM (PALARIS)

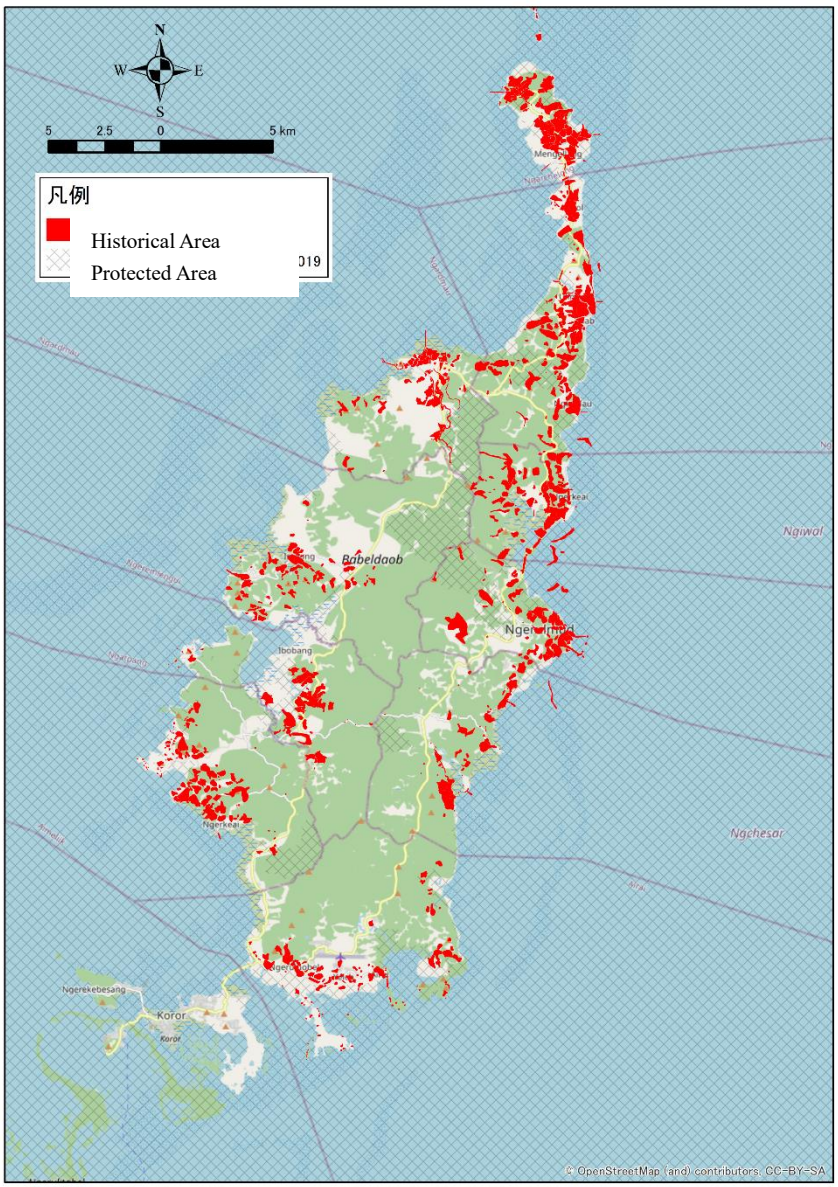
Figure 1-3-2.1 Land Use Map of Palau

2) Protected Area

The protected areas in Palau include the Protected Area and the Historical Area, as shown in Figure 1-3-2.2. Airai, and Kokusai substations do not fall under any of the protected areas.

According to the Palau Environmental Quality Protection Board (EQPB), there are existing power poles in the area, so it is possible to construct them with minimal environmental impact.

Protected Area and Historical Area are scattered around the planned location of power poles, so it is necessary to plan to avoid the Historical Area.



Source: PALAU AUTOMATED LAND AND RESOURCE INFORMATION SYSTEM (PALARIS)

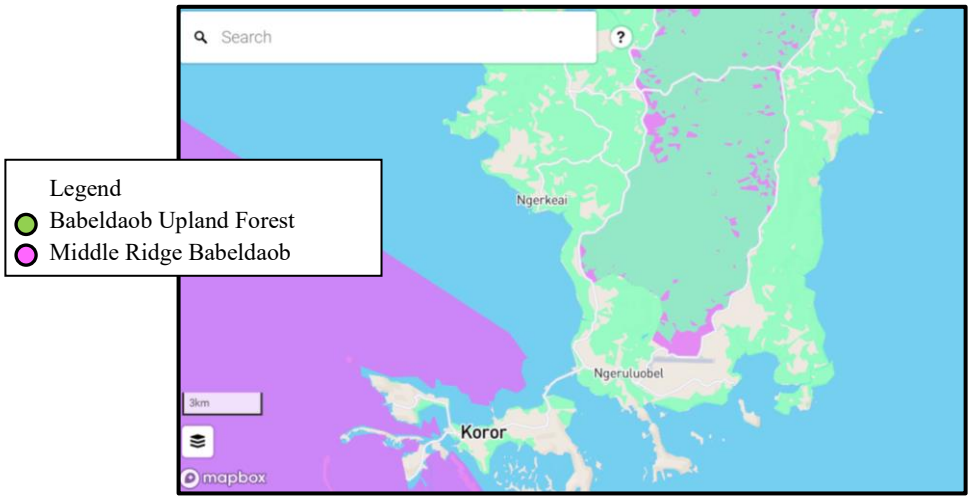
Figure 1-3-2.2 Distribution of Protected Areas in Palau

3) Ecosystem

Figure 1-3-2.3 shows Key Biodiversity Area (KBA) and Endangered species in Palau.

In Babeldaob Upland Forest, 3 species of Critically Endangered (CR), 2 species of Endangered species (EN), and 3 species of Vulnerable (VU) have been confirmed.

Also, in Middle Ridge Babeldaob, 2 species of EN and 2 species of Near Threatened (NT) have been confirmed.



KBA	Category		Scientific Name
Babeldaob Upland Forest	Critically Endangered CR)	Invertebrates	*Partula calypso*
			Partula leucothoe
			Partula thetis
	Critically Endangered(EN)	Mammals	*Emballonura semicaudata*
			Pteropus mariannus
	Vulnerable (VU)	Plants	*Aglaia mariannensis*
			Parkia parvifoliola
			Pericopsis mooniana
Middle Ridge Babeldaob	EN	Birds	*Alopecoenas canifrons*
			Megapodius laperouse
	Near Threatened (NT)		*Ducula oceanica*
			Todiramphus pelewensis

Source：https://www.ibat-alliance.org/visual-data-map

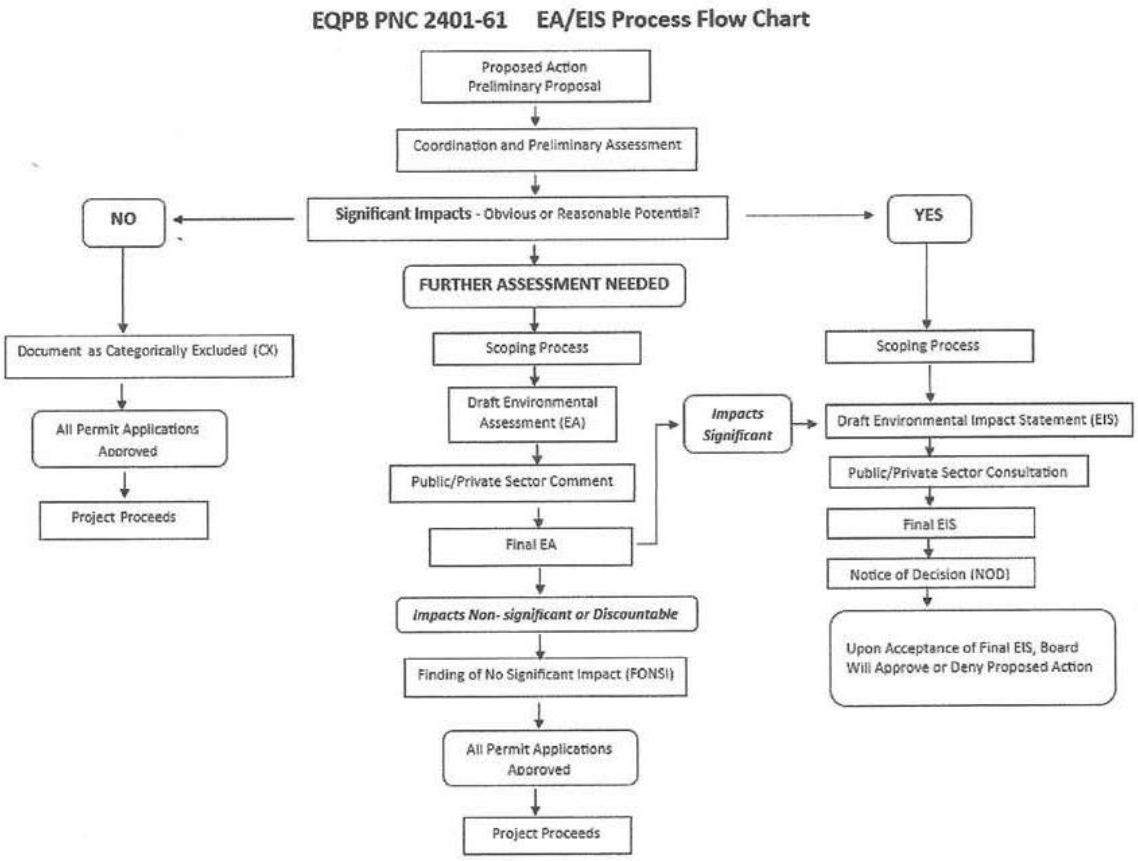
Figure 1-3-2.3 KBA and Endangered species in Palau

(3) Environmental and Social Consideration Systems and Organizations in the Partner Country

1) Environmental Quality Protection Act

Environmental Impact Assessment (EIA) in Palau is regulated by Chapter 2401-61 EA & EIS Regulations in the Environmental Quality Protection Act. The supervising ministry is the EQPB, which will review the Project and decide whether to issue a Categorical Exclusion (EX), Environmental Assessment (EA), or Environmental Impact Statement (EIS), depending on the environmental impact of the Project.

The EQPB determined that the Project will have no significant environmental impacts and is therefore a CX. The EA/EIS procedure in Palau is shown in Figure 1-3-2.4.



Source: Chapter 2401-61 EA & EIS Regulation

Figure 1-3-2.4 EA/EIS Procedure in Palau

2) Standards on Air Quality

Environmental standards on air quality are as shown in Table 1-3-2.2.

Although effluent standards in Palau are a little looser than WHO standards, the Project complies with the air quality standard and contributes to the conservation of the living environment.

Table 1-3-2.2 Air Quality Standards in Palau

Items	Standards		（Reference） WHO standards
Sulfur Oxides	60μg/m^3 (0.02ppm)	Annual arithmetic mean	20μg/m^3 (24-hour mean) 500μg/m^3 (10-minute mean)
	365μg/m^3(0.12ppm)	Maximum 24-hour concentration not to be exceeded more than once a year	
	1,300μg/m^3 (0.5ppm)	Maximum 1-hour concentration not to be exceeded more than once a year.	
	650μg/m^3 (0.25ppm)	Maximum 4-hour concentration not to be exceeded more than once a year	
Particulate Matter	60 μ g/m^3	Annual geometric mean	PM2.5: 10μg/m^3 PM10: 20μg/m^3 （Annual mean）
	150 μ g/m3	Maximum 24-hour concentration not to be exceeded more than once a year	PM2.5: 25 μ g/m^3 PM10: 50 μ g/m^3 （24-hour mean）
	360 μ g/m3	Maximum 8-hour concentration not be exceeded more than once a year	N/A
Carbon Monoxide	10 μ g/m3 (9ppm)	Maximum 8-hour concentration not be exceeded more than once a year	10μg/m^3（8-hour mean）

Items	Standards		（Reference） WHO standards
	40 μ g/m3 (35ppm)	Maximum 1-hour concentration not to be exceeded more than once a year.	30μg/m^3（1-hour mean）
Oxidants	160 μ g /m3 (0.08ppm)	Maximum 1-hour concentration not to be exceeded more than once a year.	120μg /m^3（8-hour mean）
Hydrocarbon	160 μ g /m3 (0.24ppm)	Maximum 3-hour concentration not to be exceeded more than once a year.	N/A
Nitrogen Oxides	160 μ g /m3 (0.05ppm)	Maximum 24-hour concentration not to be exceeded more than once a year	40μg/m^3 (Annual mean) 200μg/m3 (1-hour mean)

Source:：National Ambient Air Quality Standards for Nepal, 2003, WHO Air quality guidelines 2005

3) Standards on Noise and Vibration

There are no standards on noise and vibration in Palau.

For the reference, Table 1-3-2.3 shows Noise standards by International Finance Corporation (IFC) (Environmental, health, and safety guidelines, General guidelines)

Table 1-3-2.3 Noise standards by IFC

	Daytime (7:00-22:00)	Nighttime (22:00-7:00)
Residence, Institutional, and education area	55	45
Industrial, Commercial area	70	70

4) Water quality standards

Table 1-3-2.4 shows water quality standards in Palau, based on Chapter 2401-11 Marine and Fresh Water Quality Regulations.

Malakal substation is applied to Class B, and Kokusai, and Airai substation are applied to Class 1, by EQPB.

Palauan Standards is equivalent to Japanese standards.

There are no effluent standards on construction.

Table 1-3-2.4 Water quality standards

	Unit	Class AA	Class A	Class B	Class BB	Class 1	Class 2	Japanese standards (Environmental Protection in the sea)
E.coli	MPN/100mL	-				Average 126 Maximum 410		-
pH		7.7-8.5				6.5-8.5 shall not be greater than .2 pH units from		7.0-8.3

	Unit	Class AA	Class A	Class B	Class BB	Class 1	Class 2	Japanese standards (Environmental Protection in the sea)
						ambient conditions.		
Total Nitrogen	mg/L	0.4	0.8		0.4	0.75	1.50	1.0
Total Phosphorus	mg/L	0.025		0.5		0.2		0.09
Dissolved Oxygen	-	Not less than 80%				Not less than 75%		Not less than 2 mg/L
Turbidity	NTU	Not more than 1		Not more than 2		Not more than 5%	Not more than 10%	

Dissolved Oxygen is allowable change quantity from natural conditions, and Turbidity is allowable increase quantity from natural conditions

Source：Chapter 2401-11 Marine and Fresh Water Quality Regulations

5) Gap Analysis related to EIA

Table 1-3-2.5 shows Gap Analysis between JICA Guidelines for Environmental and Social Considerations (hereinafter referred to as "JICA Guidelines") and Palauan regulations.

Table 1-3-2.5 Gap Analysis between JICA Guidelines and Palauan regulations

Item	JICA Guidelines	Palauan Regulations	Gaps / Countermeasures
Underlying Principles	Environmental impacts that may be caused by projects must be assessed and examined in the earliest possible planning stage. Alternatives or mitigation measures to avoid or minimize adverse impacts must be examined and incorporated into the project plan. (JICA Guidelines p. 28)	EA and EIS which are applied to individual projects are regulated in Chapter 2401-61 EA & EIS Regulations.	JICA guidelines and Palauan regulations both mention processes of EIA.
Information disclosure and stakeholder consultation	EIA reports (which may be referred to differently in different systems) must be written in the official language or in a language widely used in the country in which the project is to be implemented. When explaining projects to local residents, written materials must be provided in a language and form understandable to them. •EIA reports are required to be made available to the local residents of the country in which	In the Project, IEE is applied. EA or EIS report is disclosed in the newspaper for 30 days so that stakeholders can express their opinions.	JICA guidelines and Palauan regulations both mention information disclosure and stakeholder consultation.

Item	JICA Guidelines	Palauan Regulations	Gaps / Countermeasures
	the project is to be implemented. The EIA reports are required to be available at all times for perusal by project stakeholders such as local residents and copying must be permitted. (JICA Guidelines, p.32) •For projects with a potentially large environmental impact, sufficient consultations with local stakeholders, such as local residents, must be conducted via disclosure of information at an early stage, at which time alternatives for project plans may be examined. The outcome of such consultations must be incorporated into the contents of project plans. (JICA Guidelines, p. 29) •In preparing EIA reports, consultations with stakeholders, such as local residents, must take place after sufficient information has been disclosed. Records of such consultations must be prepared; •Consultations with relevant stakeholders, such as local residents, should take place if necessary throughout the preparation and implementation stages of a project. Holding consultations is highly desirable, especially when the items to be considered in the EIA are being selected, and when the draft report is being prepared; (JICA Guidelines, p. 32)		
Impact to be assessed	The impacts to be assessed with regard to environmental and social considerations include impacts on human health and safety, as well as on the natural environment, that are transmitted through air, water, soil, waste, accidents, water usage, climate change, ecosystems, fauna and flora, including trans-boundary or global scale impacts. These also include social impacts, including migration of population and involuntary resettlement, local economy such as employment and	The items which are included in EA are summary of the Project, permission of national and state government, natural resource nearby the Project site, and measures for avoiding and minimizing the impacts to natural and social environment, such as air quality, noise, water quality, ecosystem, topography, local community etc.	Palauan regulations have sufficient items to implement environmental and social considerations. However, the Project is not applicable to EA.

Item	JICA Guidelines	Palauan Regulations	Gaps / Countermeasures
	livelihood, utilization of land and local resources, social institutions such as social capital and local decision-making institutions, existing social infrastructures and services, vulnerable social groups such as poor and indigenous peoples, equality of benefits and losses and equality in the development process, gender, children's rights, cultural heritage, local conflicts of interest, infectious diseases such as HIV/AIDS, and working conditions including occupational safety. (JICA Guidelines, p. 28) In addition to the direct and immediate impacts of projects, their derivative, secondary, and cumulative impacts as well as the impacts of projects that are indivisible from the project are also to be examined and assessed to a reasonable extent. It is also desirable that the impacts that can occur at any time throughout the project cycle should be considered throughout the life cycle of the project. (JICA Guidelines, p. 29)		
Monitoring and Grievance Redness Mechanism	Project proponents should make efforts to make the monitoring results available to local stakeholders involved in the project. (JICA Guidelines, p.30) When third parties point out specifically that environmental and social considerations are not being fully undertaken, project proponents should make efforts to reach an agreement on the procedures to resolve the problems, through forums for discussions and examinations of the countermeasures with participation of stakeholders involved in the projects, based on sufficient information disclosure. (JICA Guidelines, p.30)	EIS report is announced 30 days to stakeholders and hears opinions from stakeholders.	Palauan regulations have sufficient systems to hear opinions by stakeholders. However, the Project is not applicable to EA or EIS.
Ecosystem	Projects must not involve significant conversion or significant degradation of critical natural habitats and critical forests. (JICA Guidelines, p. 30)	Environmental Quality Protection Act regulates the necessity of the protection of traditional flora and fauna, and the management of the protection areas.	Based on Environmental Quality Protection Act, the impacts to flora and fauna will be minimized.
Indigenous people	Any adverse impacts that a project may have on indigenous peoples are to be avoided when	Impacts to indigenous people should be minimized. Furthermore, the adequate	In the construction sites and surrounding areas, Indigenous people do not

Item	JICA Guidelines	Palauan Regulations	Gaps / Countermeasures
	feasible by exploring all viable alternatives. When, after such an examination, avoidance is proved unfeasible, effective measures must be taken to minimize impacts and to compensate indigenous peoples for their losses. (JICA Guidelines, p. 30)	compensation should be given to the affected people.	exist.

(4) Comparative Study of Alternatives (Including the Zero Option)

A comparative study of alternatives for the JP Bridge transmission method was conducted from the perspective of impacts on the natural and social environment.

Table 1-3-2.6 Comparison of Alternatives (JP Bridge Transmission Method)

Item	Zero option	Alternative 1	Alternative 2	Alternative 3
Summary	No project will be implemented.	Construct a steel tower (monopole) and install power line.	Retrofit the existing submarine cable.	Lay transmission line (cables) in existing cable holes inside of JP Bridge.
Impact on the natural environment	None in particular	There will be no impact on the natural environment because the tower will be built in a park.	Since the work will be done underwater, it may affect a wide area of the sea around the JP Bridge.	None in particular
Impact on social environment	Since there is only one transmission line from Malakal and Aimeliik Power plants, the impact of power outage will be huge.	Landscape will be damaged.	The impact of power outage due to the retrofitting of the existing submarine cable would be enormous.	None in particular
Assessment	Not recommended	Not recommended	Not recommended	Alternative 3 is recommended because it minimizes the impact on the natural and social environment.

Source: JICA Preparatory Survey Team

(5) Scoping

Table 1-3-2.7 shows scoping results, taking into account the expected impacts of the Project.

Table 1-3-2.7 Scoping

Classification		Impact items	Selection status		Reason for selection
			Before and during construction	During operation	
Pollution control	1	Air pollution	✓		**During Construction:** Possible influence of exhaust gas from construction machinery and generators. **During Operation:** None**.**
	2	Water Pollution	✓		**During Construction:** Possible impact of turbid water generated by construction.

Classification		Impact items	Selection status		Reason for selection
			Before and during construction	During operation	
					During Operation: None.
	3	Soil Pollution		✓	**During Construction:** None. **During Operation:** Since insulating oil is used in the transformer, any leakage may cause soil contamination.
	4	Waste	✓		**During Construction:** Waste from construction will be generated. **During Operation:** None. General waste is expected to be generated by the facility manager, etc., but it will be disposed of in the same way as normal general waste.
	5	Noise and Vibration	✓		**During Construction:** Noise and vibration associated with construction will be generated. **During Operation:** Very little noise and vibration will be generated during service.
	6	Land subsidence			**During Construction:** The construction is not expected to have any impact on ground subsidence. **During Operation:** No impact on ground subsidence due to the facility is expected, as the load will be distributed by the direct foundation.
	7	Bad odor			**During Construction:** None as no odor is generated. **During Operation:** None as no bad odor is generated.
	8	Bottom sediment			**During Construction:** None as no bottom sediment is generated. **During Operation:** None as no turbid water will be generated.
Natural (physical) environment	9	Protected areas	✓		**During Construction:** Impacts to protected areas along the surroundings of the sites of power poles will be assumed. **During Operation:** None as no activities that may affect ecosystems will be conducted.
	10	Ecosystems	✓		**During Construction:** Impacts to ecosystems along the surroundings of the sites of power poles will be assumed. **During Operation:** None as no activities that may affect plants, animals, or ecosystems will be conducted.
	11	Hydrology			**During Construction:** None as no activities that alter hydrology will be conducted. **During Operation:** None as no activities that alter hydrology will be conducted.
	12	Topography, geology			**During construction:** None as no landform changes will be made. **During Operation:** None as no landform changes will be made**.**
Social Environment	13	Land acquisition, Involuntary resettlement	✓	✓	**Before/During Construction, and During Operation:** Some private land exists at the location of the power poles. The land will be acquired after consultation with Bureau of Land and Surveys (BLS), which is in charge of land management, and the landowners.
	14	Poor peoples			**During Construction:** No impact is expected**.** **During Operation:** No impact expected**.**
	15	Minority peoples, Indigenous peoples			**During Construction:** No impact is expected**.** **During Operation:** No impact expected**.**
	16	Local economy, such as			**During Construction:** Local employment as construction workers is expected.

Classification		Impact items	Selection status		Reason for selection
			Before and during construction	During operation	
		employment and means of livelihood			**During Operation:** Stable supply of electricity is expected to have socioeconomic effects on private homes and industries.
	17	Land use and local resource use			**During Construction and Operation:** Land acquisition is limited to the site of the location of the transmission line poles, so the development activities are limited in scope. Therefore, no significant impact on land use and local resource use is expected.
	18	Water use			**During Construction and Operation:** There are no rivers or reservoirs in the vicinity of the Project area, so there will be no impact on water use or water rights.
	19	Existing social infrastructure and social services	✓		**During Construction:** Traffic congestion by vehicles is possible. Also, there is a possibility of temporary power outages during transmission line construction. **During Operation**: During operation, public facilities and services will be improved by stabilizing the power supply.
	20	Social organizations such as social capital and local decision-making bodies	✓	✓	**Before/During Construction, and During Operation:** Some private land exists at the location of the power poles. The land will be acquired after consultation with Bureau of Land and Surveys (BLS), which is in charge of land management, and the landowners.
	21	Uneven distribution of damages and benefits			**During Construction:** None as there will be no uneven distribution of damages and benefits due to construction. **During Operation:** No uneven distribution of benefits is expected due to the improvement of the electricity situation as a public service
	22	Regional fragmentation			**During Construction**: None as there will be no regional division due to construction. **During Operation:** None as there will be no regional division due to the Project**.**
	23	Cultural heritage	✓		**During Construction:** Historic districts are scattered along the road where the poles are planned, and cultural heritage may be affected. **During Operation:** None as no cultural heritage sites in the area where the facility will be constructed.
	24	Landscape			**During Construction:** None. There will be no impact on the landscape due to construction. **When During Operation:** None as no facilities that would affect the landscape.
	25	Gender			**During Construction:** None as there will be no gender-sensitive activities. **During Operation:** None as there will be no gender-sensitive activities.
	26	Children's rights			**During Construction:** None as there will be no activities affecting children's rights. **During Operation:** There will be no activities no activities affecting children's rights.
	27	Infectious disease such as HIV/AIDS			**During Construction:** None as no infectious materials will be used. **During Operation:** None as no infectious materials will be used.

Classification		Impact items	Selection status		Reason for selection
			Before and during construction	During operation	
	28	Labor environment	✓	✓	**During Construction:** Consideration for construction workers is needed. **During Operation:** None.
Others	29	Accidents	✓	✓	**During Construction:** Accidents due to construction work are possible. **During Operation:** Accidents involving the handling of operating equipment are assumed.
	30	Climate Chnage	✓		**During Construction:** None **During Operation:** None

Source: JICA Preparatory Survey Team

(6) TOR for Environmental and Social Considerations Survey

Based on the scoping results, the TORs for the environmental and social considerations survey were examined as shown in Table 1-3-2.8 below.

Table 1-3-2.8 TOR of Environmental and Social Consideration Survey

Environmental items	Survey Items	Survey method
Air pollution	・Confirmation of environmental standards (Palau's environmental standards, WHO standards, etc.) ・Impact during construction	・Confirmation of environmental standards, etc. ・Confirmation of the nature of the work, type of construction equipment, type of pump, etc.
Soil pollution	・Transformer installation method, insulating oil management method	・Survey of existing data (examples from other substations, etc.)
Water Pollution	・Impact during construction	・Confirmation of the surrounding environment through field surveys and hearings ・Confirmation of construction details and drainage conditions due to the use of this facility
Waste	・Construction waste treatment methods	・Field survey and hearing
Noise and vibration	・Environmental standards, etc. and WHO standards, etc. ・Impact during construction	・Confirmation of the surrounding environment through field surveys, interviews, and literature research
Protected Areas, Ecosystem	・Impact during construction	・Confirmation of construction details ・Field survey and hearing to the experts
Labor environment, Accidents	・Details of accidents that may occur during construction and during operation	・Details of accidents that may occur during construction and operation, and consideration of countermeasures
Land acquisition, Social organizations such as social capital and local decision-making bodies	・Confirmation of land ownership	・Confirmation of land data and interview survey with BLS ・Confirmation of scale of land acquisition and amount of compensation by re-commissioning to local consultant
Existing social infrastructure and social services	・Impact of construction vehicles ・Temporary power outage due to construction	・Field survey and hearing ・Confirmation of construction plan
Cultural heritage	・Impact during construction	・Field survey and literature review of the historic district

Source: JICA Preparatory Survey Team

(7) Survey Results for Environmental and Social Considerations

1) Air Pollution

The concentration of PM10 has been about 19 μg / m^3, which is well below the environmental standard (annual average value of 60 μg / m^3)[6].

Construction works will generate emission gases due to operation of construction machines. Impacts of emission gases will be reduced by turning off the engine during idling and equalization of working schedule. Moreover, the Contractor will be encouraged to use low emission construction machines. When generation of dusts is anticipated in construction works, the Contractor will be encouraged to sprinkle water appropriately to prevent the dusts. If necessary, dust prevention sheet will be utilized for construction works.

During operation, emission of gases is expected due to operation of emergency generator.

However, the impact is very small since it will be operated in emergency times only.

Accordingly, the air pollution is anticipated to be little.

2) Water Pollution

In 2018, PPUC sampled water in ICE BOX PARK, and the turbidity was 1.4 NTU, there are no suspended solids[7].

Turbid water is anticipated to be generated from construction works. It will however be prevented by installing gutter and catch basin of suspended solid.

Also, the Contractor will install silt fences to prevent water pollution in the Project sites

Construction workers use portable toilet, and effluent is treated in wastewater treatment plants in Malakal, so there are no impacts to surrounding environment.

Therefore, the water pollution due to the Project is anticipated to be little.

3) Soil Contamination

During operation stage, insulation oil is used in transformers. Leakage of insulation oil may cause soil contamination. Therefore, concrete wall is installed to prevent soil contamination.

Therefore, no soil contamination due to the project is expected.

4) Waste

During construction, waste (concrete mass approx.. 128 m^3, steel scrap approx.. 39 ton, and waste oil approx.. 7 ton) is generated. The Contractor will dispose of concrete mass and steel scrap in

[6] Source: https://air-quality.com/place//7e8e80f1?lang=en&standard=aqi_us

[7] Source: EQPB Laboratory

the landfill site (Aimeliik landfill site), permitted by EQPB. PPUC will accept waste oil from the Contractor, and reuse waste oil.

During operation, general waste from manager of transformer is discharged, but it is treated adequately as well as general waste.

5) Noise and Vibration

There are no regulations on noise and vibration in Palau, so the Contractor should comply with the reference standards of IFC (75dB in daytime), and does not construct during night.

Noise and vibrations are anticipated to be generated by construction machines during construction stage. The noise due to construction works will be controlled by the Contractor, applying soundproof walls, low noise and vibration construction machines and equalization of construction schedules in accordance with requirements.

No device generating significant noise and vibration is planned to be installed and operated at substations.

Little noise and vibration are generated during operation.

Therefore, noise and vibrations impacts are anticipated to be little.

6) Protected areas, Ecosystem, Cultural heritage

For the Project, the cut of 387 trees, such as coconuts and mango etc is needed.

JICA Preparatory Survey Team heard opinions from Palau Conservation Society (NPO), and they confirmed that there are no endangered species such as invertebrates, shown in Figure 1-3-2.3 in the Project sites.

However, in case that endangered species are confirmed by any chance during construction, some measures, such as the change of the span of power poles and the movement of the species, should be taken.

Furthermore, as shown in Picture 1-1, there are about 1 meter segregation from the boundary of the road to KBA, and endangered species are not confirmed in the Project sites as mentioned above, so the impact to KBA is very small.

Power poles are planned to avoid the sites of protected areas and historical areas in Figure 1-3-2.2, KBA in Figure 1-3-2.3, and in the locations where there are no habitats.

Therefore, impacts to protected areas, ecosystem and cultural heritage are minimized.

Picture 1-1 The boundary of the road and KBA

7) Labor environment and Accidents

Accidents, including traffic ones, are anticipated in the construction stage. However, to prevent the accidents, wearing accident protectors such as gloves and helmet as well as safety trainings for construction works will be encouraged.

During operation, the accident by operation of machines is assumed, so safety trainings for the operation also will be encouraged.

Therefore, the impacts of accidents are mitigated in both construction and operation stages.

8) Land acquisition and Social Organizations such as Social Capital and Local Decision-Making Bodies

There are some private lands located in the areas planned for the power poles. Therefore, PPUC will negotiate with private landowners for the land use, based on “Land acquisition and Resettlement” described later.

9) Existing Social Infrastructure and Social Service

Traffic jams are anticipated to be created by the operation of construction vehicles in the construction stage. For mitigation purposes, the operation schedule of trucks will be controlled adequately.

In addition, temporary power outage is expected during construction of transmission line. Announcement of power outage in advance via internet and newspapers will minimize impacts of power outages.

(8) Impact Evaluation

Based on the survey results and according to JICA Guideline, impacts are summarized in Table 1-3-2.9 and Table 1-3-2.10.

Table 1-3-2.9 Impacts Evaluation (Natural Environment)

No.	Impact items	Evaluation		Evaluation reasons
		Before and during construction	During operation	
Impacts on natural environment				
1	Air Pollution	B-	D	**During Construction:** Emission gases and dusts are generated by operation of construction vehicles and machineries. Nevertheless, it is minimized by turning off the engine during idling and sprinkling water. **During Operation:** An emergency generator generates emission gases. However, the impact is very small since it will be operated in emergency times only. Therefore, the air pollution impacts are anticipated to be little
2	Soil pollution	D	B-	**During Construction:** Impacts to soil pollution are not assumed. **During Operation:** To prevent soil pollution by insulating oil, concrete wall is installed. Therefore, impacts to soil pollution are minimized.
3	Water Pollution	B-	D	**During Construction:** Turbid water is anticipated to be generated from construction works. It will be prevented by installing gutter and catch basin of suspended solid. **During operation:** It also will be prevented by installing gutter and catch basin of suspended solid.
4	Waste	D	D	**During Construction:** The Contractor will adequately dispose of waste generated by construction works. **During operation:** general waste from manager of transformer is discharged, but it is treated adequately as well as general waste.
5	Noise and Vibrations	B-	D	**During Construction:** Noises and vibrations are generated by construction machines. In order to minimize the noises and vibrations, the Contractor installs soundproof walls, uses low noise and vibration construction machines, and equalizes construction schedules. **During Operation:** Transformer generates little noise and vibration.
6	Protected areas	B-	D	**During Construction:** Power poles are planned to avoid the sites of protected areas. Therefore, impacts to protected areas are minimized. **During Operation:** Impacts to protected areas are not assumed.
7	Ecosystem	B-	D	**During Construction:** Power poles are planned in the locations to avoid KBA. It is assumed that there are no endangered species in the Project sites. However, in case that endangered species are confirmed by any chance during construction, some measures, such as the change of the span of power poles and the movement of the species, should be taken. Therefore, impacts to ecosystem are minimized **During Operation:** Impacts to ecosystem are not assumed.

A± : The item for which serious positive or negative influence is assumed
B± : The item for which positive or negative influence is assumed
C± : The item for which slight positive or negative influence is assumed,
D : The item for which influence is not assumed

Source: JICA Preparatory Survey Team

Table 1-3-2.10 Impacts Evaluation (Social Environment)

No.	Impact items	Evaluation		Evaluation reasons
		Before and during construction	During operation	
Impacts on social environment				
1	Land acquisition, Social organizations such as social capital and local decision-making bodies	B-	B-	**Before/During construction and During operation:** The power poles are partly located in private lands. The land acquisition is needed, with the discussion with landowners.
2	Existing social infrastructure and social services	B-	D	**During Construction:** Traffic jam by construction vehicles is anticipated. To prevent it, vehicles operation schedule is adequately controlled. Also, temporary power outage during construction of transmission line is expected. Announcement of the power outage in advance by internet and newspapers will minimize the impacts by power outage. **During Operation:** N/A.
3	Cultural heritage	B-	D	**During Construction:** Power poles are planned to avoid the sites of historical areas. Therefore, impacts to historical areas are minimized. **During Operation:** Impacts to protected areas are not assumed.
4	Accidents	B-	B-	**During Construction:** To prevent accidents, wearing accident protectors such as gloves and helmet will be encouraged and safety trainings / monitoring for construction works will be conducted. **During Operation:** During operation, accident by operation of machines is assumed, so safety trainings for the operation also will be encouraged.

A± : The item for which serious positive or negative influence is assumed
B± : The item for which positive or negative influence is assumed
C± : The item for which slight positive or negative influence is assumed,
D : The item for which influence is not assumed

Source: JICA Preparatory Survey Team

(9) Mitigation Measures

Measures to mitigate any significant environmental and social impacts are described in Table 1-3-2.11.

Table 1-3-2.11 Mitigation Measures of Environmental and Social Impacts

Classification	Items	Mitigation Measures	Implementing Organization	Cost
Before Construction	Land acquisition, Social organizations such as social capital and local decision-making bodies	In accordance with JICA guideline and WB OP4.12, an ARAP will be prepared based on the consensus with project affected people, and compensation at full replacement cost and support will be provided.	PPUC	PPUC budget
During Construction	1.Air pollution	Sprinkling water. Using low emission gas models of construction machines.	The Contractor	Included in construction cost
	2.Soil Pollution	Installation of concrete wall	The Contractor	Included in construction cost
	3.Water pollution	Discharging water after collection by gutters and catch basins of suspended solid.	The Contractor	Included in construction cost
	4.Noise and vibrations	Installing soundproof walls. Using low noise and vibration models of construction machines.	The Contractor	Included in construction cost
	5.Protected areas, ecosystem, cultural heritage	Construction to avoid protected areas etc. The measures, such as the change of the span of power poles and the movement of the species will be taken, in case that endangered species are confirmed by any chance during construction	The Contractor	Included in construction cost
	6.Accidents	Wearing safety protector such as gloves, helmet, safety belt, etc., and implementing safety management meeting.	The Contractor	Included in construction cost
	5.Existing social infrastructure and social services	Providing adequate operation schedule of construction vehicles.	The Contractor	Included in construction cost
During Operation	1.Accidents	Safety training on the maintenance of facilities	PPUC	Included in operation & management cost

Source: JICA Preparatory Survey Team

(10) Environmental Management Plans and Monitoring Plans

Implementation institution of Environmental management plan and monitoring plan, Environmental management plan (draft) and monitoring plan (draft) are described in Figure 1-3-2.5, Table 1-3-2.12, and Table 1-3-2.13 respectively.

	Implementation		Supervising
Before Construction	PPUC	to	MPII
During Construction:	The Contractor	to	PPUC and EQPB
During Operation:	PPUC	to	MPII

Figure 1-3-2.5 Implementation institution

Table 1-3-2.12 Environmental Management Plan (Draft)

No	Category	Impact	Countermeasures	1.Responsible Organization 2.Supervision Organization	Cost
Before Construction					
	Land acquisition, Social institutions such as social infrastructure and local decision-making institutions	Loss of assets, income and livelihood due to land acquisition	In accordance with JICA guideline and WB OP4.12, an ARAP will be prepared based on the consensus with project affected people, and compensation at full replacement cost and support will be provided.	1.PPUC 2.MPII	Budget by PPUC
Construction Stage					
1	Air Pollution	Emission gases and dusts are generated by operation of construction vehicles and machineries.	Pollution will be minimized by sprinkling water. The Contractor will use the latest type of construction machinery in a good gas emission condition.	1,Contractor 2.PPUC	Included in construction cost
2	Water Pollution	Turbid water is drained in rivers.	The Contractor will install gutters and basins to catch turbid water and to reduce turbidity before draining.	1,Contractor 2.PPUC	Included in construction cost
3	Noise and Vibration	Noise and vibration are generated by construction machinery.	The Contractor will install a fence to minimize the noise and will use low noise/vibration machinery.	1,Contractor 2.PPUC	Included in construction cost
4	Existing Social Infrastructure and Social Services	Traffic jam due to construction vehicles.	Traffic condition will be controlled around the sites. Operation time will be scheduled adequately. Power outage schedule will be informed to affected people in advance by internet and newspapers.	1,Contractor 2.PPUC	Included in construction cost
5	Accident	Accident in construction works.	The Contractor will provide safe driving instructions. Based on occupational safety and health standards, the Contractor will make workers wear safety protector such as gloves, helmet, safety belts, etc.	1,Contractor 2.PPUC	Included in construction cost
6	Protected areas, ecosystem, cultural heritage	Impacts to protected areas etc. by construction of power poles	The Contractor will construct power poles to avoid protected areas etc. In case that endangered species are confirmed by any chance during construction, the Contractor will take the measures, such as the change the span of power poles and the movement of the species.	1,Contractor 2.PPUC	Included in construction cost
Operation Stage					
1	Accidents	Electrocution caused by contacting with wire or power poles	Safety training on the maintenance of facilities	1,PPUC 2.MPII	Included in operation & maintenance cost
2	Soil Pollution	Insulating oil for the transformer may cause, soil pollution.	The Contractor will construct the concrete wall to prevent soil pollution.	1,PPUC 2.MPII	Included in operation & maintenance cost

Source: JICA Preparatory Survey Team

Table 1-3-2.13 Environmental Monitoring Plan (Draft)

Time	Classification	Monitoring Item	Monitoring Point	Frequency	Method	1.Responsible organization 2.Supervision organization
Before Construction	1. Social institutions such as social infrastructure and local decision-making institutions	Compensation payment	-	Once a month until the start of construction	Check of compensation payment and grievance redress	1.PPUC 2.MPII
Construction Stage	1. Air Pollution	The condition of the sprinkle The use condition of low emission gas construction vehicles	Surrounding areas of construction sites	During construction work Once a week	Visual check	1.The Contractor 2.PPUC and EQPB
	2. Water Quality	Free of visible floating materials, oils Turbidity, pH	The nearest ocean from construction sites	During construction work Once a week	Visual check Measure	1.The Contractor 2.PPUC and EQPB
	3.Noise and vibration	The condition of noise	Surrounding areas of construction sites	During construction work Once a week	Measure	1.The Contractor 2.PPUC and EQPB
	4. Existing Social Infrastructure and Social Services	Traffic conditions Confirming a power outage plan	Surrounding areas of construction sites	Once a week during construction	Visual check Photographic records Monthly work report	1.The Contractor 2.PPUC
	5. Accident	Safety training to prevent accidents	-	Once a week during construction	Visual check Photographic records Monthly work report	1.The Contractor 2.PPUC
	6. Protected areas, ecosystem, cultural heritage	Impacts to protected areas etc.	Surrounding areas of protected areas, KBA and historical areas	Once a week during construction	Visual check Photographic records Monthly work report	1.The Contractor 2.PPUC and EQPB
Operation Stage	1. Accident	Safety training to prevent accidents	-	Once a week	Visual check Photographic records Monthly work report	1.PPUC 2.MPII
	2. Soil pollution	Occurrence of Soil pollution	Surrounding areas of the transformer	Once a week	Visual check	PPUC

Source: JICA Preparatory Survey Team

(11) Stakeholder Meeting

The first stakeholder meeting was held on September 23, 2021. The participants were the respective state governments, MPII and EQPB. Koror and Airai states expressed their preference

for a transmission method for the JP Bridge over the overhead method.

Appendix 14 shows the minutes of stakeholder meeting.

1-3-3 Land Acquisition and Resettlement

(1) Necessity of Land Acquisition and Resettlement

In Palau, the Bureau of Land and Surveys (BLS) manages landowners, but there is no law on land acquisition, so PPUC consults with landowners.

The lands of the rehabilitation of Malakal, Kokusai, and Airai Substation are owned by the respective state government.

Therefore, PPUC will conclude agreements on land use with each state government.

PPUC can use the lands of each state government free of charge, but land acquisition of private lands will be done after consultation with private landowners.

(2) Legal Framework for Land Acquisition and Resettlement

1) Overview of Partner Country Systems for Land Acquisition and Resettlement

As mentioned above, there is no legal system for land acquisition and resettlement in Palau, and BLS, which is in charge of land management, will consult with landowners.

2) Comparison of JICA Guideline with the Legal Systems of Other Countries

The main items are compared as shown in Table 1-3-3.1. The lands for the Project, are not changed landowners, but are just land uses, so the taxes for the register and the assignment are not needed. Also, the lands for power poles are topical, and do not need the leveling, so the cost for the leveling is not needed.

Therefore, the market price, based on appraisal results, is equal to replacement price.

Table 1-3-3.1 Comparison of JICA Guideline with the Legal System of the Partner Country

Key Facts	JICA Guideline/ World Bank OP 4.12	Partner country legal system	Actions to be taken in the Project (Draft)
Approval of compensation recipients	All affected people are approved as candidate recipients of compensation regardless of their status as legal/ illegal dwellers	Since the process is for private land acquisition, compensation has only been considered for private landowners.	Compensation for private landowners who is affected by the Project is implemented. In the Project sites, there are no illegal residents and properties including crops.
Enhancement of public participation in planning an implementation of the ARAP	Appropriate participation by the affected people and their communities should be promoted in planning, implementation and monitoring during the Project period	Opportunities for public participation have not been prepared since the acquisition is based on individual agreement.	Consultation meeting was held on January 2022 for the landowners.

Grievance redress mechanism	Grievance redress system must be formulated and must function appropriately	Grievance redress mechanism will be established prior to the acquisition of lands needed for the Project.	Grievance redress process is prepared.
Compensation rate	Replacement cost should be applied. Compensation should be paid before the commencement of the Project.	In case of land use, market price, based on the appraisal results, is applied as replacement price. Compensation will be paid before the commencement of the Project.	In case of land use, market price, based on the appraisal results, is applied as replacement price. Compensation will be paid before the commencement of the Project.

Source: JICA Preparatory

3) Land Acquisition and Resettlement Policy for the Project

Since there is no legal system for land acquisition in Palau, the policy for land acquisition and resettlement of the Project will be based on JICA guideline and World Bank safeguard policies.

(3) Scale and Scope of Land Acquisition and Resettlement

No resettlement will occur in the Project, but ARAP will be prepared as it may be necessary to acquire some private land.

There are no houses, buildings and structures affected by the Project. Trees that may touch power cables will be removed. Table 1-3-3.2 shows trees affected by the Project.

Table 1-3-3.2 Trees Affected by the Project

Types of trees	Number of affected trees
Coconut and Mango etc. (Large size)	361
Coconut and Mango etc. (Small size)	26
Total	**387**

Source: JICA Preparatory Survey Team

The Project needs to acquire 29 private lands, with a total area of 5,426.90 m^2. In the Project sites, there are no illegal residents and properties including crops. Right of Way (hereinafter referred to as "ROW") is 8 ft (2.4m).

The land affected by the Project is summarized in Table 1-3-3.3. The table shows Land use classification, affected by the Project, but there are no impacts to commercial.

Compensation policies are announced by discussions with landowners individually.

Table 1-3-3.3 Sites to be Affected by the Project

Cadastral Lot No.		Owner	Land use	Area (m^2)
Koror state				
1	062 B 04	Private	Residential / Commercial	190.86
2	030 B 17	Private	Residential / Commercial	54.90
3	030 B 18	Private	Residential / Commercial	57.72
4	030 B 24	Private	Residential	338.63
5	092 B 01	Private	Residential / Commercial	264.56
6	022 B 07	Private	Residential / Commercial	56.76
7	022 B 12	Private	Residential / Commercial	203.02
8	021 B 08	Private	Residential / Commercial	109.32
9	055 B 02	Private	Residential / Commercial	469.74
10	055 B 01	Private	Residential / Commercial	393.52
Sub-total				**2,139.03**
Airai state				

Cadastral Lot No.		Owner	Land use	Area (m^2)
1	024 N 14	Private	Residential / Commercial	181.46
2	024 N 12	Private	Residential / Commercial	50.49
3	069 N 01	Private	Residential / Commercial	102.39
4	024 N 15	Private	Residential / Commercial	83.14
5	025 N 10	Private	Residential / Commercial	276.40
6	025 N 09	Private	Residential / Commercial	268.85
7	025 N 08	Private	Residential / Commercial	99.43
8	009 N 01	Private	Residential / Commercial	413.85
9	009 N 03	Private	Residential / Commercial	128.85
10	009 N 20	Private	Residential / Commercial	117.49
11	002 N 01	Private	Residential / Commercial	40.23
12	059 N 01	Private	Residential / Commercial	137.54
Sub-total				**1,900.12**
Ngchesar state				
1	064 P 18	Private	Business	147.99
2	045 P 09	Private	Unimproved	407.46
3	059 P 01	Private	Unimproved	97.16
4	069 P 04	Private	Unimproved	217.66
5	069 P 03	Private	Unimproved	169.19
Sub-total				**1,039.46**
Ngatpang state				
1	024 P 18	Private	Unimproved	122.84
2	023 L 03	Private	Unimproved	225.45
Sub-total				**348.29**
Total				**5,426.90**

Source: JICA Preparatory Survey Team

Table 1-3-3.4 shows the composition of PAPs. There are 101 people in total, 4% of the total is under 20 years old, and 16% of the total is over 60 years old. In addition, women ratio is 33% of the total.

Table 1-3-3.4 The composition of PAPs

Age	Men	Women	Total
0-9	2	1	3
10-19	0	1	1
20-29	5	2	7
30-39	33	10	43
40-49	5	8	13
50-59	14	4	18
60-69	7	7	14
Over 70	2	0	2
Total	68	33	101

Source: JICA Preparatory Survey Team

Table 1-3-3.5 shows the income of PAPs. Most of PAPs are working for minimum hourly wage, 3.5 USD.

However, Impacts of income to PAPs are not assumed.

Table 1-3-3.5 The income of PAPs

Monthly income (USD)	Income of PAPs
Less than 300	16
300 – 599	57
600 – 999	8
1000 – 1499	8
1500 – 2499	2
More than 2500	10
Total	33

Source: JICA Preparatory Survey Team

(4) Entitlement Matrix

Table 1-3-3.6 shows entitlement matrix of each property.

Table 1-3-3.6 Entitlement Matrix

	Type of Loss	Eligible Persons	Entitlement	Remarks
1	Land	Land owners affected by the proposed project.	Compensation based on the replacement cost.	-
2	Structures	Owners of structures potentially impacted by proposed project. (There are no structures anticipated to be impacted by the Project.)	Compensation based on the replacement cost.	Compensation shall be made at the same time as the land acquisition because the owner of structure is the same as the landowner.
3	Trees	Owners of trees impacted by the Project.	Compensation based on the replacement cost.	Compensation shall be made at the same time as the land acquisition because the owner of tree is the same as the landowner.
4	Crops	Owners of crops impacted by the Project.	Owners are allowed to harvest the crops prior to the construction.	After the date of agreement, planting of crops is prohibited.

Source: JICA Preparatory Survey Team

(5) Cutoff Date

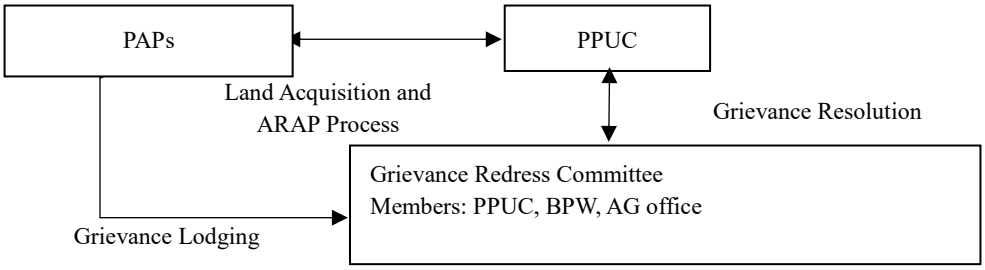
Cut-off date is established to decide the eligibility of Project Affected Persons (PAPs). According to the World Bank's safeguard policy, persons who encroach onto the Project area after the cut-off date are not entitled to compensation or any other form of resettlement assistance.

For the Project, the cut-off date is June 30, 2022.

Cutoff Date is announced by discussions with landowners individually.

(6) Institution for ARAP and Land Acquisition

PPUC has overall responsibility for the implementation of ARAP and the land acquisition as the executing agency of the Project. The Palau's Bureau of Public Works (BPW) and the office of the Attorney General (AG) shall help in cases where grievance resolution is required as members of the Grievance Redress Committee.



Source: JICA Preparatory Survey Team

Figure 1-3-3.1 Institution for Land Acquisition

(7) Grievance Redress Mechanism

There are no existing organizations for arbitration. Therefore, Grievance Redness Committee is established newly. The members are PPUC, BPW, and AG office.

Grievance Redness is implemented through local languages.

Grievance Redness is announced by discussions with landowners individually.

In the grievance redness mechanism, PAPs can request assistance or lodge a complaint to Grievance Redness Committee in the following cases:

1. In case that the living standards become worse due to the land acquisition, PAPs can request to provide opportunities for restoring and improving their living standards, for example, providing employment opportunity and job training at PPUC.
2. In case that PAPs are identified as a socially vulnerable household such as low income, elderly and/or female, PAPs can request PPUC to provide special considerations appropriate to their situation, to improve living standards diminished due to the land acquisition.
   However, as the results of the survey, there are no socially vulnerable households.
3. In case of any other issues related to the land acquisition, PAPs can lodge a complaint to PPUC/Grievance Redress Committee to discuss the solution.

(8) Monitoring

Monitoring will be conducted to ensure effective and reasonable implementation the Project through the progress of the acquisition, and grievances and requests from PAPs and the solutions.

(9) Implementation Schedule

The organization responsible for the preparation and implementation of the ARAP is PPUC. The ARAP has been prepared in March 2022, and the implementation of the ARAP will be completed by December 2022, before notice of the bidding documents.

Table 1-3-3.7 Implementation Schedule

	2021			2022												2023		
	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
Preparation of ARAP	■	■	■	■	■	■												
Meetings with Affected Landowners					■	■												
Organizational Preparations							■	■										
Land Acquisition									■	■	■	■	■	■	■			
Grievance Redress Mechanism									■	■	■	■	■	■	■	■	■	
Monitoring									■	■	■	■	■	■	■	■	■	
Grant Agreement												■						
Detailed Design and Bidding													■	■	■	■	■	
Contract and Commencement of Construction																		■

Source: JICA Preparatory Survey Team

(10) Cost and Financial Resources

Table 1-3-3.8 shows details of compensation amount.

Table 1-3-3.8 Details of Compensation Amount

Item			Quantity	Unit	Unit price (USD)	Amount (USD)
Land Acquisition	Koror	Residential / Commercial	1,800.40	m^2	120.00	216,048.00
		Residential	338.63	m^2	90.00	30,476.70
	Airai	Residential / Commercial	1,900.12	m^2	26.00	49,403.12
	Ngchesar	Business, Unimproved	1,039.46	m^2	9.40	9,770.92
	Ngatpang	Unimproved	348.29	m^2	6.60	2,298.71
Acquisition of trees		Large size	361	trees	300	108,300.00
		Small size	26	trees	150	3,900.00
Contingency			10	%	420,197.46	42,019.75
Total						**462,217.20**

Source: JICA Preparatory Survey Team

(11) Consultation with residents

PPUC explained the Project outline, and discussed with landowners, who is affected by the Project, by the individual interview (21 of men, 5 of women). The discussion was held in January to March 2022, at the affected sites.

Table 1-3-3.9 shows the comments by residents and the measures.

Table 1-3-3.9 Comments by residents and the measures

No.	Date	Participants	Sex	Comments	Measures
1	27th, January	Landowner of 062 B 04	M	They want to know the exact locations of power poles, not to disturb walkways of students.	PPUC distributed the location map of power poles.
2	1st, February	Landowner of 030 B 17	M	N/A	N/A
3	27th, January	Landowner of 030 B 24	M	They want to know the exact locations of power poles, not to disturb walkways of students.	PPUC distributed the location map of power poles.
4	27th, January	Landowner of 092 B 01	F	N/A	N/A
5	27th, January	Landowner of 022 B 07	M	N/A	N/A
6	25th, January	Landowner of 022 B 12	M	N/A	N/A
7	21st, January	Landowner of 021 B 08	M	N/A	N/A
8	20th, January	Landowner of 055 B 02	M	They want PPUC to install underground cables, not to be cut trees. They want PPUC to implement the compensation, because there were no power lines.	PPUC explained to implement the compensation, because underground cables needs high costs.
9	20th, January	Landowner of 055 B 01	M	N/A	N/A
10	23rd, February	Landowner of 024 N 14	M	N/A	N/A
11	1st, February	Landowner of 024 N 12	M	N/A	N/A
12	27th, February	Landowner of 024 N 15	M	N/A	N/A
13	22nd, February	Landowner of 025 N 10	F	N/A	N/A
14	22nd, February	Landowner of 025 N 09	F	They want PPUC to reduce the numbers of new power poles as many as possible.	PPUC explained to use existing power poles as many as possible.
15	22nd, February	Landowner of 025 N 08	M	N/A	N/A
16	8th, February	Landowner of 009 N 01	M	N/A	N/A
17	8th, February	Landowner of 009 N 03	M	N/A	N/A
18	8th, February	Landowner of 009 B 20	M	N/A	N/A
19	18th, February	Landowner of 002 N 01	M	They want to know the exact locations of power poles, not to disturb the access to driveways.	PPUC distributed the location map of power poles.
20	18th, February	Landowner of 059 N 01	M	N/A	N/A
21	24th, February	Landowner of 064 P 18	M	N/A	N/A
22	18th, February	Landowner of 045 P 09	F	N/A	N/A
23	21st, February	Landowner of 059 P 01	F	N/A	N/A
24	22nd, February	Landowner of 069 P 04	M	N/A	N/A
25	21st, March	Landowner of 069 P 03	M	N/A	N/A
26	21st, March	Landowner of 023 L 03	M	N/A	N/A

(12) Checklist for Environmental and Social Considerations

Based on JICA Guideline for Environmental and Social Considerations (April 2010), the environmental review was confirmed using the environmental checklist for the transmission and distribution sector, as shown in Table 1-3-3.10.

(13) Monitoring Form

Appendix 15 shows Monitoring Form

Table 1-3-3.10 Environmental Checklist

Classification	Environmental item	Main items to be checked	Yes: Y No: N	Environmental and social considerations
1. Licensing and Explanation	(1) EIA and environmental permits	(a) Has an Environmental Assessment Report (EIA Report) been prepared? (b) Has the EIA report been approved by the government of the country concerned? (c) Are there any conditions attached to the approval of the EIA report? If so, are these conditions met? (d) In addition to the above, if necessary, have environmental permits and approvals been obtained from local authorities?	(a)N (b)N (c)N (d)N	(a) (a)–(c) EIA report is not required. (d) Earth Moving Permit is required from EQPB for the rehabilitation of existing substations (Malakal, Kokusai) and will be obtained before the start of the Project.
	(2) Explanation to local stakeholders	(a) Have the Project contents and impacts been properly explained to local stakeholders, including information disclosure, to obtain their understanding? (b) Have comments from local residents and other stakeholders been reflected in the Project contents?	(a) (b)	(a) Meetings with local stakeholders have been planned in accordance with JICA guideline. (b) The first stakeholder consultation was held on September 23, 2021, and the stakeholders expressed their preference for a method other than the overhead as the transmission method for the JP Bridge
	(3) Examination of alternatives	(a) Have multiple alternatives to the Project plan been considered (including items pertaining to the environment and society when considering them)?	(a)Y	(a) Alternatives were also compared for the transmission method of the JP Bridge. Specifically, the overhead, submarine cable, and installation to existing check box were compared. Considering the natural and social environment, installation to existing check box was adopted.
2.. Pollution control	(1) Water quality	(a) Will the water quality in the downstream of the surrounding rivers be degraded by soil runoff from exposed areas of topsoil such as embankments and cut areas? If so, will countermeasures be provided?	(a)N	(a) Large-scale geographic change does not occur. The impact of turbid water due to construction is assumed, but the impact is minimized because gutters and basins are installed to drain wastewater after the settlement of suspended matter.
3. Natural Environment	(1) Protected areas	(a) Is the site located in a protected area as defined by the laws of the country and international conventions? (b) Will the Project have an impact on a protected area?	(a)N	(a) Protected areas are scattered along the road where the power poles are planned, but the plan should avoid the protected areas.
	(2) Ecosystem	(a) Does the site contain primary forests, natural tropical forests, or ecologically important habitats (coral reefs, mangrove swamps, tidal flats, etc.)? (b) Does the site contain habitats of valuable species that are required to be protected under the laws of the country or international conventions? (c) If there is concern about significant impacts on ecosystems, will measures be taken to reduce impacts on ecosystems? (d) Will measures be taken to block the migration routes of wildlife and livestock, and to fragment their habitats?	(a)N (b)N (c)N (d)N (e)N (f)N	(a) – (c) The Project site is located within the existing substation and along the existing road, and there are no ecologically important habitats. There are no endangered species in the Project sites. However, in case that endangered species are confirmed by any chance during construction, some measures, such as the change of the span of power poles and the movement of the species, should be taken. (d) The Project will not cause blockage of livestock and wildlife migration routes, habitat fragmentation, etc. (e) The Project will not disrupt the ecosystem as feared.

Classification	Environmental item	Main items to be checked	Yes: Y No: N	Environmental and social considerations
		(e) Will the Project result in deforestation, poaching, desertification, drying of wetlands, etc.? (e) Will the Project result in deforestation, poaching, desertification, drying up of wetlands, etc.? Is there a risk of disturbance of the ecosystem due to the introduction of exotic species (species that have not lived in the area before), pests, etc.? What measures will be taken against these? (f) If the Project is to be constructed in an undeveloped area, will the natural environment be significantly damaged by the development of the new area?		(f) The Project site is located in an existing substation and along the existing road, which is already under development.
	(3) Geomorphology and geology	(a) Are there any areas of poor geology on the transmission and distribution line routes where landslides or landslides are likely to occur? If so, will appropriate measures be taken in terms of construction methods? (b) Will landslides or collapses be caused by civil engineering works such as embankments and cuts? Are appropriate measures taken to prevent soil collapse and landslides? (c) Will soil runoff occur from embankments, cut areas, soil dumping sites, and soil extraction sites? Will appropriate measures be taken to prevent soil runoff?	(a)N (b)N (c)N	(a) N/A. Geographic change does not occur. (b) N/A. Geographic change does not occur. (c) N/A. Geographic change does not occur.
4. Social environment	(1) Resettlement	(a) Will involuntary resettlement occur as a result of project implementation? If so, will efforts be made to minimize the impact of relocation? (b) Will the relocating residents be provided with appropriate explanations on compensation and livelihood restoration measures prior to relocation? (c) Will a survey for resettlement be conducted and a resettlement plan be developed, including compensation at replacement cost and restoration of livelihoods after resettlement? (d) Will compensation payments be made prior to relocation? (e) Is there a written compensation policy in place? (f) Does the plan give appropriate consideration to socially vulnerable groups, especially women, children, the elderly, the poor, and ethnic minorities and indigenous peoples, among the relocated residents? (g) Can the relocated residents reach a consensus before the relocation? (h) Is there a system in place to ensure proper implementation of the resettlement? Will there be sufficient implementation capacity and budgetary provision? (i) Will there be a plan to monitor the impact of the resettlement?	(a) (b) (c) (d) (e) (f) (g) (h) (i) (j)	(a) Involuntary resettlement does not occur. (b) Stakeholder meetings will be held. Explanation/clarification on compensation and livelihood restoration assistance will be provided to affected people. Affected people will conclude the agreement with PPUC. (c) A survey of the asset of all affected people lost due to the Project was conducted. ARAP includes compensation and livelihood restoration programs. (d) Compensation will be paid prior to the resettlement. (e) Compensation policy was described in ARAP (including eligibility for compensation, entitlement matrix etc.). (f) ARAP considers socially vulnerable groups such as low income, elderly and/or female, to improve living standards. (g) Involuntary resettlement does not occur. (h) PPUC is responsible for the implementation of ARAP. (i) Monitoring of land acquisition and grievance redress will be conducted. A monitoring plan was developed in ARAP. (j) A grievance redress committee will be established.

Classification	Environmental item	Main items to be checked	Yes: Y No: N	Environmental and social considerations
		(j) Is there a grievance redress mechanism in place?		
	(2) Life and livelihood	(a) Will the Project have an adverse impact on the livelihoods of residents? (b) Will there be a risk of disease outbreaks (including HIV and other infectious diseases) due to population influx from other areas? (b) Will there be a risk of disease outbreaks (including HIV and other infectious diseases) due to population influx from other areas? Will appropriate public health considerations be taken into account as necessary? (c) Will there be radio interference caused by steel towers, etc.? If significant radio wave interference is expected, will appropriate measures be considered? (d) Will compensation for the construction of transmission line be provided in accordance with national laws?	(a) (b) (c) (d)	(a) An economic displacement such as the loss of crops and agricultural land is expected. ARAP was developed and the loss will be compensated at full replacement cost. (b) No influx of population from outside of the Project site is predicted. (c) The Project will not cause radio interference. (d) Compensation under power line will be paid according to the local laws and ARAP.
	(3) Cultural heritage	(a) Is there a risk that the Project will damage archaeological, historical, cultural, or religious heritage or sites? (b) Is the Project likely to damage archaeological, historical, cultural, or religious heritage or sites, and will the measures provided for in the national legislation of the country concerned be taken into account?	(a) N	(a) Historic areas are scattered along the road where the utility poles are planned, so the power poles are planned avoiding the historical areas.
	(4) Landscape	(a) Will the Project have an adverse effect on landscapes that require special consideration, if any? If so, will the necessary measures be taken?	(a)N	(a) The Project site and its surroundings are already developed, and the Project will not significantly damage the landscape.
	(5) Ethnic minorities, indigenous peoples	(a) Is consideration given to reducing the impact on the culture and way of life of ethnic minorities and indigenous peoples of the country? (b) Are the rights of minorities and indigenous peoples to their lands and resources respected?	(a)N/A (b)N/A	(a)–(b) There are no indigenous peoples affected by the Project.
	(6) Working environment	(a) Will the working environment laws of the country to be observed in the Project be observed? (b) Will the Project take into consideration the safety of project personnel in terms of hardware, such as the installation of safety equipment to prevent occupational accidents and the management of hazardous substances? (c) Are soft measures planned and implemented for project personnel, such as the formulation of safety and health plans and the implementation of safety education for workers and others (including traffic safety and public health)? (d) Will appropriate measures be taken to ensure that security personnel involved in the Project do not infringe on the safety of project personnel and local residents?	(a)Y (b)Y (c)Y (d)Y	(a)–(d) It is the responsibility of PPUC to comply with Palau's working environment laws. (a)–(b) Workers will be required to wear helmets and protective equipment, and safety training will be thoroughly provided to ensure the safety of workers during construction and during service.

Classification	Environmental item	Main items to be checked	Yes: Y No: N	Environmental and social considerations
5. Others	(1) Impacts during construction	(a) Are there mitigation measures for pollution during construction (noise, vibration, turbid water, dust, exhaust gas, waste, etc.)? (b) Will the construction have an adverse effect on the natural environment (ecosystem)? Will mitigation measures be provided? (c) Will the construction have an adverse effect on the social environment?	(a)Y (b)Y (c)Y	(a) Possible impacts include noise and vibration, dust, exhaust gas, and waste. (b) There are protected areas scattered along the road where the poles are planned, but the impact can be minimized by avoiding the protected areas. (c) Construction may cause traffic congestion on the roads around the site. PPUC will remind the Contractor not to concentrate vehicles at certain times of the day. PPUC will also inform the residents of the power outage plan in advance via radio, internet, text messages, etc.
	(2) Monitoring	(a) Will the monitoring of the Project be planned and implemented for the above environmental items that may have an impact? (b) Are the items, methods, frequency, etc. of the plan appropriate? (c) Is the monitoring system (organization, personnel, equipment, budget, etc. and its continuity) to be established? (d) Are the methods, frequency, etc. of reporting from the supplier to the competent authorities specified?	(a)Y (b)Y (c)Y (d)Y	(a)–(d) PPUC will monitor environmental items (the situation of compensation, air quality, water quality, noise, protected areas, ecosystem, cultural heritage, existing social infrastructure, accidents) that may have an impact. The Project does not require an environmental assessment, but PPUC is the competent authority of EQPB.
6. Notes	Reference to other environmental checklists	(a) If necessary, the applicable check items in the checklist for roads shall also be added for evaluation.	(a)N/A	(a) There are no additional relevant checks to be made.
	Notes on the use of environmental checklists	(a) If necessary, also identify the impact on transboundary or global environmental issues (e.g., possible factors related to transboundary disposal of waste, acid rain, ozone depletion, and global warming issues).	(a)N/A	(a) The impact of the Project is limited in terms of geography and duration, and no extensive environmental impact is expected.

Source: JICA Preparatory Survey Team

1-4 Tax Exemption

In order to obtain customs clearance and duty exemption for the materials and equipment to be procured under the Project, the Contractor shall submit an application for customs clearance and duty exemption in advance to the Bureau of Revenue, Customs and Taxation of the Ministry of Finance through the Procurement Officer of PPUC, along with a copy of the bill of lading and other necessary documents. At the same time, a copy of the application must be submitted to the Bureau of International Trade and Technical Assistance of the Ministry of State. This will result in a full duty exemption (3 %) rather than a refund. Note that Palau does not have a value-added tax (VAT) or any other tax system for goods[8].

Attention should be paid to confirming the progress of procedures so that delays in tax exemption measures do not affect the progress of the Project.

[8] The new tax law is scheduled to take effect on January 1, 2023, and the Palau Goods and Services Tax (PGST) and other taxes are scheduled to be introduced. However, the new tax exemption mechanism and other details are still in the development stage, and no clear answers could be obtained during the survey.
Therefore, it is necessary to pay attention to this issue when the Project implemented.

CHAPTER 2 CONTENTS OF THE PROJECT

Chapter 2 Contents of the Project

2-1 Basic Concept of the Project

2-1-1 Upper-Level Goals

The Government of Palau revised the National Long-Term Energy Policy in 2015 and formulated the Palau Energy Roadmap in 2017. In the policy and roadmap, the government has set a goal to increase the share of renewable energy to 45 % of total domestic power generation by 2025, and has expressed this goal as an NDC under the Paris Agreement.

Based on the master plan formulated in the JICA Master Plan, the Capacity Plan formulated by PPUC in 2020 (as well as the Power System Priority Plan 2021-2025 formulated in 2021) states that it is essential to expand the power system to be implemented in parallel with IPP Projects.

2-1-2 Project Overview

The Project aims to improve the reliability and stability of electricity supply and to promote the introduction of renewable energy on the islands of Koror and Babeldaob, thereby contributing to the improvement of the quality of life of residents and the reduction of greenhouse gas emissions.

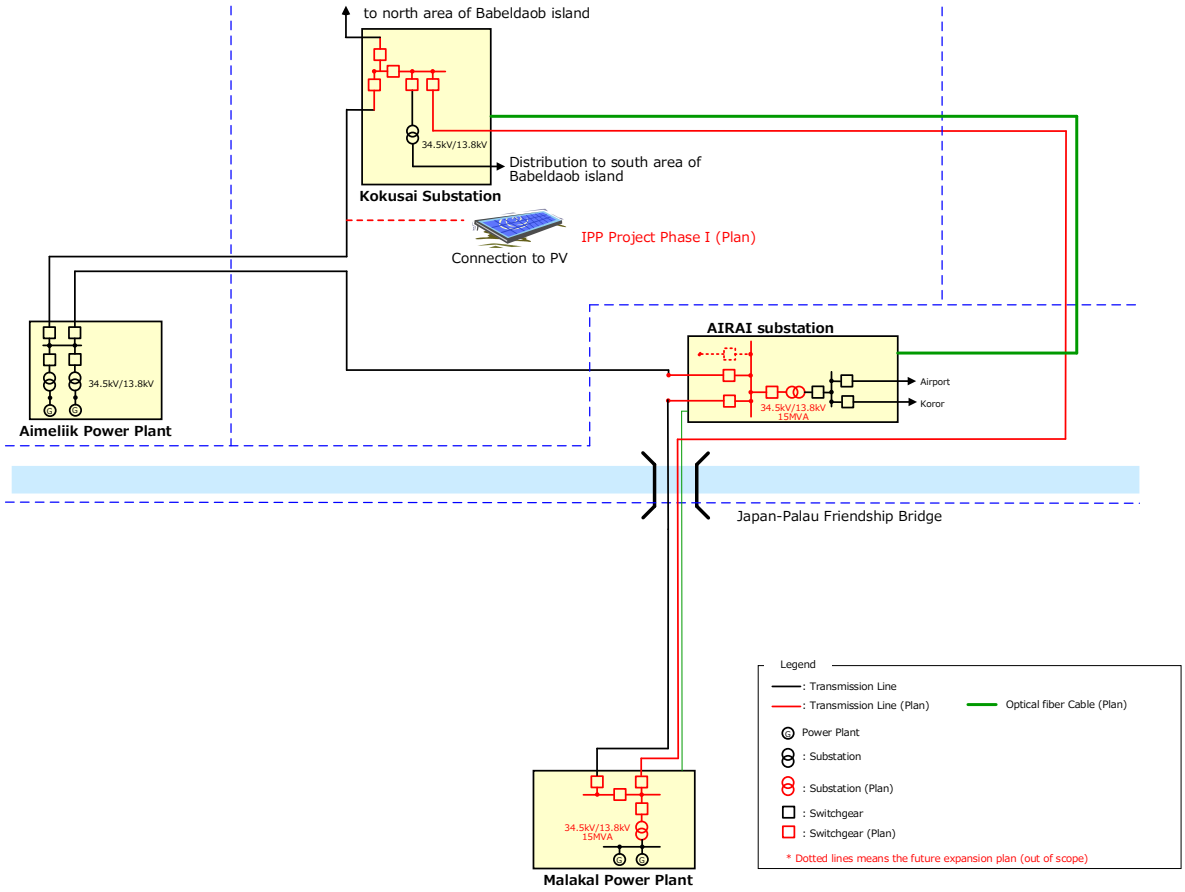
The outline of the basic plan of the Project based on the design policy described above is shown in Table 2-1-2.1 and Figure 2-1-2.1.

Table 2-1-2.1 Project Summary

Main components	Quantity
Procurement and Installation	
1. Construction of 34.5 kV transmission line (Malakal – Kokusai line)	
(a) 34.5 kV overhead line	About 32.0 km
(b) 34.5 kV underground cable	About 3.0 km
(c) 34.5 kV transmission line (JP Bridge)	About 0.3 km
(d) 34.5 kV underground cables (to the transmission line outlets of Malakal, Airai and Kokusai Substations)	1
2. Construction of 13.8 kV distribution line (up to the existing connection point)	
(a) 13.8 kV overhead line and underground cable (up to the distribution line outlets of Malakal Power Plant)	1
3. Expansion of Malakal Power Plant	
(a) 15 MVA 34.5/13.8 kV transformer	1 unit
(b) 34.5 kV switchgear (indoor)	4 lots
4. Renewal of Airai Substation	
(a) 15 MVA 34.5/13.8 kV transformer	1 unit
(b) 34.5 kV switchgear (indoor)	3 lots
5. Expansion of Kokusai Substation	
(a) 34.5 kV switchgear (indoor)	5 lots
Supply	
1. Maintenance tools for procured materials and equipment	1
2. Replacement parts and consumables for procured materials and equipment	1

Main components	Quantity
Construction	
1. New substation building	3 buildings
2. Civil engineering work	1

Source: JICA Preparatory Survey Team



Source：JICA Preparatory Survey Team

Figure 2-1-2.1 Key Components of the Project

2-2 Outline Design of the Japanese Assistance

2-2-1 Design Policy

2-2-1-1 Basic Policy

The Project is part of the implementation of the "Palau Energy Roadmap" formulated by the Government of Palau and the "Power System Prioritization Plan 2021-2025" of PPUC, and also aims to improve the reliability and stability of power supply on the two islands by upgrading the transmission and transformation facilities on Koror and Babeldaob.

In addition, it should be noted that the Project is an urgent grant aid project, and the target years for project evaluation and facility planning should be carefully set in the "Target Years for the Project" section below, in order to avoid a situation where the increasing demand for electricity exceeds the

capacity of the facility after it is put into service, and the facility needs to be replaced before it reaches the end of its service life.

At the same time, in consideration of the fact that the development plan is to be carried out in an area where socioeconomic activities are active, the policy is to ensure that environmental and social considerations are taken into account at the planning stage.

2-2-1-2 Policy on Natural Conditions

(1) Temperature and Humidity

Palau has a tropical oceanic climate, with average temperatures ranging from 27.4°C to 28.0°C, with no major fluctuations throughout the year. The average humidity is high, ranging from 85 % to 90%, and like the temperature, does not fluctuate greatly throughout the year. The substation and transmission equipment to be used in the Project should take into account the above temperature and humidity, and should be designed so that the equipment can operate normally and not affected by the temporary rise in temperature and high humidity caused by the outside air temperature and direct sunlight. Since the switchgear is installed inside the building, there is no need to take any special measures against the outdoor temperature of the planned site, but the temperature of the room design shall be set at 40°C and the outside temperature at 31°C to ensure that the equipment functions properly.

(2) Rainfall and Lightning

Rainfall in Palau is extremely heavy, with an annual precipitation of about 3,800 mm. There is a rainy season (May–October) and a dry season (November–April), with short, heavy rains. During the rainy season, it often rains for several hours to half a day. Typhoons occur all year round, but due to its proximity to the source, large typhoons are very rare. However, since Typhoon Surigae occurred in April 2021, it is necessary to consider rainwater countermeasures for the foundations and buildings of substation facilities, such as raising them 10 to 30 cm above the ground level and installing gutters. In addition, safety considerations for rainfall during the construction period and process planning should be taken into account in the planning. Although no records of lightning strikes were found, lightning rods, etc. will be appropriately planned in accordance with the applicable laws and regulations in Palau.

(3) Seismic Conditions

Although the occurrence of earthquakes is extremely rare in Palau, a horizontal seismic intensity of 0.1 G, which is commonly used in Japan, is adopted as a design condition for equipment in consideration of damage.

(4) Topographical and Geological Conditions

The soil investigation confirmed that Malakal, and Airai substations have sufficient bearing capacity for the construction of the new switchgear building, and the design bearing capacity based

on the results of SWS test and plate loading test is shown in Table 2-2-1.1. A direct foundation is adopted as a result. However, ground improvement is considered for Kokusai Substation because a soft layer was confirmed at 2–3 meters below the ground surface in the SWS test.

Table 2-2-1.1 Soil Investigations Results

	Construction Site	Extreme Bearing Capacity		Design Bearing Capacity	
		kN/m^2	t/m^2	kN/m^2	t/m^2
(1)	Malakal	168	17.1	56	5.7
(2)	Airai	168	17.1	56	5.7
(3)	Kokusai	168	17.1	56	5.7

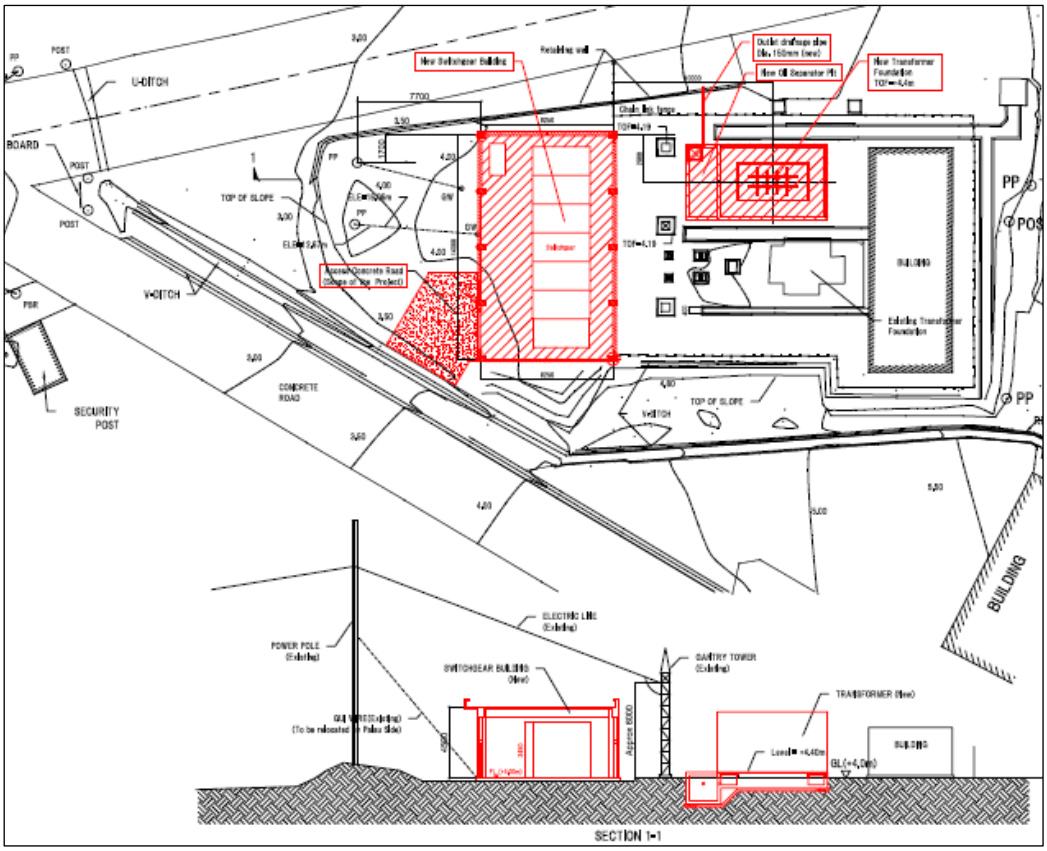
Source: JICA Preparatory Survey Team

1) Topography and Geology of the Site for Malakal Power Plant

As shown in Figure 2-2-1.1, the switchgear building will be constructed in the existing Malakal Power Plant. The construction site is located about 150 m from the coastline, with a site area of about 600 m^2 and a maximum width of about 25 m. The land is generally flat with some undulations. The geology is good and the site is suitable for the construction of the switchgear building (single-story concrete structure).

Panoramic view of the existing Malakal Power Plant and the construction site	Image of the construction of the switchgear building

Figure 2-2-1.1 Layout Plan of Malakal Power Plant Switchgear Building

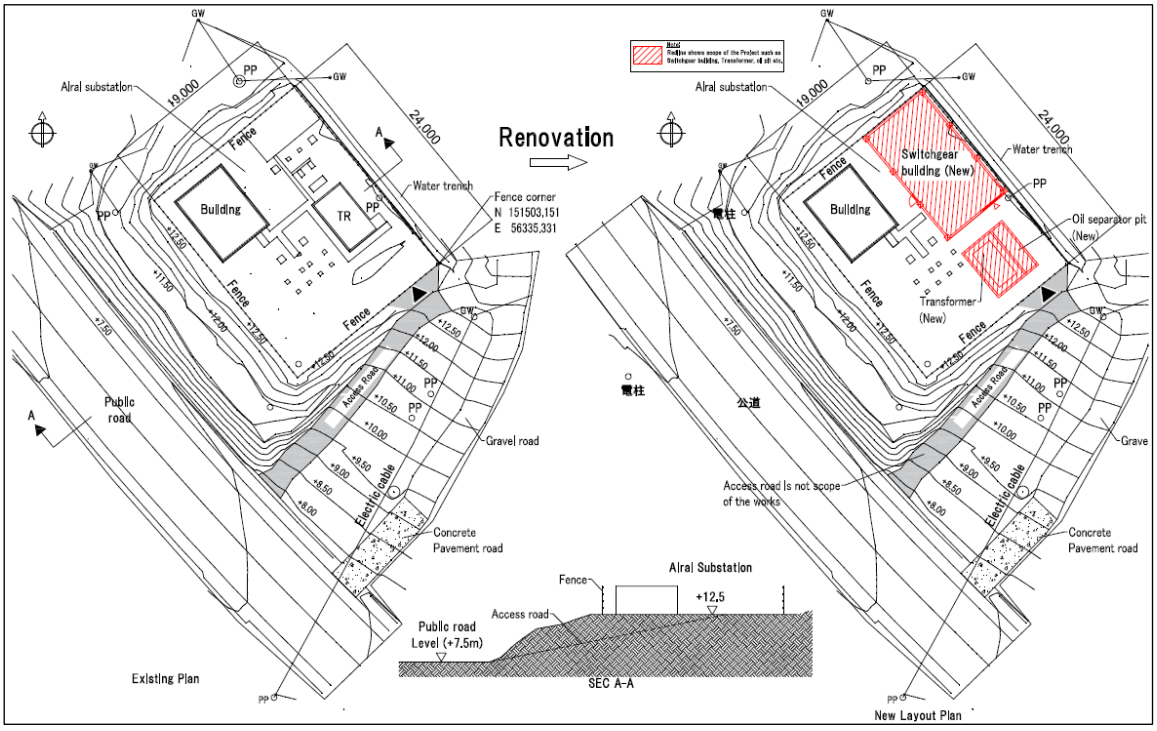


Source: JICA Preparatory Survey Team

Figure 2-2-1.2 Layout Plan for Malakal Power Plant

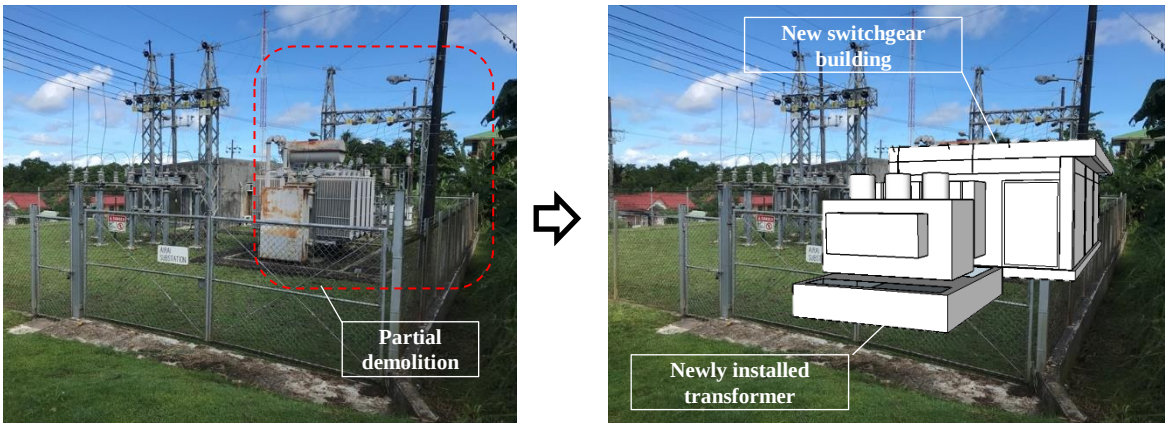
2) Topography and Geology of the Site for Airai Substation

Airai Substation is an existing substation located on a small plot of land with an area of approximately 456.0 m^2 (19.0 m x 24.0 m). The site is located near a public road, but the height difference between the public road and the site is about 5.0 m, and the access road has a steep slope, making it difficult to bring in equipment and construction materials such as fresh concrete. The plan is to demolish the transformers and 34.5 kV switchgear of the existing substation, construct a new switchgear building and transformer foundation, and install new switchgear and new transformer. The ground, which used to be a site for a privately owned reinforced concrete building before the substation was constructed, is sufficiently strong to support the new building and transformer foundations. Figure 2-2-1.3 shows the layout plan, and Figure 2-2-1.4 shows the current status and construction image.



Source: JICA Preparatory Survey Team

Figure 2-2-1.3 Layout Plan for Airai Substation



Existing substation status　　Construction image

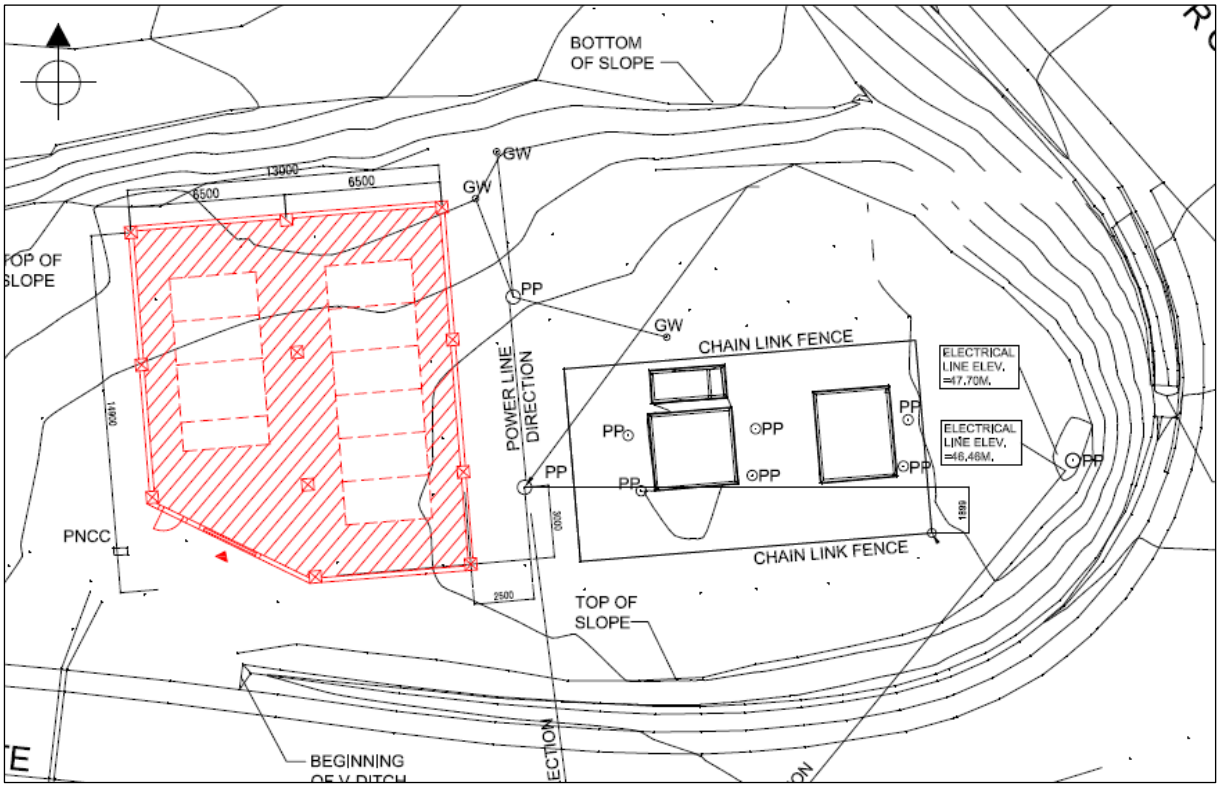
Source: JICA Preparatory Survey Team

Figure 2-2-1.4 Airai Substation Current Status and Construction Image

3) Topography and Geology of the Site for Kokusai Substation

The Kokusai Substation will be constructed adjacent to the existing substation constructed in 1995 with the assistance of Japan's Grant Aid, which is located at an altitude of about 37.0 m above sea level, and the site area is about 420 m^2. The access is good since it is surrounded by roads on the east and south sides. However, since there are poles and telephone line buried in the site, the usable area of the flat part of the site is limited and some land development work is required. Figure 2-2-1.5 and Figure 2-2-1.6 show the layout plan and current status. The SWS test and plate loading test show that the soil is clayey 1.0 to 2.0 m below the ground surface, and there is a soft layer

below that. The ground is considered to be in a good condition.



Source: JICA Preparatory Survey Team

Figure 2-2-1.5 Layout Plan for Kokusai Substation

Panoramic view of the existing Kokusai substation and the construction site

Construction image of the switchgear building

Source: JICA Preparatory Survey Team

Figure 2-2-1.6 Current Status and Construction Image of Kokusai Substation

2-2-1-3 Policy on Socioeconomic Conditions

For the transmission line installation work of the Project, a power outage is required to install equipment and materials at Kokusai, Airai, and Malakal Power Plant, and to connect the 34.5 kV transmission line and 13.8 kV distribution line with the existing transmission and distribution line. Therefore, it is necessary to properly plan the power outage to minimize the impact of the power distribution facilities on the consumers and to shorten the power outage duration. During construction, consideration should be given to avoid disturbing the surrounding residents and traffic as much as possible, as well as to avoid disturbing the existing structures and underground utilities. In the design of the transmission line, consideration should be given to maintaining a safety clearance from nearby houses and stores along the road boundary. In cases where existing trees are considered to be an obstacle to the installation of power line, underground installation should be considered. For the section of the route, PPUC will provide sufficient explanation of the plan to the landowners and local residents in advance. Furthermore, during the excavation work for the construction of the substation and transmission line, care should be taken not to disturb the existing infrastructure facilities such as telephone, water, and sewage line. In the construction of overhead line, it is necessary to ensure a safety clearance from existing power distribution line, telephone line, roads, etc., in accordance with the laws and regulations applicable in Palau, and to design and construct the line in a way that avoids interference with existing infrastructure

facilities.

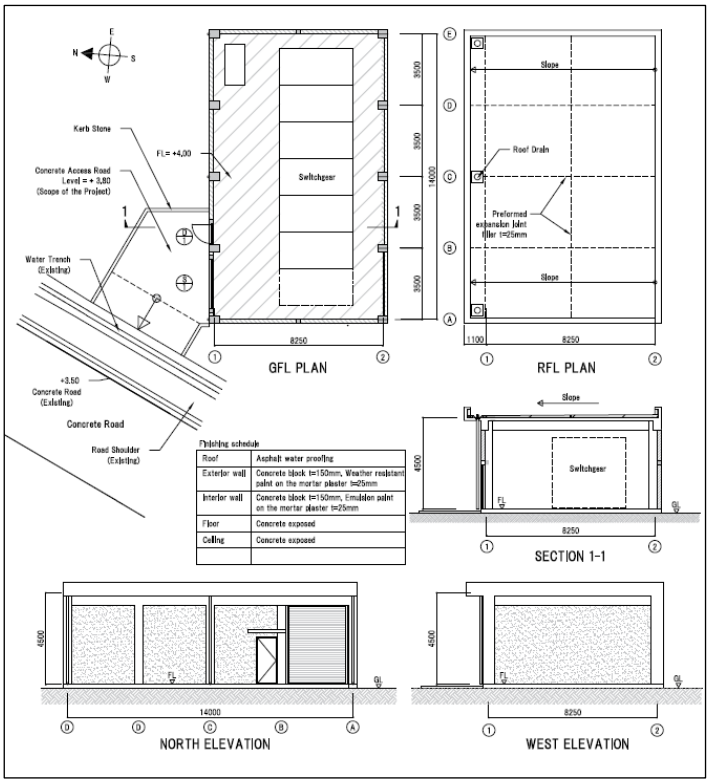
2-2-1-4 Policy on Construction Procurement Conditions

(1) Basic Plan for Switchgear Building at Each Substation

Since Palau is an island country, it is necessary to protect the switchgear building from salt damage and wind and rain damage, and to plan for a long-term operation. Therefore, one switchgear building will be planned for each substation constructed, renewed, and expanded. The scale of the building will be planned in an appropriate area in consideration of the quantity and dimensions of the switchgear building to be installed (besides maintenance space, ease of loading and unloading, future plans, etc.). All substations will be built inside the existing power plant / substation, so the layout plan will be made in consideration of the position and height of the overhead line in the sky, the position of the utility pole, and the position of the columns / guy wire. For the purpose of protecting the building itself from salt damage and wind and rain damage, the dimensions of the columns and beams are planned so that the cover thickness of the reinforcing bars can be secured slightly larger as a reinforced concrete structure. Since the building does not include toilets or offices, water supply and drainage equipment will not be considered, but air conditioners and lighting equipment will be installed for the purpose of keeping the switchgear building in an appropriate state. Also, paint that is resistant to salt damage as the building finishing material will be selected. Considering the results of the soil investigation, a direct foundation was adopted.

(2) Switchgear Building at Malakal Power Plant

The switchgear building to be constructed in Malakal Power Plant will be a single-story reinforced concrete structure measuring 8.25 m x 14.0 m, taking into account the dimensions of the switchgear to be stored and the maintenance space around it. Since the site is geographically limited, shutter doors will be used instead of swinging doors for loading and unloading, and an access road shorter than the existing power plant road will be provided. The facilities include only air conditioning and lighting, and no water supply and drainage.

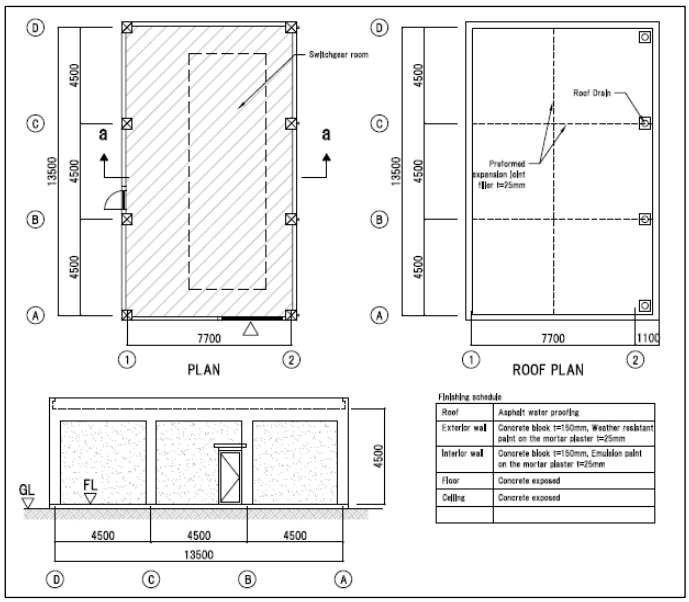


Source: JICA Preparatory Survey Team

Figure 2-2-1.7 Layout Plan and Cross Section of Malakal Power Plant

(3) Switchgear Building at Airai Substation

The switchgear building of the Arai Substation will be constructed on a vacant lot created by the demolition and renovation of a part of the existing substation. Considering the dimensions of the switchgear to be housed and the maintenance space around it, the building will be a single-story reinforced concrete structure measuring 7.7 m x 13.5 m as shown in the figure below. The building will be equipped with air conditioning and lighting systems only, and no water supply or drainage system.

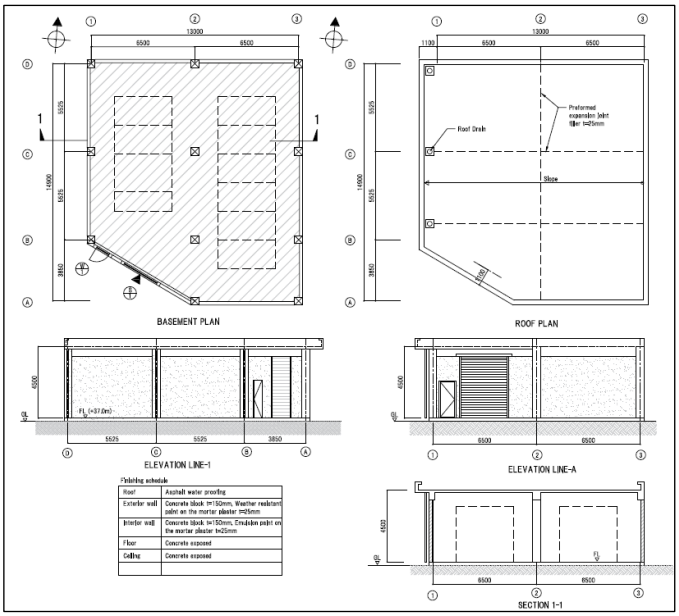


Source: JICA Preparatory Survey Team

Figure 2-2-1.8 Switchgear building at Airai Substation

(4) Switchgear Building of Kokusai Substation

The switchgear building of Kokusai Substation will be constructed adjacent to the existing substation. Considering the dimensions of the switchgear to be stored and the maintenance space around it, the building will be a single-story reinforced concrete structure measuring 13.0 m x 14.9 m as shown in Figure 2-2-1.9. This building also has only air-conditioning and lighting equipment. There is no water supply or drainage system. The site area is limited and there are telephone line buried at the site. Therefore, the construction location and plan need to be carefully implemented. In addition, it is necessary to consider the height of the foundation and plan the construction location so that there is no difference in elevation at the entrance.



Source: JICA Preparatory Survey Team

Figure 2-2-1.9 Switchgear Building at Kokusai Substation

2-2-1-5 Policy on the Use of Local Contractors and Equipment

(1) Local Contractors

Palau's main industries, including construction, tourism and commerce, are heavily dependent on assistance from Japan, the United States, Taiwan and other countries, and foreign engineers from the Philippines, Guam and other countries for design engineers and electrical and equipment engineers. Particularly in construction work, there are many cases where clients offer conditions to use foreign engineers. For this reason, it is difficult to hire engineers with a required level of technical skills locally. For the installation of power equipment and construction of facilities in this project, the policy is to use local construction companies in terms of using materials and equipment for construction and providing labor, but it is necessary to dispatch Japanese engineers for quality control, schedule control, and safety control.

There are about 30 local construction companies, but only two of them are major general construction companies, and the rest are many small construction companies. The general construction companies have a large number of regular workers and construction materials and equipment (construction vehicles and equipment), which can be procured. The switchgear building planned for each of the planned construction sites is a single-story reinforced concrete structure, and there are no special work requirements; therefore, it is possible to hire local workers to carry out the facility construction work.

(2) Local Materials and Equipment

Aggregates and asphalt pavement materials can be procured locally, and cement, reinforcing steel, and steel frame materials are imported from neighboring countries such as the Philippines and Guam, and are prevalent locally as general-purpose imports. In addition, wall, ceiling, and plumbing materials for general buildings, as well as electrical cables, lighting fixtures, and equipment can be procured locally as general-purpose imports. The local construction companies have their own ready-mixed concrete production facilities, which can produce up to 400 m^3 of ready-mixed concrete per day and ensure a strength of about 30 N/mm^2 in 28 days. These materials and equipment required for construction work can be procured locally, although quality and delivery control is necessary. Therefore, in formulating the construction plan, materials that can be procured locally will be used as much as possible, taking into consideration the development of local industries. On the other hand, the substation equipment and transmission equipment required for the Project are not manufactured in Palau, but are imported, so it is necessary to consider procuring such equipment from Japan or third countries.

2-2-1-6 Policy on Operation and Maintenance and Management Capability of Implementing Agencies

PPUC, which will be in charge of operation and maintenance after the implementation of the Project, has been stably operating and maintaining the power system throughout Palau and has a certain level of technology in the operation of power facilities.

2-2-1-7 Policy for Setting the Scope and Grade of Facilities and Equipment

Since PPUC does not have design standards, the Team conducted a survey on the applicable standards during the schematic design study. The existing facilities consist of substation equipment constructed with support from the U.S. and Japan, as well as equipment upgraded by PPUC, and it was said that it would be sufficient to follow the latest standards in consideration of coordination with these facilities. Therefore, the design should be based on the ANSI, IEC, and JEC standards and the specifications of the existing equipment.

2-2-1-8 Policy on Construction Method/Procurement Method and Construction Period

Since the Project will be implemented based on the Japan's Grant Aid scheme, it is necessary to complete the installation within the deadline. In addition, in order to complete the Project within the specified construction period and to achieve the expected effects of the construction of the substation, it is necessary to develop a process plan that takes into consideration the coordination of the construction process on the Japanese side and the Palauan side, as well as the inland transportation route, transportation method, period, and various procedures.

In the Project, new, renewal and expansion of 34.5/13.8 kV substations and construction of 34.5 kV transmission line (overhead line and underground cables) will be carried out simultaneously. Therefore, it is necessary to establish a construction management system to ensure that the work proceeds safely and promptly.

2-2-2 Basic Plan

2-2-2-1 Pre-Condition of the Project

(1) Purpose of the Power Demand Forecast in this Feasibility Study

The main components of the Project are the reinforcement of existing Airai substation and existing Malakal substation (34.5/13.8kV, 10MVA×1unit) and the 34.5kV transmission line (Malakal – Kokusai line) to reinforce the transmission and substation facilities in PPUC’s main power system of Koror – Babeldaob grid (KB Grid).

The purpose of the power demand forecast on the Project is to identify the project prerequisites by forecasting power demand in the KB Grid. It will act as base data to verify the validity and effectiveness of the Project in light of the transmission and substation network planning, including power flow analysis and evaluation on how well the Project coordinates with other development projects.

(2) Target Years for the Project

The Project is developed for the upper level transmission and substation facilities in the KB Grid. Therefore, there is a concern that the operation of the lower level power facilities (stable power supply) may be impacted if the Project is not implemented in terms of the medium to long-term

network planning.

The target year for facility planning will be ten years after service starts. The Project must avoid equipment replacement before the facilities reach its service life once commissioned, and the ten-year figure is consistent with recent projects for enhancing upper level system power distribution in the KB Grid, as well as other similar grant aid projects. Meanwhile, as the Project is a grant aid project of urgent need, the target year for evaluating the Project and its benefits will be three years after service starts:

Start of service year：2024 (assumed)

Target year for project evaluation: 2027 (3 years after service)

Target year for facility plan: 2034 (10 years after service)

2-2-2-2 Power Flow Analysis

(1) Previous Power Demand Forecast

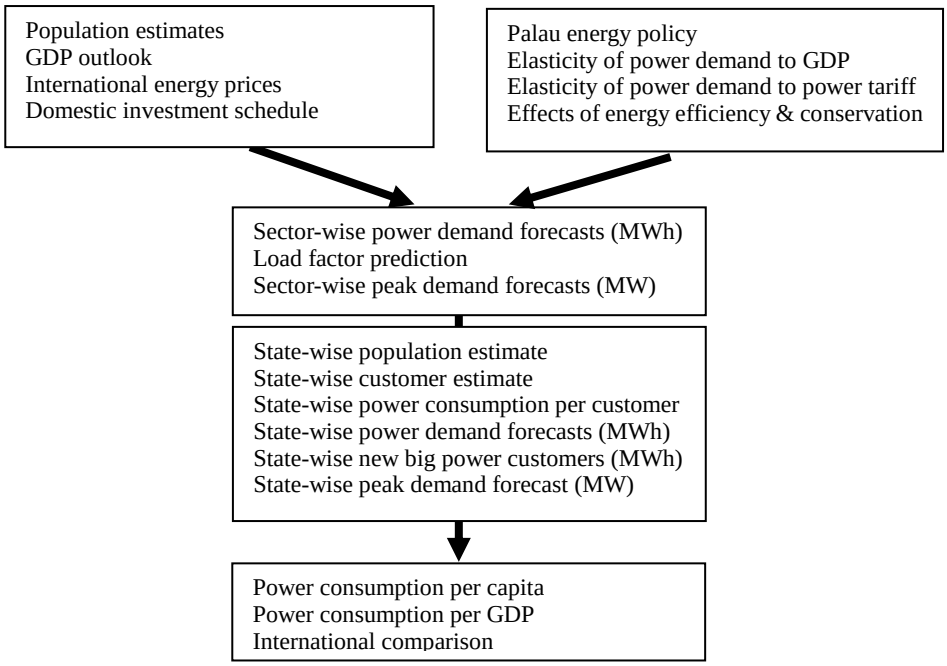
The power demand forecast for the KB Grid was developed in "The Project for Upgrading and Maintenance of National Power Grid in the Republic of Palau" (hereinafter referred to as the "JICA MP 2019") conducted by JICA in 2019, and has been agreed upon by Palau.

The following is an overview of the power demand forecast made in the previous project (JICA MP 2019), followed by an explanation of the results of the power demand forecast for the KB Grid in the Project.

1) Methodology for power demand forecast under previous project (JICA Master Plan project)

a) Power Demand Forecasting Methods

First, the sector-wise power demand is forecasted, and the then the peak demand and power generation are calculated. In addition, the state-wise power demand is forecasted and used for the power system analysis of the Project. This power demand forecasting flow is shown in Figure 2-2-2.1.



Source: JICA Preparatory Survey Team

Figure 2-2-2.1 Power Demand Forecasting Flow

The power demand forecasting model is built based on the power demand forecasting flow described in Figure 2-2-2.1.

b) Power Demand Forecasting Equation

The power consumer sector to be estimated consists of the commercial sector, public sector, residential sector, and power losses. The power demand to be covered by PPUC is calculated by summing up the above power demand per sector.

The forecasting procedures are as follows:

- The elasticities of power demand per sector to GDP are estimated using past data.
- The long-term elasticities are calculated using data from 2000 to 2016.
- The short-term elasticities are calculated using data from 2010 to 2016.
- The elasticities for power demand forecasting equations are decided after analyzing the above two elasticities.

The forecasting equation formulas are as follows:

・Commercial and Public sectors

Ln (power demand in commercial and public sectors) = a*Ln (GDP in commercial and public sectors) - b*Ln (tariff in commercial and public sectors) + c

・Residential sector

Ln (power demand in residential sector) = a*Ln (income per capita) - b*Ln (tariff in residential

sector) + c

In the above equations, "Ln" is the natural logarithm, "a" is the GDP elasticity, and "b" is the tariff elasticity.

The power demand for the commercial, public and residential sectors is forecasted by using the above elasticities and the equations are shown below.

Power demand forecasting equations for the commercial and public sector:

Yt = Yt-1*(1+a*Sectoral GDP growth rate)*(1-b*Tariff growth rate)*(1-EE&C rate/100)

Y_t : Sectoral power demand (MWh in t years)

a : Sectoral elasticity to GDP

b : Elasticity to tariff

Energy efficiency & conservation rate (EE&C rate) is the effects of EE&C activities, which are defined by "Power energy savings / Power energy demand".

Power demand forecasting equations for the residential sector:

Yt = Y t-1*(1+a*Income per capita growth rate)*(1-b*Tariff growth rate)*(1-EE&C rate/100)

Y_t : Sectoral power demand (MWh in t years)

a : Elasticity to income per capita

b : Elasticity to tariff

Energy efficiency & conservation rate (EE&C rate) is the effects of EE&C activities, which are defined by "Power energy savings / Power energy demand".

Table 2-2-2.1 and Table 2-2-2.2 show the peak demand forecast and its ratio by state, respectively. As shown in Table 2-2-2.2, Koror state, a densely populated area in Palau, has the highest peak demand, and accounts for approximately 66% of the total peak demand. Other states have less than 5% of the total peak demand, except for Airai state.

Table 2-2-2.1 Peak Demand Forecast by State (in JICA MP 2019)

Unit：kW

	2016	2017	2018	2019	2020	2021	2022	2023	2024
Aimeliik	453	459	470	481	492	505	514	524	533
Airai	2,535	2,587	2,680	2,776	2,909	3,071	3,209	3,351	3,496
Koror	7,985	8,127	8,445	8,775	9,396	9,807	10,176	10,554	10,941
Melekeok	438	445	459	472	487	503	515	668	712
Ngaraard	88	89	93	96	100	104	106	143	157
Ngardmau	37	38	39	40	41	43	44	45	46
Ngaremlengui	100	102	105	108	111	114	116	119	121
Ngatpang	61	62	64	65	67	69	70	72	73
Ngchesar	46	46	48	49	50	52	53	54	55
Ngarchelong	79	80	82	84	87	89	91	104	117
Ngiwal	49	50	52	53	54	56	57	58	60
Total	11,870	12,090	12,530	13,000	13,790	14,410	14,950	15,690	16,310

	2025	2026	2027	2028	2029	2030	2031	2032	2035
Aimeliik	543	551	559	568	570	573	576	578	586
Airiai	3,656	3,745	3,844	3,937	3,997	4,058	4,120	4,182	4,367
Koror	11,395	11,650	11,911	12,178	12,327	12,477	12,628	12,782	13,254
Melekeok	792	841	927	1,031	1,054	1,078	1,090	1,103	1,141
Ngaraard	356	373	427	445	496	510	511	513	519
Ngardmau	47	48	49	50	50	51	52	52	54
Ngaremlengui	124	126	128	131	132	133	134	135	139
Ngatpang	74	76	77	78	79	80	80	81	83
Ngchesar	56	57	58	60	60	61	61	62	64
Ngarchelong	131	145	159	173	186	198	211	224	226
Ngiwal	61	62	63	64	65	65	66	66	68
Total	17,240	17,670	18,200	18,710	19,020	19,280	19,529	19,778	20,501

Source: Palau Transmission and Distribution System Improvement and Maintenance Enhancement Planning Project

Table 2-2-2.2 Peak Demand Ratio by State (in JICA MP 2019)

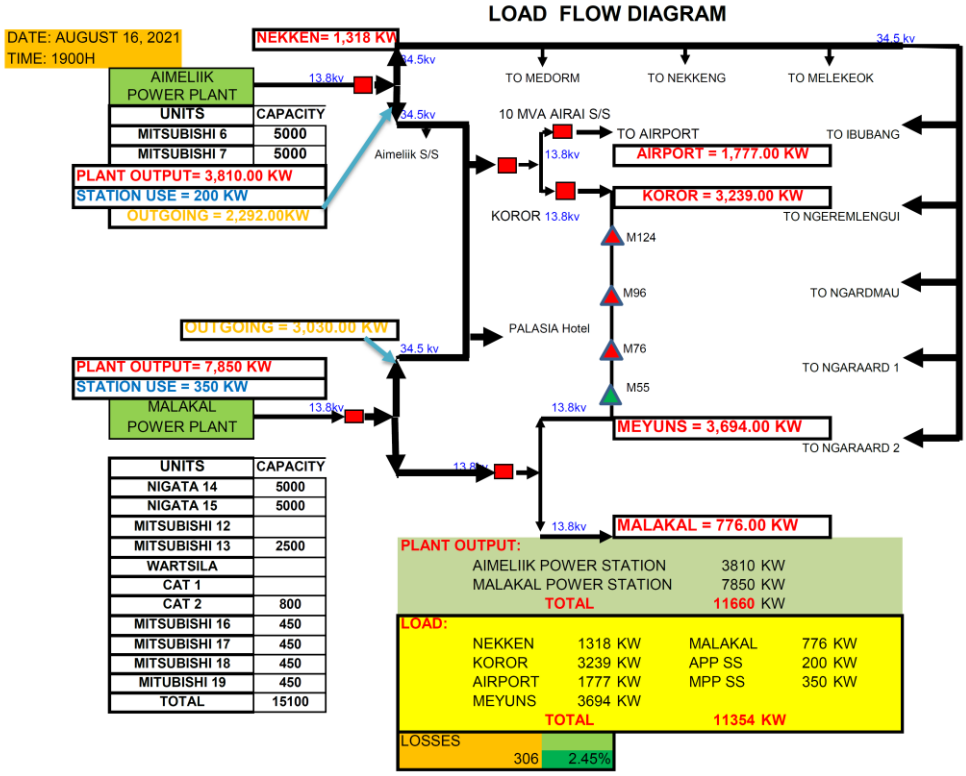
Unit：%

	2016	2017	2018	2019	2020	2025	2030	2035
Aimeliik	3.8	3.8	3.7	3.7	3.6	3.2	3.0	2.9
Airai	21.4	21.4	21.4	21.4	21.1	21.2	21.0	21.3
Koror	67.3	67.2	67.4	67.5	68.1	66.1	64.7	64.7
Melekeok	3.7	3.7	3.7	3.6	3.5	4.6	5.6	5.6
Ngaraard	0.7	0.7	0.7	0.7	0.7	2.1	2.6	2.5
Ngardmau	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Ngaremlengui	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7
Ngatpang	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.4
Ngchesar	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3
Ngarchelong	0.7	0.7	0.7	0.6	0.6	0.8	1.0	1.1
Ngiwal	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3
Koror+Babeldaob	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Palau Transmission and Distribution System Improvement and Maintenance Enhancement Planning Project

2) Peak Demand Performance

Figure 2-2-2.2 shows the latest actual power flow observed during the 1st field survey (August 2021). The peak demand was 11.354 MW, and the power generation was 11.660 MW, consisting of 3.810 MW at Aimeliik Power Plant and 7.850 MW at Malakal Power Plant. The power loss in transmission line was 0.306 MW, which was 2.62 %.



Source：PPUC

Figure 2-2-2.2 Actual Peak Power Flow (August 2021)

3) New Large-Scale Power Demand

The new large-scale power demand is expected in Koror, Airai, Melekeok, Ngaraard, and Ngarchelong, which is the same as that of JICA MP 2019. In addition, a large commercial facility (approx. 1.0 MW) is scheduled to be completed by the end of 2021 in Airai, which is newly identified as the large-scale power demand in the 1st field survey.

When the new large-scale power demand is defined as the Base case, the new large-scale power demand in the High case and the Low case is defined as double that in the Base case and zero new demand, respectively. The table below shows the peak demand of the new large-scale power demand for each case.

Table 2-2-2.3 List of New Large-Scale Power Demands for Each Case (at Peak Demand)

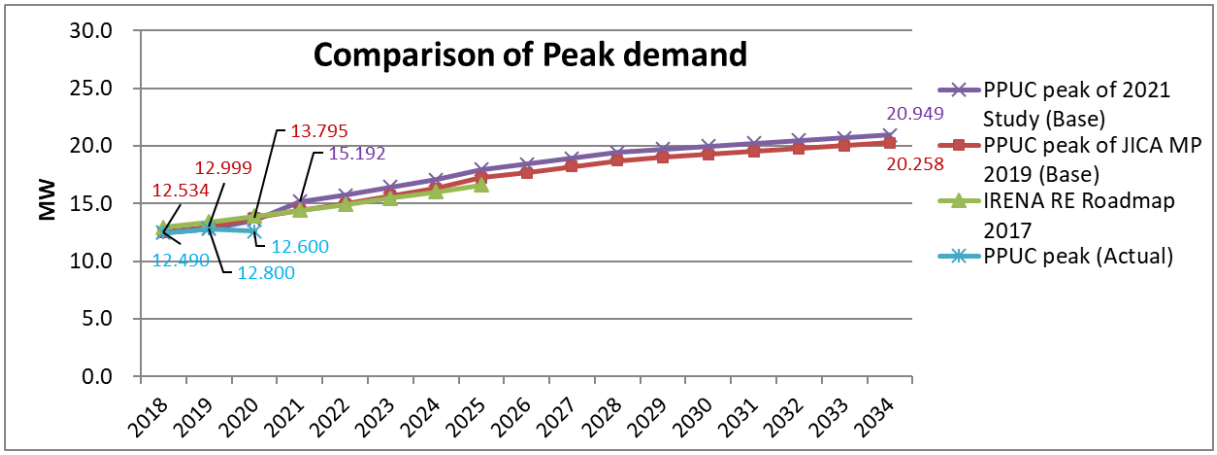
Unit: MW

Case		2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
High	Current	0.000	0.546	2.742	3.036	3.655	4.040	4.919	5.026	5.270	5.467	5.614	5.699	5.744	5.790	5.816	5.836
Base	Current	0.000	0.273	1.371	1.518	1.828	2.020	2.460	2.513	2.635	2.734	2.807	2.849	2.872	2.895	2.908	2.918
	Previous (MP)	*0.000*	*0.273*	*0.371*	*0.518*	*0.828*	*1.020*	*1.460*	*1.513*	*1.635*	*1.734*	*1.807*	*1.849*	*1.872*	*1.895*	*1.908*	*1.918*
Low	Current	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Source: JICA Preparatory Survey Team

4) Power Demand Forecast in the KB Grid

As mentioned above, the power demand forecast of the Project was developed based on the result of the 1st field survey with PPUC and the power demand forecast of the previous project (JICA MP 2019). Figure 2-2-2.3 shows the comparison of the peak demand forecast of the Project with the actual peak demand, the estimate of the "JICA MP 2019" and the estimate of the "Palau Energy Roadmap 2017" by IRENA. As shown in Figure 2-2-2.3, the actual peak demand in 2020 and 2021 were somewhat lower than the forecasted peak demand of JICA MP 2019, a decline which might be attributed to the Covid-19 pandemic. Therefore, the power demand forecast of the Project is developed based on the result of the comparison of the peak demand of JICA MP 2019 and the actual peak demand in 2019, and not only based on the result of the 1st field survey. The annual growth rate of peak demand (MW) from 2019 to 2034 is 3.3%.



Source: JICA Preparatory Survey Team

Figure 2-2-2.3 Comparison of Actual Demand and Forecast Power Demand

5) Case Study

As described in "3) New large-scale power demand" above, this study is basically be done same as the JICA MP 2019. However, for the Low case, the drop in power demand due to the impact of Covid-19 (approx. 9%) is reflected.

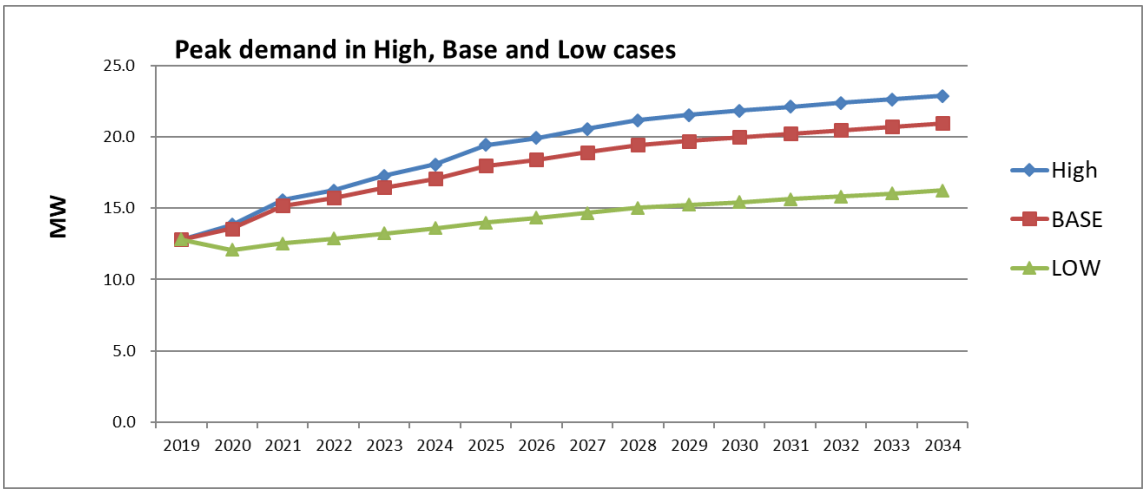
Based on these assumptions, the total peak demand in each case can be calculated as shown in Table 2-2-2.4 and Figure 2-2-2.4 below.

Table 2-2-2.4 Peak Demand in Each Case

Unit: MW

Case	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
High	12.8	13.9	15.6	16.2	17.3	18.1	19.4	19.9	20.6	21.2	21.5	21.8	22.1	22.4	22.6	22.9
Base	12.8	13.6	15.2	15.7	16.5	17.1	18.0	18.4	18.9	19.4	19.7	20.0	20.2	20.5	20.7	20.9
Low	12.8	12.1	12.5	12.9	13.2	13.6	14.0	14.3	14.7	15.0	15.2	15.4	15.6	15.8	16.0	16.2

Source: JICA Preparatory Survey Team



Source: JICA Preparatory Survey Team

Figure 2-2-2.4 Peak Demand for High Base Low Cases

6) State-Wise Power Demand Forecast

Based on the peak demand in the Base case above, the result of the peak demand forecast per state in the KB Grid is shown in Table 2-2-2.5. As shown in Table 2-2-2.5, Koror state, a densely populated area in Palau, has the highest peak demand, and accounts for approximately 60% of the total peak demand. Other states have less than 5% of the total peak demand, except for Airai state.

Table 2-2-2.5 Peak Demand Forecast by State

Unit: MW

State	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Aimeliik	0.474	0.484	0.497	0.506	0.516	0.525	0.535	0.543	0.550	0.559	0.561	0.564	0.567	0.569	0.572	0.575
	4%	4%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Airiai	2.734	2.864	4.524	4.660	4.800	4.943	5.100	5.188	5.285	5.377	5.436	5.496	5.557	5.618	5.681	5.740
	21.4%	21.1%	29.8%	29.6%	29.2%	29.0%	28.4%	28.2%	27.9%	27.7%	27.6%	27.5%	27.5%	27.4%	27.4%	27.4%
Koror	8.641	9.252	9.157	9.520	9.893	10.274	10.721	10.972	11.229	11.492	11.638	11.786	11.935	12.086	12.240	12.395
	67.5%	68.1%	60.3%	60.6%	60.1%	60.2%	59.7%	59.6%	59.3%	59.1%	59.0%	59.0%	59.0%	59.0%	59.1%	59.2%
Melekeok	0.465	0.480	0.495	0.507	0.658	0.701	0.780	0.828	0.913	1.015	1.038	1.062	1.073	1.086	1.098	1.111
	3.6%	3.5%	3.3%	3.2%	4.0%	4.1%	4.3%	4.5%	4.8%	5.2%	5.3%	5.3%	5.3%	5.3%	5.3%	5.3%
Ngaraard	0.095	0.098	0.102	0.104	0.141	0.155	0.351	0.367	0.420	0.438	0.488	0.502	0.503	0.505	0.507	0.509
	0.7%	0.7%	0.7%	0.7%	0.9%	0.9%	2.0%	2.0%	2.2%	2.3%	2.5%	2.5%	2.5%	2.5%	2.4%	2.4%
Ngardmau	0.039	0.040	0.042	0.043	0.044	0.045	0.046	0.047	0.048	0.049	0.049	0.050	0.051	0.051	0.052	0.052
	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.2%	0.3%	0.3%	0.3%	0.3%	0.2%
Ngaremlengui	0.106	0.109	0.112	0.114	0.117	0.119	0.122	0.124	0.126	0.129	0.130	0.131	0.132	0.133	0.134	0.135
	0.8%	0.8%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.6%	0.6%	0.6%
Ngatpang	0.064	0.066	0.068	0.069	0.071	0.072	0.073	0.075	0.076	0.077	0.078	0.079	0.079	0.080	0.080	0.081
	0.5%	0.5%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%
Ngchesar	0.048	0.049	0.051	0.052	0.053	0.054	0.055	0.056	0.057	0.059	0.059	0.060	0.060	0.061	0.062	0.063
	0.4%	0.4%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%
Ngarchelong	0.083	0.086	0.088	0.090	0.102	0.115	0.129	0.143	0.157	0.170	0.183	0.195	0.208	0.221	0.221	0.222
	0.6%	0.6%	0.6%	0.6%	0.6%	0.7%	0.7%	0.8%	0.8%	0.9%	0.9%	1.0%	1.0%	1.1%	1.1%	1.1%
Ngiwal	0.052	0.053	0.055	0.056	0.057	0.059	0.060	0.061	0.062	0.063	0.064	0.064	0.065	0.065	0.066	0.067
	0.4%	0.4%	0.4%	0.4%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%
Koror+Babeldaob	12.800	13.583	15.192	15.722	16.452	17.061	17.971	18.404	18.924	19.429	19.725	19.989	20.230	20.475	20.713	20.949
	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Source: JICA Preparatory Survey Team

(2) Capacity of Existing Distribution Transformers in the KB Grid

The total capacity of the existing 34.5/13.8 kV distribution transformers in the KB Grid is 51.05 MVA as shown in the table below. There are 12 substations in total in the KB Grid (including substation facilities for local supply). However, if any fault occurs in a transmission line, power outages will occur in all of the sections throughout the faulted line because only three of the substations (Aimeliik Power Plant, Malakal Power Plant, and Airai Substation) are equipped with line circuit breakers.

Table 2-2-2.6 Capacity of Existing 34.5/13.8 kV Distribution Transformer

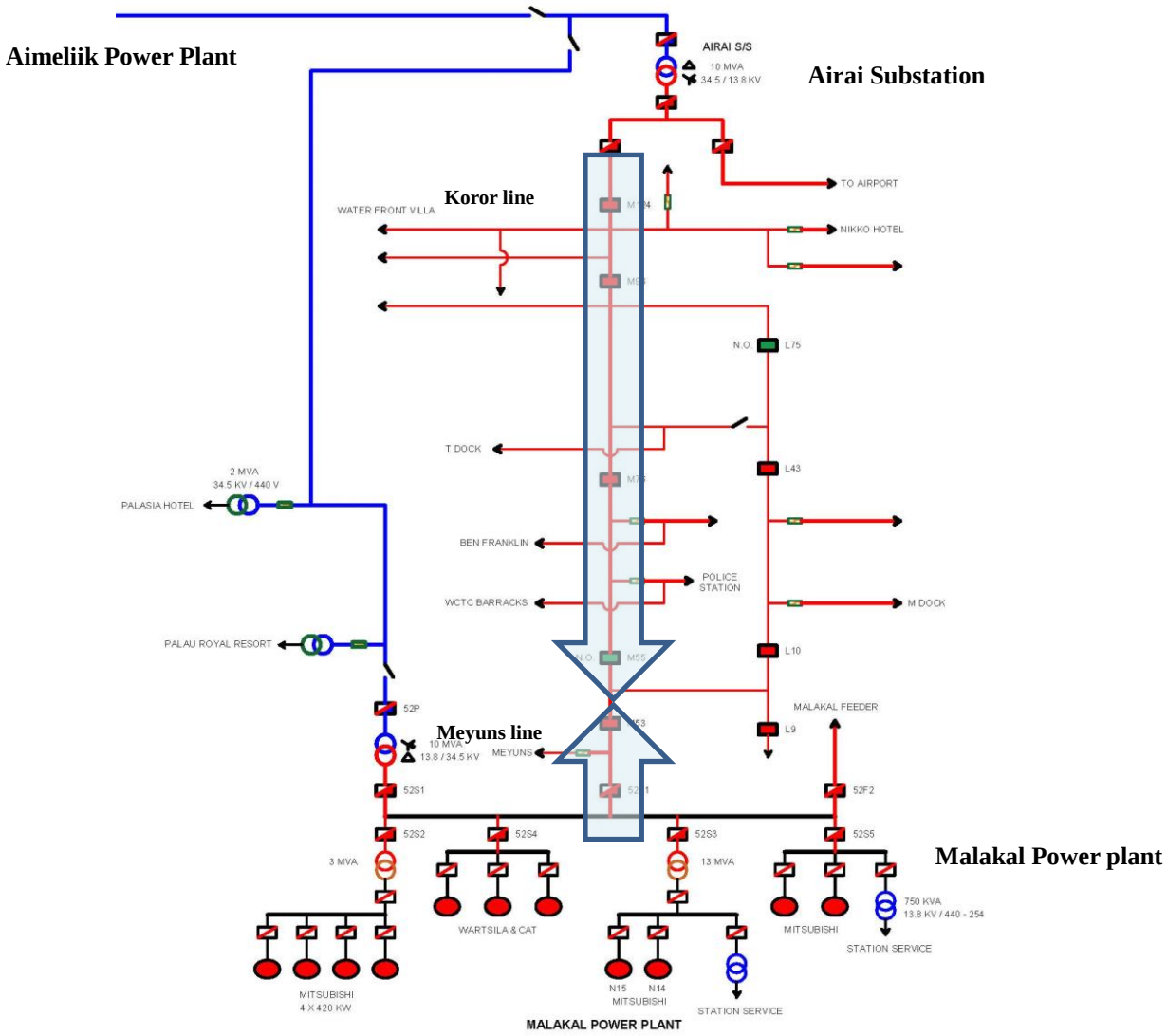
Substation	Transformer capacity (MVA)	Quantity	Total transformer capacity (MVA)
Airai Substation	10	1	10
Kokusai Substation	5	1	5
Malakal Power plant	10	3	10
Aimeliik 2 (Mogami) Substation	0.75	3	2.25
Aimeliik 1 (Medorm) Substation	1.5	1	1.5
Nekken Substation	0.75	3	2.25
Ibobang Substation	0.25	3	0.75
Ngremlengui (Asahi) Substation	0.30	1	0.30
Ngardmau Substation	0.75	3	2.25
Ngaraard 1 Substation	0.25	3	0.75
Ngaraard 2 Substation	2	1	2
Hotel (Palasia Hotel)*	1	1	1
Hotel (Royal Resort)*	1.5	2	3
Total Capacity			51.05

* Private
Source: JICA Preparatory Survey Team

(3) Load Allocation for Each Substation

Each substation load is calculated based on the actual distribution line load of each power plant obtained at the 1st field survey (August 2021) and the power demand forecast of the Project. PPUC installed power meters to measure the power flow of transmission line only at Aimeliik Power Plant, Malakal Power Plant and Airai Substation. Hence, the actual power flow in transmission line and each substation load are assumed by dividing the actual power flow measured at those power plants and Airai Substation by the transformer capacities of the substations connected to each transmission line. Other assumptions are shown below.

- Existing Malakal Power Plant currently has a 34.5 kV transmission line to Airai and two 13.8 kV distribution line feeders to Meyuns and Malakal. However, since the Meyuns feeder is connected with the Koror feeder of Airai substation through the grid-interconnected switch (N.O.) (Refer to the Figure below), the load on those feeders can be shifted by opening and closing section switches on the 13.8 kV distribution network.
- For new large-scale power demand, the completion of a large commercial facility (about 1.0 MW) in Airai state is scheduled by the end of 2021. In addition, a large-scale resettlement from Koror to Airai is planned by the end of 2021, which is expected to transfer about 0.50 MW of power demand.



Source：PPUC

Figure 2-2-2.5 KB Grid in Airai and Koror

Based on the above allocation, Figure 2-2-2.5 shows the result of load allocation to each substation.

Table 2-2-2.7 Transformer Loading Forecast in Each Substation in the KB Grid

Unit: MW

Substation	34.5/13.8 kV Transformer (PF 0.90)	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Airai Substation	**15 MVA (13.5 MW) (2024 -2034)**	**5.312**	**5.413**	**5.617**	**5.828**	**6.178**	**7.803**	**8.069**	**8.342**	**10.071**	**10.604**	**10.902**	**11.215**	**11.528**	**11.710**	**11.894**	**12.080**	**12.269**	**12.461**	**12.650**
(Koror, Airport)	10 MVA (9.0 MW) (2016 -2023)	**59%**	**60%**	**62%**	**65%**	**69%**	**87%**	**90%**	**93%**	**75%**	**79%**	**81%**	**83%**	**85%**	**87%**	**88%**	**89%**	**91%**	**92%**	**94%**
Kokusai Substation	5.0 MVA	0.583	0.592	0.611	0.627	0.646	0.667	0.682	0.837	0.884	0.966	1.018	1.105	1.212	1.236	1.262	1.275	1.289	1.303	0.078
(Kokusai)	(4.5 MW)	12.95%	13.15%	13.59%	13.94%	14.35%	14.83%	15.16%	18.59%	19.64%	21.46%	22.62%	24.56%	26.92%	27.47%	28.04%	28.32%	28.65%	28.96%	1.74%
Ngchesar Substation	5.0 MVA																			1.241
(Melekeok+Ngchesar+Ngiwal)	(4.5 MW)																			27.6%
Malakal Power Station	**15 MVA (13.5 MW) (2024 -2034)**	**4.616**	**4.698**	**4.882**	**5.073**	**5.432**	**5.376**	**5.589**	**5.808**	**4.583**	**4.630**	**4.656**	**4.683**	**4.711**	**4.726**	**4.742**	**4.758**	**4.774**	**4.790**	**4.806**
(Meyuns, Malakal)	10 MVA (9.0 MW) (2016 -2023)	51%	52%	54%	56%	60%	60%	62%	65%	34%	34%	34%	35%	35%	35%	35%	35%	35%	35%	36%
Aimeliik 2 (Mogami) Substation	0.075×3 MVA	0.103	0.104	0.107	0.109	0.112	0.114	0.116	0.119	0.121	0.123	0.125	0.127	0.129	0.129	0.130	0.131	0.131	0.132	0.132
	(0.2 MW)	51.3%	52.0%	53.3%	54.5%	55.8%	57.2%	58.2%	59.4%	60.4%	61.5%	62.4%	63.3%	64.4%	64.6%	64.9%	65.3%	65.5%	65.8%	66.2%
Aimeliik 1 (Medorm) Substation	1.5 MVA	0.262	0.265	0.272	0.278	0.285	0.292	0.297	0.303	0.308	0.314	0.319	0.323	0.328	0.330	0.331	0.333	0.334	0.336	0.338
	(1.35 MW)	19.4%	19.7%	20.1%	20.6%	21.1%	21.6%	22.0%	22.4%	22.8%	23.3%	23.6%	23.9%	24.3%	24.4%	24.5%	24.7%	24.8%	24.9%	25.0%
Nekken Substation	0.075×3 MVA	0.081	0.083	0.084	0.086	0.088	0.091	0.092	0.094	0.096	0.098	0.099	0.100	0.102	0.102	0.103	0.104	0.104	0.104	0.105
	(0.2 MW)	40.7%	41.3%	42.2%	43.2%	44.2%	45.4%	46.2%	47.1%	47.9%	48.8%	49.5%	50.2%	51.0%	51.2%	51.5%	51.8%	51.9%	52.2%	52.5%
Ibobang Substation	0.025×3 MVA	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.003	0.003	0.003	0.003	0.003	0.003	0.003
	(0.06 MW)	3.28%	3.33%	3.44%	3.49%	3.60%	3.71%	3.76%	3.87%	3.92%	3.98%	4.09%	4.14%	4.19%	4.25%	4.30%	4.30%	4.35%	4.35%	4.41%
Ngeremlengui (Asahi) Substation	0.30 MVA	0.098	0.100	0.103	0.106	0.109	0.112	0.114	0.117	0.119	0.122	0.124	0.126	0.129	0.130	0.131	0.132	0.133	0.134	0.135
	(0.27 MW)	36.5%	37.2%	38.3%	39.4%	40.5%	41.6%	42.3%	43.4%	44.1%	45.2%	46.0%	46.7%	47.8%	48.1%	48.5%	48.9%	49.2%	49.6%	50.0%
Ngardmau Substation	0.075×3 MVA	0.036	0.037	0.038	0.039	0.040	0.042	0.043	0.044	0.045	0.046	0.047	0.048	0.049	0.049	0.050	0.051	0.051	0.052	0.052
	(0.2 MW)	18.2%	18.7%	19.2%	19.7%	20.2%	21.2%	21.7%	22.2%	22.6%	23.1%	23.6%	24.1%	24.6%	24.6%	25.1%	25.6%	25.6%	26.1%	26.1%
Ngaraard 1 Substation	0.025×3 MVA	0.003	0.003	0.003	0.003	0.004	0.004	0.004	0.005	0.006	0.013	0.013	0.015	0.016	0.018	0.018	0.018	0.018	0.018	0.018
	(0.06 MW)	5.2%	5.3%	5.5%	5.7%	5.9%	6.2%	6.3%	8.5%	9.3%	21.1%	22.1%	25.3%	26.4%	29.4%	30.3%	30.3%	30.4%	30.5%	30.7%
Ngaraard 2 Substation	2.0 MVA	0.161	0.163	0.169	0.174	0.181	0.186	0.190	0.238	0.264	0.467	0.497	0.562	0.593	0.654	0.679	0.693	0.707	0.709	0.712
	(1.8 MW)	9.0%	9.1%	9.4%	9.7%	10.0%	10.4%	10.6%	13.2%	14.7%	25.9%	27.6%	31.2%	32.9%	36.3%	37.7%	38.5%	39.3%	39.4%	39.6%
Hotel (Palasia Hotel)	1.0 MVA	0.108	0.110	0.114	0.118	0.127	0.125	0.130	0.136	0.141	0.147	0.150	0.154	0.157	0.159	0.161	0.163	0.166	0.168	0.170
	(0.9 MW)	12.0%	12.2%	12.7%	13.2%	14.1%	13.9%	14.5%	15.1%	15.6%	16.3%	16.7%	17.1%	17.5%	17.7%	17.9%	18.2%	18.4%	18.6%	18.9%
Hotel (Royal Resort)	1.5×2 MVA	0.323	0.329	0.342	0.355	0.380	0.376	0.391	0.407	0.422	0.441	0.451	0.461	0.472	0.478	0.484	0.490	0.497	0.503	0.509
	(2.7 MW)	12.0%	12.2%	12.7%	13.2%	14.1%	13.9%	14.5%	15.1%	15.6%	16.3%	16.7%	17.1%	17.5%	17.7%	17.9%	18.2%	18.4%	18.6%	18.9%
KB grid	48.63 MVA	11.689	11.900	12.345	12.800	13.583	15.192	15.722	16.452	17.061	17.971	18.404	18.924	19.429	19.725	19.989	20.230	20.475	20.713	20.949
	(43.76 MW)	27%	27%	28%	29%	31%	35%	36%	38%	39%	41%	42%	43%	44%	45%	46%	46%	47%	47%	48%

Note: % means load factor of transformers in each substation

Source: JICA Preparatory Survey Team

The transformer capacity of Airai Substation, which currently supplies power to Airai and a part of Koror, is 10 MVA, which is equivalent to approx. 9 MW (PF 90 %).

As shown in Table 2-2-2.8, the transformer capacity (approx. 9MW) of Airai substation is expected to reach its limit in 2024 (peak demand: approx. 10MW), and the reinforcement of Airai substation on the Project is essential.

Also, the transformer capacity of Malakal Power Plant (approx. 9MW) should be 15 MVA. The capacity is the same as Airai substation when considering the case that there is no power supplied from Aimeliik Power Plant when something happens in Malakal Power Plant.

Table 2-2-2.8 Transformer Capacity of Substations Planned in the Project

Power demand area (Name of substation)	Demand in the target year for the facility plan (2034)	Transformer capacity	Transformer loading (Power demand / transformer capacity)
Koror State and Airai State (Airai substation)	12.65MW	13.5MW*（15MVA）	93.7%
Koror State (Malakal Power Plant)	4.81MW	13.5MW*（15MVA）	35.6%

＊Assume a power factor of 90%.

Source: JICA Preparatory Survey Team

2-2-2-3 Power System Analysis

(1) Purpose

The purpose of the power system analysis is to identify that the transmission line loading, the transformer loading and the bus voltage during the normal operation and the fault-state operation are within an acceptable range, taking into consideration future development plans (including IPP projects) of PPUC.

(2) Current Status of Facilities

1) Power Generation Facilities

There are two power plants in the KB Grid: Malakal Power Plant located on Koror Island and Aimeliik power plant on Babeldaob Island. Both power plants generate power using diesel oil as fuel. Table 2-2-2.9 summarizes the existing power generation facilities.

Table 2-2-2.9 Existing Power Generation Facilities (KB Grid in 2021)

Name of Power Plant	Generator	Output Rating (kW)	Output Voltage (kV)	Rotating Speed (rpm)	Year Commissioned
Malakal	Mitsubishi 12	3,400	13.8	720	1997
	Mitsubishi 13	3,400	13.8	720	1997
	Wartsila 1	2,000	13.8	1200	1996
	Caterpillar 1	1,825	0.48	1800	2006
	Caterpillar 2	1,825	0.48	1800	2006
	Niigata 14	5,000	6.6	720	2005

Name of Power Plant	Generator	Output Rating (kW)	Output Voltage (kV)	Rotating Speed (rpm)	Year Commissioned
	Niigata 15	5,000	6.6	720	2005
	Mitsubishi 1	500	0.48	1800	2012
	Mitsubishi 2	500	0.48	1800	2012
	Mitsubishi 3	500	0.48	1800	2012
	Mitsubishi 4	500	0.48	1800	2012
Aimeliik	Mitsubishi 6	5,000	13.8	720	2013
	Mitsubishi 7	5,000	13.8	720	2013
	CAT 3516	2,000	0.48	1800	2012
Total		36,450			

Source: PPUC

2) Transmission Lines

The existing transmission line facilities are shown in Table 2-2-2.10. All transmission lines in Palau are single 34.5 kV lines, supported mostly by concrete poles and partly by panther masts. The transmission lines are constructed on Koror Island and Babeldaob Island from the south to the north, with a total length of approximately 80 km.

Table 2-2-2.10 Existing Transmission Lines (KB Grid in 2021)

Line	Voltage (kV)	Number of Circuits	Length (km)	Conductor	Capacity (A) [(MW) : Power factor 0.9 assumed]
Malakal–Airai	34.5	1	9.184	AAC150mm^2	Approx. 420 A [Approx. 21.5 MW]
Aimeliik–Airai	34.5	1	18.553	AAC150mm^2	Approx. 420 A [Approx. 21.5 MW]
Aimeliik–Nekken	34.5	1	4.287	AAC150mm^2	Approx. 420 A [Approx. 21.5 MW]
Nekken–Kokusai	34.5	1	8.849	AAC150mm^2	Approx. 420 A [Approx. 21.5 MW]
Kokusai–Ngaraard	34.5	1	38.778	AAC150mm^2	Approx. 420 A [Approx. 21.5 MW]
Total			79.651		

Source: PPUC

3) Substations

For substations in the KB Grid, see Table 2-2-2.6 above.

(3) Power System Analysis Assumptions

The validity of the equipment specifications is identified by using power system analysis software (PSSE@34.5). Specifically, power flow analysis and short circuit analysis are performed with the data collected during the 1st field survey into the software.

Since the main component of the Project is related to Airai substation, the scope of the power system analysis targets the KB Grid (see Figure 2-2-2.6). In addition, the large solar farm and the battery energy storage system (BESS), which are introduced by the independent power producers (IPPs) supported by PPUC (Phase-1 IPP and Phase-2 IPP), are also be included in the power system analysis because they have a significant impact on the KB Grid.

The power system analysis is be performed for the KB Grid in the following years: 2024

(completion year of the Project), 2027 (target year for project evaluation) and 2034 (target year for facility plan).

The power system analysis assumptions are shown below.

- Modeling the KB Grid shown in Figure 2-2-2.6.
- Phase-1 (including Bus stop junction) and Phase-2 to be supported by other donors (ADB) are operational (for Phase-1 and Bus stop junction by 2023, for Phase-2 by 2025). The main configurations and specifications of the solar farm and BESS in each phase:

  Phase-1

  PV array: 12.46 MWp ac (15.27 MWp dc)

  BESS: 8.8 MW ac / 12.906 MWh (co-located with the PV array)

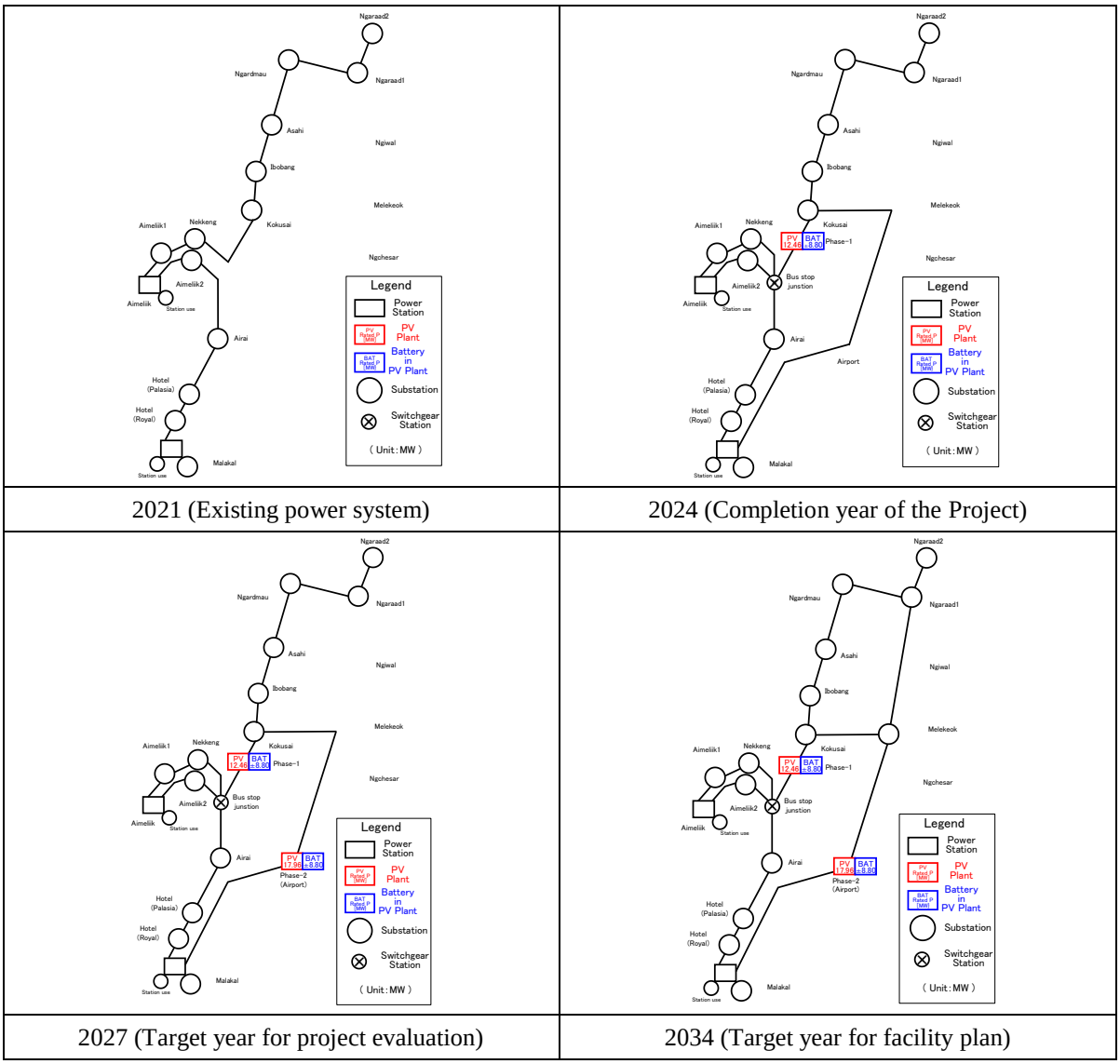
  Phase-2

  PV array: 17.96 MWp ac (22 MWp dc)

  BESS: 8.8 MW ac / 30 MWh (co-located with the PV array)
- The scenarios on the power system analysis are shown in the table below (○ meaning "done"). In the power flow analysis, two scenarios are mainly assumed: peak demand (zero renewable energy (RE) output) and off-peak demand (maximum RE output) for each year under analysis. Also, the power demand in each scenario is assumed to be the high case for the peak demand and the low case for the off-peak demand, respectively (see Table 2-2-2.4). In addition, the short analysis is performed to confirm the breaking capacity of the switchgears with faults in the network (34.5 kV and 13.8 kV).

Power system analysis	2021 (Base)	2024	2027 (Evaluation)	2034
Power flow analysis (Normal: peak demand and off-peak demand)	○	○	○	○
Power flow analysis (Fault: peak demand and off-peak demand)	-	-	○	○
Short circuit analysis	○	-	-	○
Power flow analysis (Normal: without the Project)	-	-	○	-

- In accordance with system operation standards of PPUC, the acceptable operating range for the nominal voltage is 34.5 kV±5%. Also, since the Meyuns feeder is interconnected with the Koror feeder through the grid-interconnected switch, the load on these feeders can be shifted by operating and closing section switches so that the system voltage is maintained within the acceptable operating range.
- The power factor (PF) of the load is assumed to be 90% in consideration of the operational results at the time of the 1st field survey (August 2021).
- The buses at each power plant and substation are modeled at 34.5 kV or 13.8 kV, and the individual substation load is connected to the 13.8 kV buses.



2021 (Existing power system)	2024 (Completion year of the Project)
2027 (Target year for project evaluation)	2034 (Target year for facility plan)

Source: JICA Preparatory Survey Team

Figure 2-2-2.6 Power System Analysis Model

(4) Power System Analysis Results

The results of the power system analysis for each year are shown below.

1) KB Grid in 2021 (Present)

a) System modeling

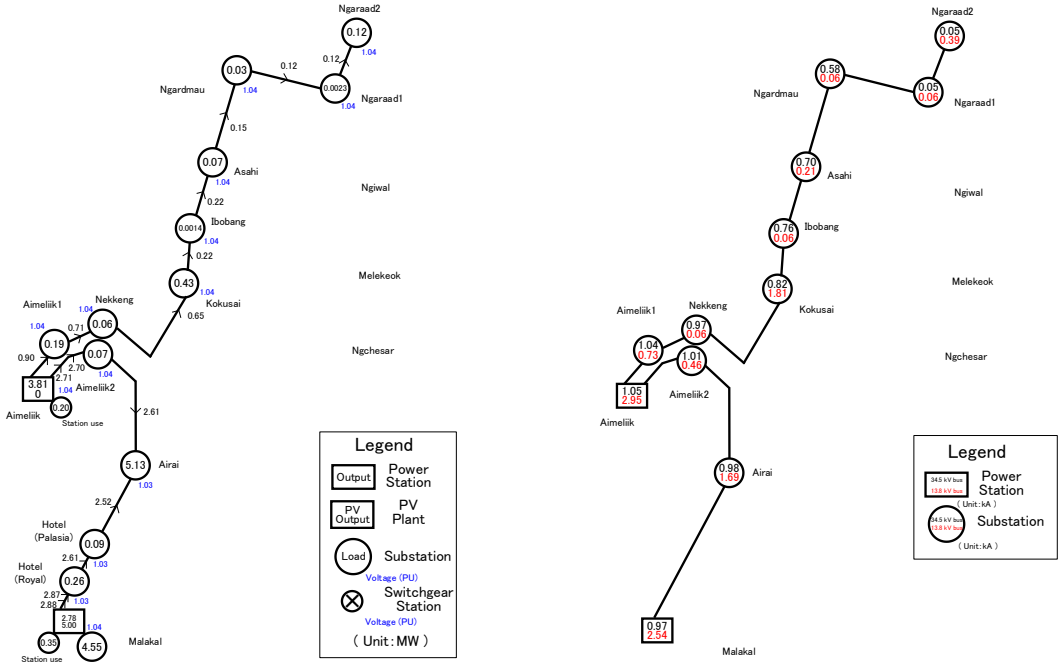
The existing KB Grid in 2021 (See Figure 2-2-2.7)

b) Power flow analysis results

PPUC installed power meters to measure the power flow of transmission lines only at Aimeliik Power Plant, Malakal Power Plant and Airai Substation. Therefore, the actual loading of all substations in the KB Grid could not be measured. Therefore, the individual substation power demand is assumed by dividing the actual power flow measured at both of

power plants and Airai Substation by the transformer capacities in each substation. The power flow results of the 34.5 kV network of the KB Grid in 2021 are shown in Figure 2-2-2.7.

The maximum power flow of Malakal – Hotel (Royal) line is 2.88 MW at the peak demand, which is sufficiently less than the 34.5 kV transmission line capacity of 21.5 MW. Therefore, no 34.5 kV transmission lines are overloaded. The voltage is maintained within the range of 103 % to 104 % at the peak demand, which is within the acceptable range (100 ± 5 %).



Power flow analysis result　　Short circuit analysis result

Source: JICA Preparatory Survey Team

Figure 2-2-2.7 Results of Power Flow Analysis and Short Circuit Analysis (KB Grid in 2021)

c) Short circuit analysis results

Figure 2-2-2.7 shows the results of the short circuit analysis. Since the power system is small in scale and every transmission line consists of only single circuit, the maximum three-phase short circuit current was 1.05 kA at Aimeliik Power plant in the 34.5 kV network and 2.95 kA at the same power plant in the 13.8 kV network. Therefore, no circuit breaker is exceeded because these figures are sufficiently less than the circuit breaker rating of 12.5 kA.

2) KB Grid in 2024

a) System modeling

In 2022, Phase-1 IPP and the bus stop junction will be constructed and connected to the existing Kokusai - Nekken line. Also, Airai substation and Malakal Power Plant will be reinforced in 2024. In addition, the 34.5 kV transmission lines (Malakal - Kokusai line) will be newly constructed in 2024.

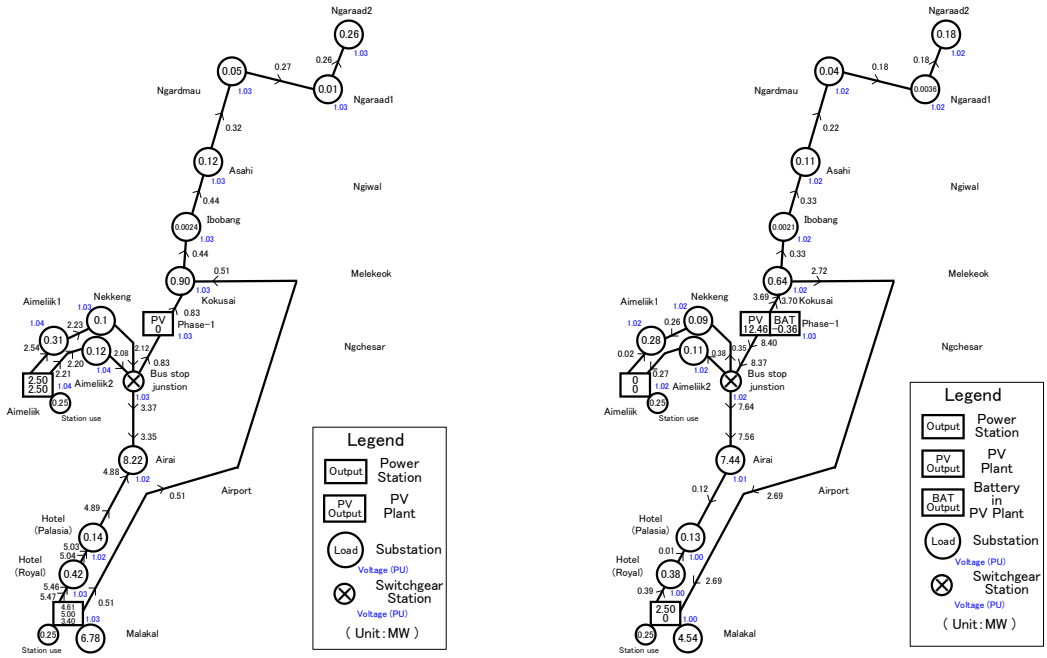
The generation power is set as shown below in order to assume severe conditions for the

power system:

- Peak demand (zero RE output): Peak demand occurs between 19:00 and 20:00. Given that no PV power is generated during nighttime and the BESS output is zero to cover the instant drop of PV generation, the output from Phase-1 IPP is basically zero. The power demand is assumed to be 19.2 MW (High case of the peak demand in 2024). The number of diesel generators in operation is five (5) in total, power plant two (2) units at Aimeliik Power Plant and three (3) units at Malakal Power Plant, based on PPUC management policy.
- Off-peak demand (maximum RE output): Since it is daytime hours, Phase-1 IPP is assumed to be producing at its maximum output (12.46 MW), and the power demand is assumed to be 13.6 MW (Low case of the peak demand in 2024). The number of diesel generators in operation is set to be one (1) unit at Malakal Power Plant (minimum loading: 50%) based on PPUC management policy.

b) Power flow analysis results

The power flow analysis results in the KB Grid in 2024 are shown in Figure 2-2-2.8. The maximum power flow is 5.47 MW on Malakal – Hotel (Royal) line at the peak demand and 8.40 MW on Phase-1 IPP- Bus stop junction line at the off-peak demand (maximum RE output), which is sufficiently lower than the 34.5 kV transmission line capacity of 21.5 MW. Therefore, no 34.5 kV transmission lines are overloaded. The voltage is maintained within the range of 102 - 104% at the peak demand and 100 - 103% at the off-peak demand (maximum RE output), which is within the acceptable range (100 ± 5%).



2024 Peak demand (zero RE output) 2024 Off-peak demand (maximum RE output)

Source: JICA Preparatory Survey Team

Figure 2-2-2.8 Power Flow Analysis Results (KB Grid in 2024)

3) KB Grid in 2027

a) System modeling

In 2025, Phase-2 IPP will be constructed and connected to Malakal - Kokusai line which is newly constructed by the Project.

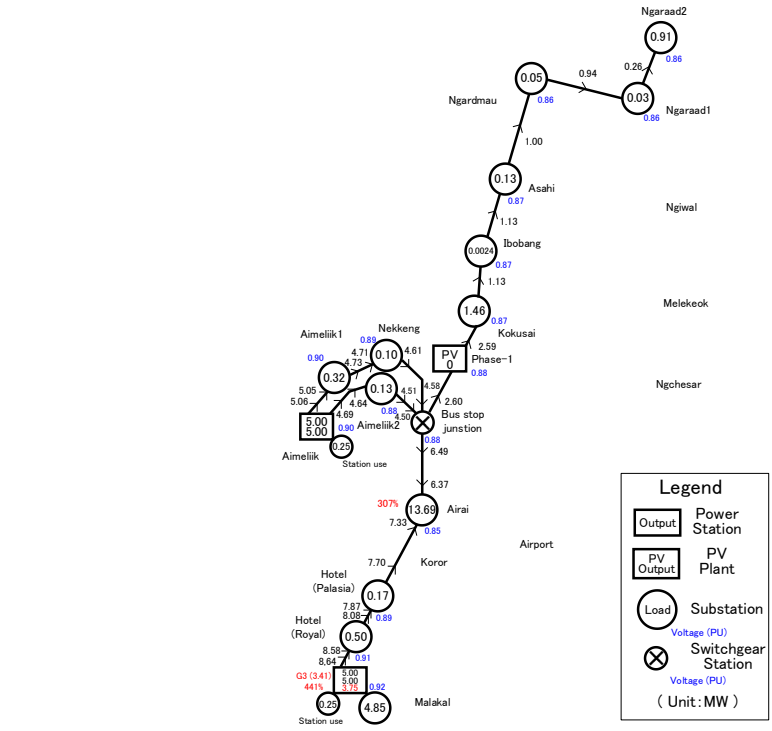
The generation power is set as shown below in order to assume severe conditions for the power system:

- Peak demand (zero RE output): Peak demand occurs between 19:00 and 20:00. Given that no PV power is generated during nighttime and the BESS output is zero to cover the instant drop of PV generation, the output from Phase-1 IPP is basically zero. The power demand is assumed to be 21.8 MW (High case of the peak demand in 2027). The number of diesel generators in operation is five (5) units in total, power plant two (2) units at Aimeliik Power Plant and three (3) units at Malakal Power Plant, based on PPUC management policy.
- Off-peak demand (maximum RE output): Since it is daytime hours, Phase-1 IPP is assumed to be producing at its maximum output (12.46 MW), and the power demand is assumed to be 14.7 MW (Low case of the peak demand in 2027). The number of diesel generators in operation is set to be one (1) unit at Malakal Power Plant (minimum loading: 50%) based on PPUC management policy.

b) Power system analysis results

Figure 2-2-2.9 shows the result of power analysis without the Project. In this case (at the peak demand) as shown in Figure 2-2-2.9, the bus voltage in the KB Grid deviates from the acceptable range of 85% to 92%, and the transformer in Airai Substation is overloaded (approximately 307%). Therefore, the power system would become unstable.

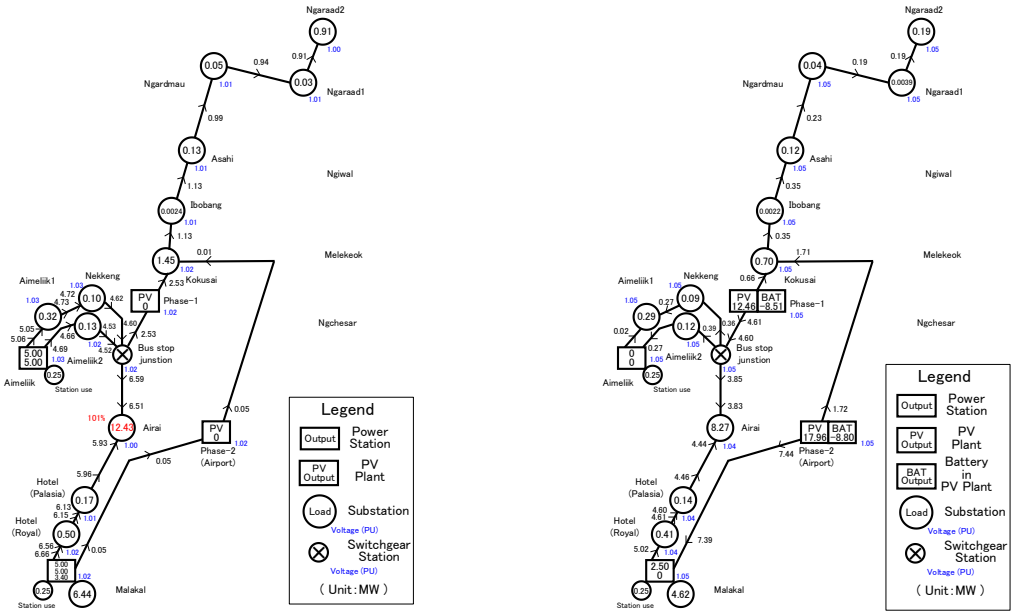
On the other hand, the power flow analysis results in the KB Grid in 2027 are shown in Figure 2-2-2.9. The maximum power flow is 6.66 MW on Malakal – Hotel (Royal) line at the peak demand and 7.44 MW on Phase-2 IPP - Malakal line at the off-peak demand (maximum RE output), which is sufficiently lower than the 34.5 kV transmission line capacity of 21.5 MW. Therefore, no 34.5 kV transmission lines are overloaded. The voltage is maintained within the range of 100 - 103% at the peak demand and 104 - 105% at the off-peak demand (maximum RE output), which is within the acceptable range (100 ± 5%).



2027 Peak demand (zero RE output)

Source: JICA Preparatory Survey Team

Figure 2-2-2.9 Power Flow Analysis Result (KB Grid in 2027, Without Project)



2027 Peak demand (zero RE output)　　2027 Off-peak demand (maximum RE output)

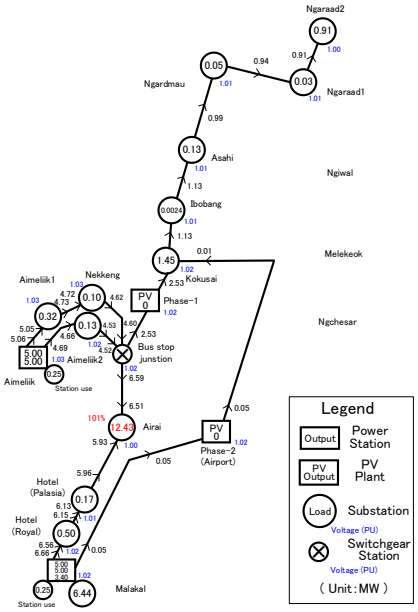
Source: JICA Preparatory Survey Team

Figure 2-2-2.10 Power Flow Analysis Results (KB Grid in 2027, With Project)

According to Figure 2-2-2.10, the loading rate of the transformer in Airai substation is 101% due to the long-distance distribution line (Koror feeder from Airai substation) with a heavy

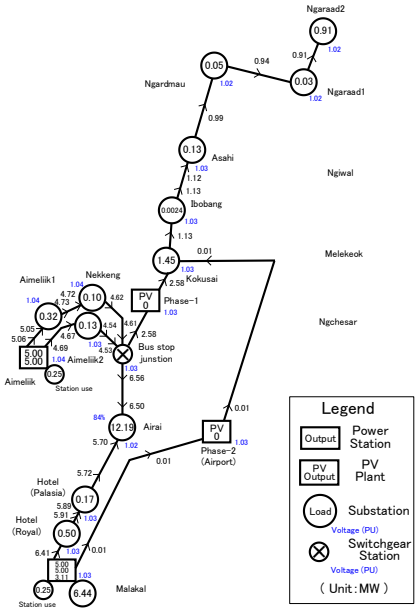
load, and which is required to compensate reactive power in order to maintain the voltage in the 13.8 kV network. Therefore, Figure 2-2-2.11 shows the results of the power flow analysis when the reactive power compensator is installed in the 13.8 kV network.

As shown in Figure 2-2-2.11, the maximum power flow is 6.56 MW on bus stop junction - Airai line, and which is sufficiently lower than the 34.5 kV transmission line capacity of 21.5 MW. Therefore, no 34.5 kV transmission lines are overloaded. The voltage is maintained within the range of 102 - 104%, and which is within the acceptable range (100 ± 5%).



2027 Peak demand (zero RE output)

Without reactive power compensator



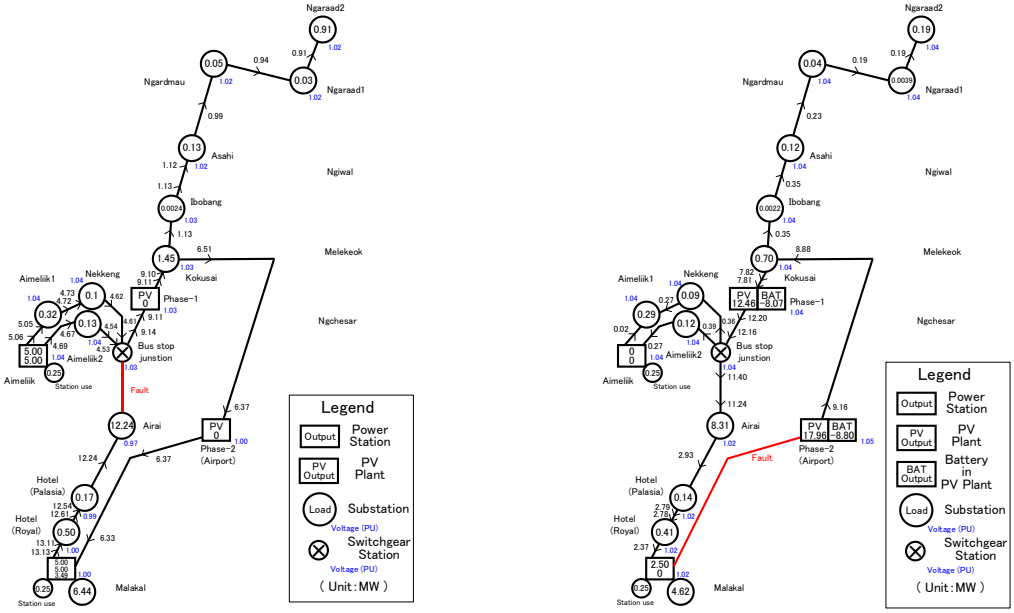
2027 Peak demand (zero RE output)

With reactive power compensator

Source: JICA Preparatory Survey Team

Figure 2-2-2.11 Power Flow Analysis Results (KB Grid In 2027, Reactive Compensator)

Figure 2-2-2.12 shows the results of the power flow analysis when a fault occurs in the transmission line with the maximum power flow and isolate it. As shown in Figure 2-2-2.12, the maximum power flow is 13.13 MW on Malakal – Hotel (Royal) line at the peak demand and 12.20 MW on Phase-2 IPP - Malakal line at the off-peak demand (maximum RE output), which is sufficiently lower than the 34.5 kV transmission line capacity of 21.5 MW. Therefore, no 34.5 kV transmission lines are overloaded. The voltage is maintained within the range of 97 - 104% at the peak demand and 102 - 105% at the off-peak demand (maximum RE output), which is within the acceptable range (100 ± 5%).



2027 Peak demand (zero RE output)

Without reactive power compensator

2027 Off-peak demand (maximum RE output)

Source: JICA Preparatory Survey Team

Figure 2-2-2.12 Power Flow Analysis Results (KB Grid in 2027, during Transmission Line Fault)

4) KB Grid in 2034

a) System modeling

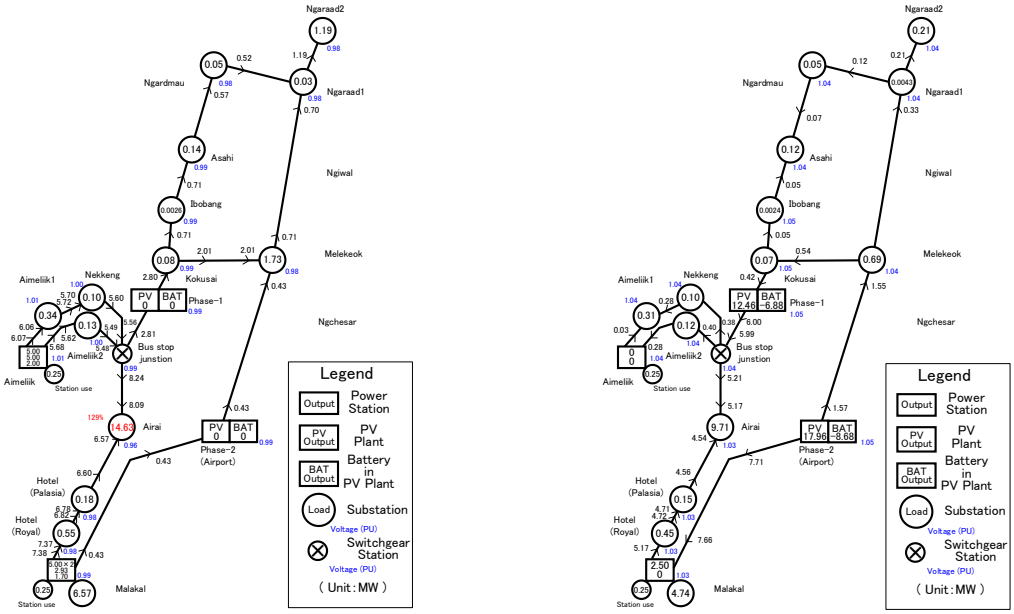
In 2034, Ngchesar Substation will be constructed and connected to Kokusai–Phase-2 IPP line, and the 34.5 kV line between Ngchesar Substation and Ngaraard 1 Substation will be constructed and formulate a large loop in the KB Grid.

The generation power is set as shown below assuming severe for the power system conditions:

- Peak demand (zero RE output): Peak demand occurs between 19:00 and 20:00. Given that no PV power is generated during nighttime and the BESS output is zero to cover the instant drop of PV generation, the output from Phase-1 IPP is basically zero. The power demand is assumed to be 24.2 MW (High case of the peak demand in 2034). The number of diesel generators in operation is seven (7) in total, power plant three (3) units at Aimeliik Power Plant and four (4) units at Malakal Power Plant, based on PPUC management policy.
- Off-peak demand (maximum RE output): Since it is daytime hours, Phase-1 IPP is assumed to be producing at its maximum output (12.46 MW), and the power demand is assumed to be 16.2 MW (Low case of the peak demand in 2034). The number of diesel generators in operation is set to be one (1) unit at Malakal Power Plant (minimum loading: 50%) based on PPUC management policy.

b) Power flow analysis results

The power flow analysis results in the KB Grid in 2034 are shown in Figure 2-2-2.13. The maximum power flow is 8.24 MW on bus stop junction - Airai line at the peak demand, and 7.71 MW on Phase-2 IPP - Malakal line at the off-peak demand (maximum RE output), which is sufficiently lower than the 34.5 kV transmission line capacity of 21.5 MW. Therefore, no 34.5 kV transmission lines are overloaded. The voltage is maintained within the range of 96 - 101% at the peak demand and 103 - 105% at the off-peak demand (maximum RE output), which is the acceptable range (100 ± 5%).



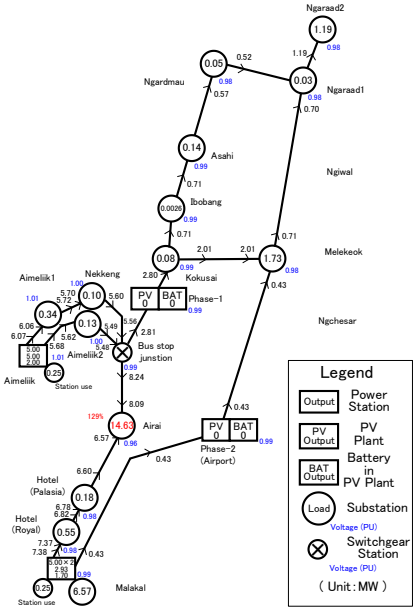
2034 Peak demand (zero RE output)　　2034 Off-peak demand (maximum RE output)

Source: JICA Preparatory Survey Team

Figure 2-2-2.13 Power Flow Analysis Results (KB Grid in 2034)

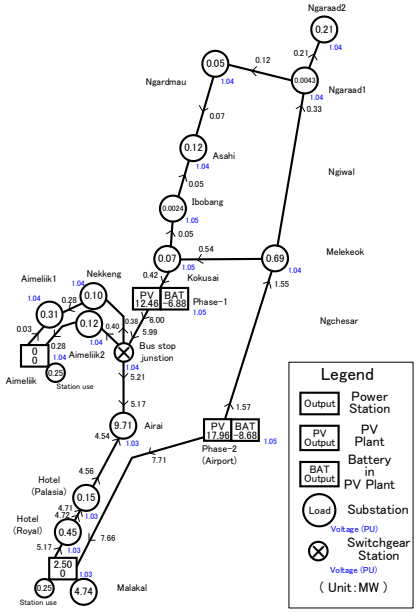
According to Figure 2-2-2.13, the loading rate of the transformer in Airai substation is 129% due to the long-distance distribution line (Koror feeder from Airai substation) with a heavy load, and which is required to compensate reactive power in order to maintain the voltage in the 13.8 kV network. Therefore, Figure 2-2-2.14 shows the results of the power flow analysis when the reactive power compensator is installed in the 13.8 kV network.

As shown in Figure 2-2-2.14, the maximum power flow is 8.18 MW on bus stop junction - Airai line, and which is sufficiently lower than the 34.5 kV transmission line capacity of 21.5 MW. Therefore, no 34.5 kV transmission lines are overloaded. The voltage is maintained within the range of 100 - 104%, and which is within the acceptable range (100 ± 5%).



2034 Peak demand (zero RE output)

Without reactive power compensator



2034 Peak demand (zero RE output)

With reactive power compensator

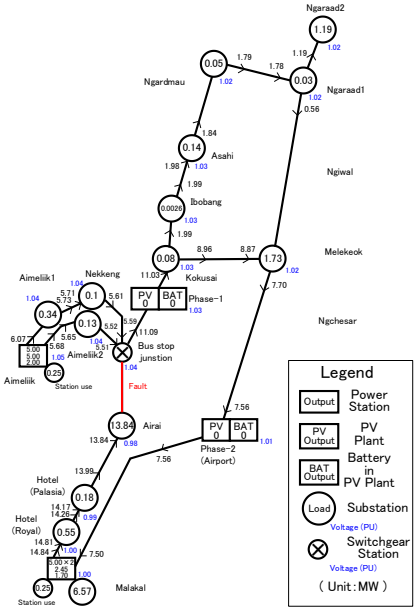
Source: JICA Preparatory Survey Team

Figure 2-2-2.14 Power Flow Analysis Results (KB Grid in 2034, Reactive Compensator)

Source: JICA Preparatory Survey Team

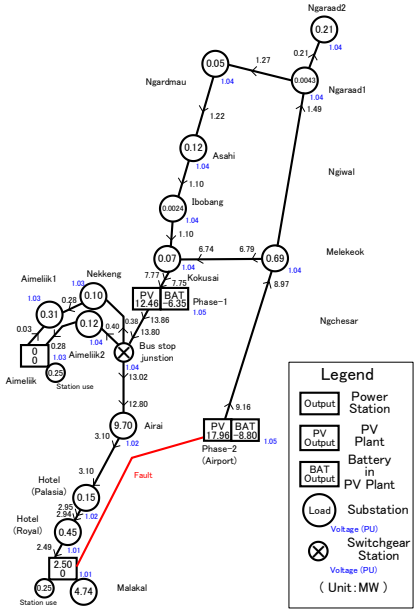
Figure 2-2-2.15 shows the results of the power flow analysis when a fault occurs in the transmission line with the maximum power flow and isolate it. As shown in Source: JICA Preparatory Survey Team

Figure 2-2-2.15, the maximum power flow is 11.09 MW on Phase-1 IPP - bus stop junction line at the peak demand (transmission line fault in bus stop junction – Airai line), and 13.86 MW on Phase-1 IPP - bus stop junction line at the off-peak demand (maximum RE output) (transmission line fault in Phase-2 IPP – Malakal line), which is sufficiently lower than the 34.5 kV transmission line capacity of 21.5 MW. Therefore, no 34.5 kV transmission lines are overloaded. The voltage is maintained within the range of 100 - 105% at the peak demand and 101 - 105% at the off-peak demand (maximum RE output), which is within the acceptable range (100 ± 5%).



2034 Peak demand (zero RE output)

With reactive power compensator



2034 Off-peak demand (maximum RE output)

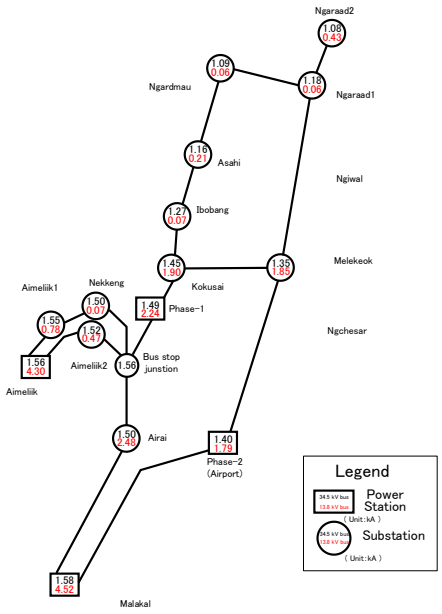
Source: JICA Preparatory Survey Team

Figure 2-2-2.15 Results of Power Flow Analysis
(KB Grid in 2034, during Transmission Line Fault)

c) Short circuit analysis

Figure 2-2-2.16 shows the results of the accident current analysis. The analysis was performed on the condition that diesel generators at Aimeliik Power Plant and Malakal Power Plant is in operation, in order to set the highest fault current among the various operation conditions.

As a result of the analysis, the maximum three-phase short circuit current was 1.58 kA at the Aimeliik Power Plant for the 34.5 kV network, and 4.52 kA at Malakal Power Plant for the 13.8 kV network. Therefore, no circuit breaker is exceeded because these figures are sufficiently lower than the circuit breaker rating of 12.5 kA.



Source: JICA Preparatory Survey Team

Figure 2-2-2.16 Short Circuit Analysis Result (KB Grid in 2034)

(5) Conclusion

The refult of the power system analysis is shown below.

Table 2-2-2.11 Power system analysis results

Power system analysis	2021 (Base)	2024	2027 (Evaluation)	2034
Power flow analysis (Normal: peak demand and off-peak demand)	○ OK	○ OK	○ OK	○ OK
Power flow analysis (Fault: peak demand and off-peak demand)	-	-	○ OK	○ OK
Short circuit analysis	○ OK	-	-	○ OK
Power flow analysis (Normal: without the Project)	-	-	x (Airai substation is overloaded)	-

There are no problems in terms of the power flow analysis and the short circuit analysis on the KB Grid in 2021 to 2034. Both of Power Plants (Aimeliik Power Plant and Malakal Power Plant) were not able to maintain the stable operation due to the singlular transmission line when a fault occurs in these lines. However, the new 34.5kV transmission line (Malakal - Kokusai line) of the Project allows the 34.5 kV transmission line to be double circuit to improve the reliability of the power system.

Therefore, the Project will improve the reliability and stability of power supply in the KB Grid and promote the introduction of RE. In the case of the peak demand, it is necessary to consider the reactive power compensator depending on the voltage in the grid (especially the 13.8 kV network in Koror state).

2-2-2-4 Overall Plan

(1) Design Conditions

The design conditions for the Project are as shown below.

1) Basic Conditions

The basic conditions applicable to the design of substation equipment, buildings, and foundations are shown in Table 2-2-2.12.

Table 2-2-2.12 Basic Conditions

Item		Data
Elevation		1,000m
Outside air temperature	40°C	40°C
Maximum wind speed		40 m/s
Seismic load		Horizontal force 0.10 G
Geotechnical Endurance		56kN/m^2
Equivalent salt density		0.5mg/cm^2

Source: JICA Preparatory Survey Team

2) Design Conditions for Transmission and Transformation Facilities

Table 2-2-2.13 Design Conditions for Transmission and Substation Facilities

Item	Data	
Nominal voltage	34.5 kV	13.8 kV
Maximum voltage	36kV	17.5kV
Frequency	60Hz	
Short circuit current	12.5kA - 1second	12.5kA – 1second
Lightning impulse withstand voltage	200kV (outdoor) 170kV (outdoor)	110kV(outdoor) 95kV (indoor)
Commercial frequency withstand voltage	70kV	34kV
Grounding	Effective grounding	
Leakage distance	31mm/kV (outdoor) 20mm/kV (indoor)	
Corruption classification	IEC Standard - very heavy pollution	
Insulation	Insulators: White or brown	
Protection class (IP)	Outdoor: IP43 or higher Indoor: IP21 or higher	

Source: JICA Preparatory Survey Team

3) Applicable Standards and Usage Units

Systems and transmission equipment for substations shall be designed in accordance with IEC standards, JEC standards, or equivalent standards.

(2) Expansion of Malakal Power Plant

For details, please refer to the drawings related to Malakal Power Plant shown below.

SS-01: Malakal Power Plant single wire connection diagram

SS-02: Malakal Power Plant Layout

Table 2-2-2.14 Specification and Quantities for Malakal Power Plant

No.	Equipment	Quantity	Specifications
1	34.5 kV switchgear	1 lot	(1) Type: - Metal-closed switchgear (indoor type) - Adequate maintenance and inspection space shall be secured. - Sufficient space for maintenance and inspection shall be secured, and the space for storing the switchgear when the transformer is replaced in the future shall be considered. (2) Type of circuit breaker: - VCB or GCB (3) Rated voltage: - 36 kV (4) Rated current: - 600A (5) Rated short-time withstand current : - 12.5kA (1 sec) (6) Number of panels: [34.5 kV] - Pull-in line: 1 set (including EVT, etc.) - Transmission line: 2 sets (including EVT, etc.) - Transmission line: 2 sets (including circuit breaker) - Main line classification: 1 set (including circuit breaker) - Protection control device [Auxiliary equipment] - Low-voltage switchboard: 1 set - Battery/charger: 1 set (including circuit breaker) *In the case of a line where the current flows in both directions, an appropriate interlock configuration shall be used. (7) Others: - The quantity of each device shall be based on the attached single wire connection diagram. - CT / VT ratio, burden, etc. shall be calculated and proposed by the bidder / the supplier. - Necessary control of each device shall be carried out from the simulated bus bar at the front. - AC power shall be supplied from the existing equipment. - The connection of the equipment shall be included in the specifications. - The signals required for the SCADA system shall be able to be taken out by the collective terminal board.

No.	Equipment	Quantity	Specifications
2	34.5 kV Cable terminals and supporting steel	1 lot	(1) Specification : - The supporting steel shall be a lattice structure made of hot-dip galvanized steel. - The cable terminal shall be designed for heat shrinkage. - (Including steel material, cable terminal kit, support material, etc.)
3	34.5 kV Power cable	1 lot	(1) Specification: - XLPE insulated cable 35kV-CVT250mm^2 - The cable shall be placed in a corrugated rigid polyethylene pipe (FEP pipe). - Terminal parts shall be included.
4	13.8 kV Power cable	1 lot	(1) Specification: - XLPE insulated cable 15kV-CVT250 mm^2 - The cable shall be placed in a corrugated rigid polyethylene pipe (FEP pipe). - Placed in the conduit pipe
5	Control line, low-voltage cable	1 lot	(1) Specifications - Power cable: 600 V cross-linked polyethylene insulated power cable - Control cable: Vinyl-insulated vinyl-sheathed cable for control with shielding
6	Grounding system	1 lot	(1) Specifications: - Mesh grounding with copper stranded wire, grounding rod, etc. shall be used. - Connection with existing grounding is acceptable. - Connection with existing grounding is acceptable.
7	Switchgear building	1 lot	(1) Specifications - The structure shall be sealed to protect the switchgear. - No ventilation or windows are required. - Air conditioning system shall be installed to maintain the internal environment. - There shall be a loading entrance for installing the switchgear and a door for people to enter and exit. - The loading entrance and door shall have an appropriate sealed structure. - The size of the building shall be based on the dimensions shown on the layout plan, but suggestions by the Bidder / the Supplier are acceptable.

Source: JICA Preparatory Survey Team

(3) Renewal of Power Transformer for Malakal Power Plant

Table 2-2-2.15 Power Transformer Specification and Quantities for Malakal Power Plant

No.	Equipment	Quantity	Specifications
1	34.5/13.8kV transformer	1 lot	(1) Type: - Outdoor type, oil-filled transformer (with tap switching device at load) (2) Rated primary voltage: - 34.5 kV (3) Rated secondary voltage: - 13.8 kV (4) Rated capacity: - 15 MVA (5) Cooling method: - ONAN (6) Number of phases:

No.	Equipment	Quantity	Specifications
			- 3 (7) Rated Frequency: - 60 Hz (8) Tap voltage: - 34.5 kV +10 % to -10 (9) Number of taps: - 17 taps (10) Step voltage: - 1.25 % (11) (11) Wiring method: - Primary: Y direct grounding - Secondary: Y-direct grounding - Tertiary: Delta (12) Impedance: - Approx. 6 (13) Others: - Bushing CTs (BCTs) shall be used. - (13) Others: Bushing CTs (BCTs) shall be provided. Lightning arresters (LAs) for primary and secondary sides shall be provided. - - The lightning arrester shall be the same manufacturer as the lightning arrester at the substation entrance.
2	34.5 kV switchgear	1 lot	(1) Model: - Metal-closed switchgear (indoor type) - Adequate maintenance and inspection space shall be secured. - Consideration shall be given to the space for storing the switchgear when the transformer is replaced in the future. (2) Type of circuit breaker: - VCB or GCB (3) Rated voltage: - 24kV (4) Rated current: - 600A (5) Rated short-time withstand current : - 12.5kA (1 sec) (6) Number of planes: [34.5 kV] - For transformer (34.5 kV side): 1 set (including circuit breaker) - - Protection control device
3	13.8 kV switchgear	1 lot	(1) (1) Specifications: - The existing switchgear shall be diverted and properly connected to the 34.5 kV/13.8 kV transformer and 34.5 kV switchgear to ensure proper operation as switchgear. - Cables, support fittings, etc. shall be prepared as required.
4	34.5 kV power cable	1 lot	(1) Specifications: - XLPE insulated cable 35kV-CVT250 mm^2

No.	Equipment	Quantity	Specifications
			- The cable shall be placed in a corrugated rigid polyethylene pipe (FEP pipe). - Terminal parts shall be included.
5	13.8 kV power cable	1 lot	(1) Specifications: - XLPE insulated cable 15kV-CVT250 mm^2 - The cable shall be placed in a corrugated rigid polyethylene pipe (FEP pipe). - Terminal parts shall be included.
6	Control line, low-voltage cable	1 lot	(1) Specifications - Power cable: 600 V cross-linked polyethylene insulated power cable - Control cable: Vinyl-insulated vinyl-sheathed cable for control with shielding
7	Grounding System	1 lot	(1) Specifications: - Mesh grounding with copper stranded wire, grounding rod, etc. shall be used. - Connection with existing grounding is acceptable. - Connection with existing grounding is acceptable.

Source: JICA Preparatory Survey Team

(4) Renewal of Airai Substation

For details, please refer to Airai Substation related drawings shown below.

SS-08: Single-wire wiring diagram for Airai Substation

SS-09: Layout of Airai Substation

Table 2-2-2.16 Specification and Quantities for Airai Substation

No.	Equipment	Quantity	Specifications
1	34.5/13.8kV transformer	1 lot	(1) Type: - Outdoor type, oil-filled transformer (with tap switching device at load) (2) Rated primary voltage: - 34.5 kV (3) Rated secondary voltage: - 13.8 kV (4) Rated capacity: - 15 MVA (5) Cooling method: - ONAN (6) Number of phases: - 3 (7) Rated Frequency: - 60 Hz (8) Tap voltage: - 34.5 kV +10 % to -10 (9) Number of taps: - 17 taps

No.	Equipment	Quantity	Specifications
			(10) Step voltage: - 1.25 % (11) (11) Wiring method: - Primary: Y direct grounding - Secondary: Y-direct grounding - Tertiary: Delta (12) Impedance: - Approx. 6 (13) Others: - Bushing CTs (BCTs) shall be used. - (13) Others: Bushing CTs (BCTs) shall be provided. Lightning arresters (LAs) for primary and secondary sides shall be provided. - - The lightning arrester shall be the same manufacturer as the lightning arrester at the substation entrance.
2	34.5 kV switchgear	1 lot	(1) Model: - Metal-closed switchgear (indoor type) - Adequate maintenance and inspection space shall be secured. - Consideration shall be given to the space for storing the switchgear when the transformer is replaced in the future. (2) Type of circuit breaker: - VCB or GCB (3) Rated voltage: - 24kV (4) Rated current: - 600A (5) Rated short-time withstand current : - 12.5kA (1 sec) (6) Number of panels: [34.5 kV] - Transmission line: 2 sets (including EVT, etc.) - Transmission line: 2 sets (including circuit breaker) - For transformer (34.5 kV side): 1 set (including circuit breaker) - In-plant transformer (50kVA): 1 unit (with fuse) - Protection control device [Auxiliary equipment] - Low-voltage switchboard: 1 set - Battery/charger: 1 set (including circuit breaker) (7) Others : - The quantity of each device shall be based on the attached single wire connection diagram. - CT / VT ratio, burden, etc. shall be calculated and proposed by the Bidder / the Supplier. - Necessary control of each device shall be carried out from the simulated bus bar at the front. - AC power shall be supplied from the existing equipment. - The connection of the equipment shall be included in the specifications.

No.	Equipment	Quantity	Specifications
			- The signals required for the SCADA system shall be able to be taken out by the collective terminal board.
3	13.8 kV switchgear	1 lot	(1) Specifications: - The existing switchgear shall be diverted and properly connected to the new 34.5 kV/13.8 kV transformer and 34.5 kV switchgear to ensure proper operation as switchgear. - Cables, support fittings, etc. shall be prepared as necessary.
4	34.5 kV power cable	1 lot	(1) Specifications: - XLPE insulated cable 35kV-CVT250 mm^2 - The cable shall be placed in a corrugated rigid polyethylene pipe (FEP pipe). - Terminal parts shall be included.
5	13.8 kV power cable	1 lot	(1) Specification: - XLPE insulated cable 15kV-CVT250 mm^2 - The cable shall be placed in a corrugated rigid polyethylene pipe (FEP pipe). - Terminal parts shall be included.
6	Control line, low-voltage cable	1 lot	(1) Specifications - Power cable: 600 V cross-linked polyethylene insulated power cable - Control cable: Vinyl-insulated vinyl-sheathed cable for control with shielding
7	Grounding System	1 lot	(1) Specifications: - Mesh grounding with copper stranded wire, grounding rod, etc. shall be used. - Connection with existing grounding is acceptable. - Connection with existing grounding is acceptable.
8	Switchgear building	1 lot	(1) Specifications - The structure shall be sealed to protect the switchgear. - No ventilation or windows are required. - An air-conditioning system shall be installed to maintain the internal environment. - There shall be a loading entrance for installing the switchgear and a door for people to enter and exit. - The loading entrance and door shall have an appropriate sealed structure. - The size of the building shall be based on the dimensions shown on the layout plan, but suggestions by the Bidder / the Supplier are acceptable.

Source: JICA Preparatory Survey Team

(5) Expansion of Kokusai Substation

For details, please refer to the drawings related to Kokusai Substation shown below.

SS-03: Kokusai Substation single wire connection diagram

SS-04: Layout of Kokusai Substation

Table 2-2-2.17 Specification and Quantities for Kokusai Substation

No.	Equipment	Quantity	Specifications
1	34.5 kV switchgear	1 lot	(1) Model: - Metal-closed switchgear (indoor type) - Adequate maintenance and inspection space shall be secured. - Consideration shall be given to the space for storing the switchgear when the transformer is replaced in the future. (2) Type of circuit breaker: - VCB or GCB

No.	Equipment	Quantity	Specifications
			(3) Rated voltage: - 36 kV (4) Rated current: - 600A (5) Rated short-time withstand current : - 12.5kA (1 sec) (6) Number of panels: [34.5 kV] - Transmission line: 3 sets (including EVT, etc.) - Transmission line: 3 sets (including circuit breaker) - Main line classification: 1 set (including circuit breaker) - For transformer (34.5 kV side): 1 set (including circuit breaker) - In-plant transformer (50kVA): 1 unit (with fuse) - Protection control device [Auxiliary equipment] - Low-voltage switchboard: 1 set - Battery charger: 1 set (including circuit breaker) (7) Others: - The quantity of each device shall be based on the attached single wire connection diagram. - CT / VT ratio, burden, etc. shall be calculated and proposed by the Bidder / the Supplier. - Necessary control of each device shall be carried out from the simulated bus bar at the front. - AC power shall be supplied from the existing equipment. - The connection of the equipment shall be included in the specifications. - The signals required for the SCADA system shall be able to be taken out by the collective terminal board.
2	34.5 kV power cable	1 lot	(1) Specification: - XLPE insulated cable 35kV-CVT250 mm^2 - The cable shall be placed in a corrugated rigid polyethylene pipe (FEP pipe). - Terminal parts shall be included.
3	Control line, low-voltage cable	1 lot	(1) Specifications - Power cable: 600 V cross-linked polyethylene insulated power cable - Control cable: Vinyl-insulated vinyl-sheathed cable for control with shielding
4	Grounding System	1 lot	(1) Specifications: - Mesh grounding with copper stranded wire, grounding rod, etc. shall be used. - Connection with existing grounding is acceptable. - Connection with existing grounding is acceptable.
5	Switchgear building	1 lot	(1) Specifications - The structure shall be sealed to protect the switchgear. - No ventilation or windows are required. - An air-conditioning system shall be installed to maintain the internal environment. - There shall be a loading entrance for installing the switchgear and a door for people to enter and exit. - The loading entrance and door shall have an appropriate sealed structure. - The size of the building shall be based on the dimensions shown on the layout plan, but suggestions by the Bidder / the Supplier are acceptable.

Source: JICA Preparatory Survey Team

(6) Basic Plan for 34.5 kV Transmission Line and 13.8 kV Distribution Line

The scope of work for transmission and distribution line is shown in Drawing No. TL-01 Project Location Map.

1) Contents of the Plan

a) 34.5 kV Transmission Line Between Malakal Power Plant and Kokusai Substation

The existing 34.5 kV transmission line between Malakal Power Plant and Aimeliik Substation will be strengthened by constructing a new 34.5 kV transmission line using an AAC-150 mm^2 overhead line or a CVT-250 mm^2 underground cable (see Drawing No. TL-03.). The length of the overhead line is about 32.0 km. The support structure of the 34.5 kV overhead line shall be concrete columns.

Table 2-2-2.18 Quantity of Poles

Electric poles	Quantity
New construction	489
Rebuilding	88
Change of pole	39

Source: JICA Preparatory Survey Team

Communication line will be attached between the Malakal Power Plant and the Koksai Substation using optical fiber cable.

b) 34.5 kV Transmission Line and 13.8 kV Distribution Line at Malakal Power Plant

Two routes of 34.5 kV and 13.8 kV underground cables will be laid from Malakal Power Plant to the poles (Malakal-1 and Koror-1).

c) 34.5 kV Transmission Line at Airai Substation

Two routes of 34.5 kV underground cables will be laid from Airai Substation to power poles (Airai-19 and Airai-20).

d) 34.5 kV Transmission Line at Kokusai Substation

Three routes of 34.5 kV underground cable will be laid from Kokusai Substation to power poles (Kokusai-1, Kokusai-1-3, Kokusai-1-4).

e) JP Bridge Cross-Section

The JP Bridge section is a 300 meter long strait crossing, and the existing 34.5 kV transmission line is laid through the JP Bridge. In the Project, the 34.5 kV transmission line in this section needs to be converted to two line, and the Team adopted a plan to lay cables inside the JP Bridge in consideration of a construction method that would not affect the bridge itself. The results of the study are shown in Appendix 7.

2) Design Conditions for 34.5 kV Transmission Line and 13.8 kV Distribution Line

Table 2-2-2.19 Weather Conditions

Item	Design value
Elevation	Less than 1000m
Conductor temperature (Celsius) - Minimum temperature - Normal temperature (EDS) - Maximum temperature - Temperature for slackness calculation	 5 degrees 25 degrees 80 degrees 50 degrees
Wind speed	40m/s
Wind load - Electric wire - telephone pole	 100 kg/m^2 80 kg/m^2
Ground bearing capacity	Based on soil survey results

Source: JICA Preparatory Survey Team

Table 2-2-2.20 Electrical Conditions

Item	Design value
Standard spacing	34.5 kV transmission line: 150m max.
Wind pressure	34.5 kV transmission line: 150m max.
Number of line	34.5 kV single line (some line have two line)
ROW	7.8 m wide (confirmation required)
Minimum height above ground of overhead wires	General: 5.8 m Sidewalk: 4.9 m Road crossing: 6.4 m
Shielding angle	60°
Minimum creepage distance	31 mm/kV
Equivalent salt deposition	0.5 mg/cm^2

Source: JICA Preparatory Survey Team

3) 34.5 kV Transmission Line (Overhead Line)

The details of the planned 34.5 kV transmission line are shown in the table below。

Table 2-2-2.21 Specification for 34.5 kV Transmission Line (Overhead Line)

No.	Item	Specifications	
1	Power pole	Type	Reinforced concrete columns 14m-7kN, 16m-7kN, 16m-7kN (split columns)
		Shape	Type A to G
		Safety rate	1.0 (Electric pole) 1.2 (Arm brace)
		Payoffs	All armored pole materials
2	Overhead wires	Type	Cross-linked polyethylene aluminum stranded wire (XLPE, AAC)
		Size	150mm^2
3	Overhead ground wire	Type	Aluminum-coated steel stranded wire (AC)
		Size	50 mm^2

No.	Item	Specifications	
		Shielding angle	60 degrees
4	Insulator	Specification	IEC60383-1 or equivalent
		Type	Line post insulator Tension-resistant insulators (4 insulators per phase)
		Material	Porcelain
		Color	White / Brown
		Minimum distance along the surface	31mm / kV
5	switchgear	Type	Column-mounted, waterproof structure
6	Fiber-optic cables	Type	SM48 x 1
		Number of wires	48
7	lightning arrester	Type	Outdoor, single phase, zinc oxide gapless
		Rated voltage	30kV
		Standard discharge current	10kA Note: Same product as for substation

Source: JICA Preparatory Survey Team

4) 34.5 kV Transmission Line (Underground Cable)

The details of the planned 34.5 kV transmission line are shown in the table below。

Table 2-2-2.22 Specification for 34.5 kV Transmission Line (Underground Cable)

No.	Item	Specifications	
1	Power cable	Standard	IEC-60502 or equivalent
		Type	Cross-linked polyethylene insulated power cable CVT-35 kV
		Size	250 mm^2
		Accessories	Cable terminal
2	Pipe line	Type	Community, communication, compact cable vinyl pipe (CCVP)
		Size	or equivalent 200φ x 1 (for power cable), 150φ x 1 (for communication cable)

Source: JICA Preparatory Survey Team

5) 34.5 kV Transmission Line (JP Bridge Crossing Section)

The details of the planned 34.5 kV transmission line are shown in the table below.

Table 2-2-2.23 Specification for 34.5 kV Transmission Line (JP Bridge Crossing Section)

No.	Item	Specifications	
1	Power cable	Standard	IEC-60502 or equivalent
		Type	Cross-linked polyethylene insulated power cable CVT-35 kV
		Size	250 mm^2
		Accessories	Cable terminal, A set of materials required for installation (support hardware, fixtures, etc.).
2	Fiber-optic cables	Type	SM48 x 1
		Number of wires	48

Source: JICA Preparatory Survey Team

6) 13.8 kV Distribution Line

Details of the planned 13.8 kV transmission line are shown in the table below.

Table 2-2-2.24 Specification for 13.8 kV Distribution Line

No.	Equipment	Specifications	
1	Overhead wires	Type	Cross-linked polyethylene aluminum stranded wire (XLPE, AAC)
		Size	150mm^2
2	Power cable	Standard	IEC-60502 or equivalent
		Type	Cross-linked polyethylene insulated power cable CVT-15kV
		Size	250mm^2
		Accessories	Cable terminal
3	Insulators	Standard	IEC60383-1 or equivalent
		Type	Line post insulator
			Tension resistant insulator (2 pcs/phase)
		Material	Porcelain
		Color	White / Brown
		Minimum creepage distance	31mm / kV
4	Surge arresters	Type	Outdoor, Single Phase, Zinc Oxide Gapless
		Rated voltage	12kV
		Standard discharge current	10kA
			(Note) Same product as for power transformer

Source: JICA Preparatory Survey Team

(7) Basic Plan for 34.5 kV Transmission Line Protection

1) Existing Power Line Protection System in Palau and Features of Various Protection Relays

Currently, the transmission line protection in Palau is provided by an overcurrent relay (ANSI Device No. 51). The overcurrent relay is a relay that detects the fault current flowing during a fault and shuts down the circuit breaker. Overcurrent relays generally operate faster when the fault current is large and slower when the fault current is small, but they interrupt the accident current faster than the transmission line melts, preventing the transmission line from melting. Overcurrent relays have the advantage of being inexpensive and easy to build a protection system, but there is a concern that as the system expands and becomes more complex, relay settlements will become more complicated, and depending on the accident point and accident conditions, there may be situations where the system cannot be protected. Therefore, the Project proposes the application of a distance relay (ANSI Device No. 21) and a differential relay (ANSI Device No. 87) with the following features.

Distance relay: ANSI Device No. 21

Distance relays use the fault current and voltage at the time of a transmission line fault to determine the impedance to the point of accident, identify the accident, and operate the circuit breaker. They are called distance relays or impedance relays because the impedance of a transmission line is roughly proportional to its distance. The distance relay judges the accident based on the impedance from the point where the relay is installed to the point of the accident, which ensures the identification of the accident section and makes it easy to coordinate with the next section. In addition, the system is highly versatile because it can determine accidents even when there are branch loads on the transmission line. However, when the transmission line distance is short or in

loop operation, it may be difficult to discriminate accidents depending on the accident point and accident conditions[1].

Differential relay: ANSI Device No. 87

Differential relays are relays installed at both ends of a transmission line that exchange fault current information with each other to operate a circuit breaker in the event of a transmission line accident. In order to apply differential relays, it is necessary for the relays installed at both ends of the transmission line to exchange fault current information at high speed, so optical fiber cables are used for communication. However, it has disadvantages such as the need for high-speed communication and the fact that it is difficult to distinguish a secondary-side failure of a transmission line branch load from a transmission line failure. Therefore, when applying power line protection, it is necessary to consider the configuration of the facility and if it is applicable.

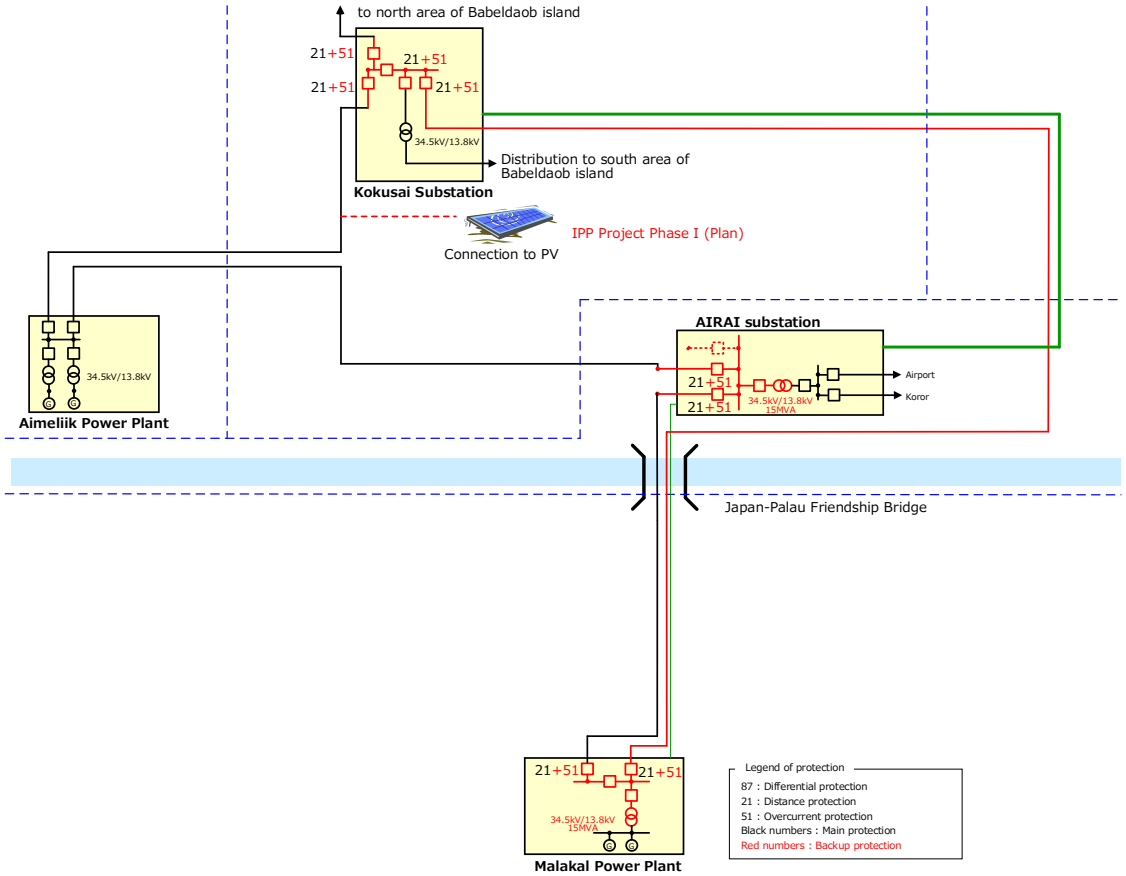
2) Basic Plan for Power Line Protection

In the Project, considering the characteristics of each protection relay system described above, it is proposed that the protection relays shown in Figure 2-2-2.17 and Table 2-2-2.25 be applied to the power substations that are planned to be newly built or modified in the Project. In this study, only the facilities that will be newly constructed or modified in the Project are taken into consideration, not Aimeliik Power Plant that will not be modified or the generation and substation facilities that will be constructed in the IPP Project.

Basic idea:

- ✓ The current power grid in Palau is protected by overcurrent relays, but it is difficult to figure out the protection coordination with overcurrent relays because there are many transmission line sections including the northern grid from Malakal Power plant through Kokusai Substation. Therefore, in the Project, overcurrent relays will not be used for the main protection. However, since overcurrent relays have been applied to existing power plants such as the Aimeliik Power Plant, overcurrent relays will be applied as back-up protection. In order to avoid damage to equipment in the event of main protection failure, an overcurrent relay should be applied as back-up protection.
- ✓ Protective relays at both ends where branch loads exist (or are planned in the future) on the transmission line will apply distance relays as the main protection.
- ✓ For protection relays at both ends of a transmission line where the transmission line distance is relatively short and fiber optic cables are laid as communication line, differential relays are applied as a main protection. However, since there is no applicable situation in the Project, the differential relay will not be selected.

[1] Overseas, a transfer function that communicates the operating status of distance relays at high speed may be added, and distance relays may be applied even during loop operation.



Source：JICA Preparatory Survey Team

Figure 2-2-2.17 Protection Relay System for Each Power Substation

Table 2-2-2.25 Protection Method for 34.5 kV Transmission Line

No.	Transmission line	Protective relays to be applied	Concept and Notes
1	Malakal Power Plant to Airal Substation	Main protection: distance relay (21) Rear protection: Overcurrent relay (51)	・A distance relay will be applied because there are multiple branch loads on the transmission line (large consumers such as hotels exist as branch loads on the existing transmission line). ・A transmission function to communicate the operating status at high speed will be added for quick and reliable grid protection (using an optical fiber cable).
2	Malakal Substation to Kokusai Substation	Main protection: distance relay (21) Rear protection: Overcurrent relay (51)	・The Ngchesar Substation, which is planned to be built in the future, will serve as a branch load, so distance relays will be applied. ・A transfer function for high-speed communication of the operating status shall be added for quick and reliable system protection (using optical fiber cables).
3	Airai Substation to Aimeliik Power Plant	Main protection: distance relay (21) Rear protection: Overcurrent relay (51)	・Since there are multiple branch loads on the transmission line, distance relays are applied. ・Since the protection relays of Aimeliik Power Plant use existing equipment, it is necessary to study the protection coordination in detail. (For the time being, 21+51 will be installed only on Kokusai Substation side.)
4	Aimeliik Substation to Kokusai Substation	Main protection: distance relay (21) Rear protection: Overcurrent relay (51)	・Same as above (For the time being, 21+51 will be installed only on Kokusai Substation side.)

Source: JICA Preparatory Survey Team

Table 2-2-2.25 shows the concept and considerations for selecting protective relays for the transmission and distribution facilities to be constructed in the Project. However, the functions required of protective relays vary depending on the configuration of the transmission and distribution facilities to be constructed in the IPP Project and the method of grid operation (e.g., whether normal loop operation will be used or not), so it is necessary to clarify these conditions, examine them in detail, and select a protective relay system based on coordination with existing facilities.

2-2-3 Outline Design Drawing

The schematic design of the Project is shown in Appendix 6.

2-2-4 Implementation Plan

2-2-4-1 Implementation Policy

The Project will be implemented based on the framework of Japan's Grant Aid, and will be implemented after the approval of the Project implementation by the Government of Japan, the signing Exchange of Notes (E/N) between the Governments of both countries, and signing the Grant Agreement (G/A) between JICA and Palau. The following is a list of basic items and points that require special consideration when implementing the Project.

(1) Executing Agency

The executing agency of the Project in Palau is PPUC, which is required to execute the Project and to be responsible for the operation and maintenance of the procured facilities after completion. In order to ensure the smooth implementation of the Project, PPUC needs to have close communication and collaboration with the Japanese consultant and supplier, and appoint a responsible person to be in charge of the Project.

The appointed PPUC staff member in charge of the Project should make sure that PPUC staff members, related organizations, and local residents who are involved in the Project are fully briefed on and understand the contents of the Project, and are encouraged to cooperate with the implementation of the Project.

(2) Consultant

In order to carry out the procurement and installation of equipment and materials for the Project, a Japanese consultant recommended by JICA (“the Consultant”) will conclude a design and supervision contract with PPUC to carry out the design and construction supervision for the Project. The Consultant will also prepare the bidding documents and conduct the bidding on behalf of PPUC, the Project executing agency.

(3) Supplier

In accordance with the framework of Japan's Grant Aid, the construction of the Project, procurement of materials and equipment, and installation work will be carried out by a supplier

incorporated in Japan, selected by the Palau side through open bidding (“the Supplier”).

After the completion of the Project, the supplier is expected to continue to provide after-sales services, including the supply of replacement parts and support in the event of malfunctions. Therefore, it is necessary to give due consideration to communication and coordination after the delivery of the relevant materials and equipment.

(4) Necessity of Dispatching Engineers

The Project consists of substation construction work, which consists of civil and building works and substation equipment installation in Malakal, Airai, and Kokusai substations, as well as construction of approximately 32.0 km of 34.5 kV overhead line, and installation of approximately 3.0 km of 34.5 kV underground cables. In addition, the majority of these various works will be carried out by multiple construction teams, which will need to be coordinated with each other. In addition, since most of these various construction works will be carried out in parallel, it is essential to dispatch a foreman from Japan who understands the scheme of Japan's Grant Aid and who can manage and guide the entire construction work in a consistent manner for the purpose of process, quality, workmanship and safety management.

2-2-4-2 Implementation Situation

(1) Construction Situation and Technology Transfer in Palau

As mentioned above (see Section 2-2-1-5), there are several general contractors and electrical contractors in Palau, and it is possible to hire local contractors for local procurement of laborers, construction vehicles, and construction equipment, as well as for civil engineering works related to the construction of facilities and transmission and distribution line for the Project. However, in order to ensure that the delivery date of the Project is met, and in consideration of the construction conditions of the 34.5 kV transmission line and 13.8 kV distribution line, it is essential to dispatch Japanese engineers to the site for process, quality and safety controls.

2-2-4-3 Scope of Work

Japan and Palau will be responsible for procurement of equipment, installation, testing, adjustment, and necessary civil works for the construction of a new 34.5/13.8 kV substation, renovation, and construction of a 34.5 kV transmission line (overhead line and underground cable). The Palau side will be responsible for the removal of the existing substation facilities. Table 2-2-4.1 shows the detailed scope of work division between Japan and Palau.

2-2-4-4 Construction Procurement Supervision Plan

In accordance with Japan's Grant Aid system, the Consultant will organize an integrated project team for implementation design and construction supervision based on the purpose of the basic design to ensure smooth implementation of the work. Since the Project is a complex construction work consisting of substation construction and transmission and distribution line construction, and since it is necessary

to coordinate with PPUC in the field to supervise the work which includes linkage with the existing substation facilities in the substation construction and the continuous connection and switching with the existing transmission line in the transmission and distribution line construction, the Consultant shall station at least one engineer at the site during the construction supervision phase to carry out comprehensive process management, quality management, workmanship management and safety management. In addition, the Consultant shall dispatch a specialist engineer other than the resident supervising engineer as the work progresses, for example, during installation of equipment, commissioning and adjustment, and handover tests, and shall supervise the construction of the equipment by the Supplier. In addition, domestic experts shall participate in on-site inspections and pre-shipment inspections of materials and equipment manufactured in Japan, and they shall supervise the materials and equipment to prevent problems from occurring after their delivery to the site.

(1) Basic Policy for Construction Supervision

The basic policy of the Consultant shall be to supervise the progress of the construction work so that the Work is completed within the specified construction period, to ensure the quality, workmanship and delivery of materials and equipment as indicated in the Contract Documents, and to supervise and guide the Supplier so that the work is carried out safely at the site. The following are the main points to be considered in construction supervision.

(2) Schedule Control

In order to ensure that the Supplier meets the delivery date indicated in the contract, the Team will compare the actual progress with the implementation agreed schedule in the contract each month or each week, and when a delay in the process is predicted, the Team will alert the Supplier and request it to submit and implement countermeasure plan, and provide guidance. The comparison between the planned schedule and the progress is mainly based on the following items:

- Confirmation of actual delivery of materials and equipment (materials and equipment for substation and transmission, and materials and equipment for civil engineering and construction work)
- Checking the status of temporary works and preparation of construction equipment
- Confirmation of estimates and actual numbers of engineers, technicians, laborers, etc.

(3) Safety Control

In consultation and cooperation with the responsible person of the Supplier, safety management shall be carried out to prevent occupational accidents at the site and accidents to third parties during the construction period. The points to be noted regarding safety management at the site are as follows:

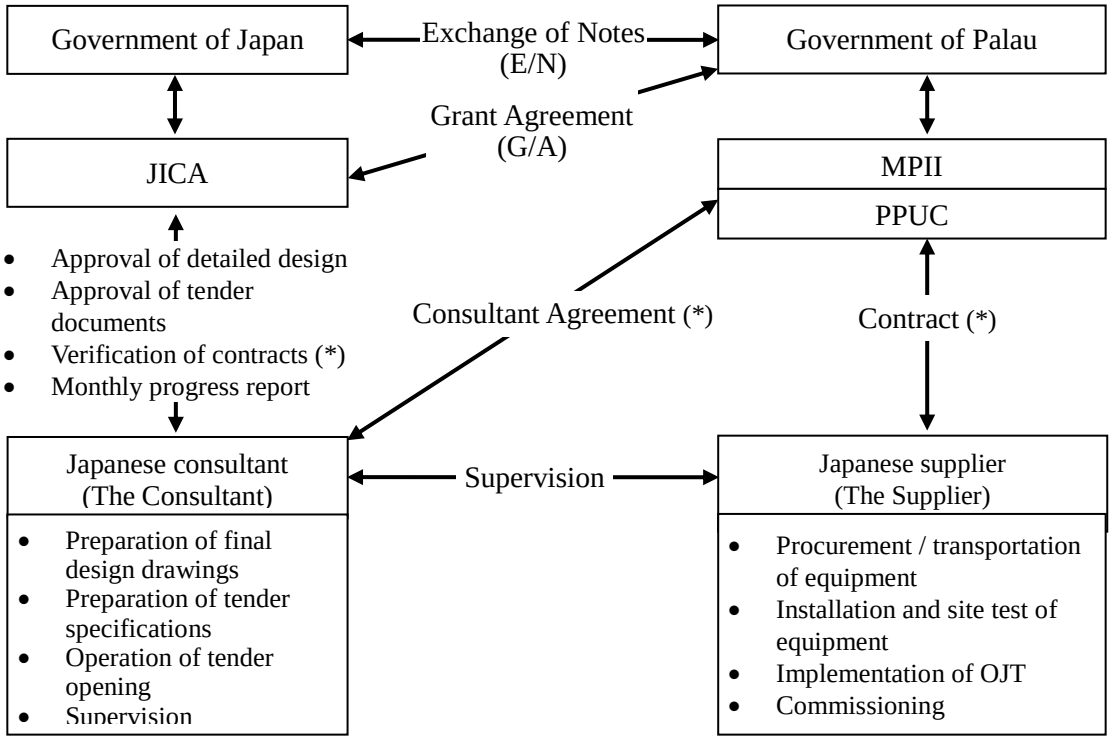
- Establishment of safety management regulations and appointment of managers
- Preventing disasters by conducting periodical inspections of construction machinery
- Formulate operation routes for construction vehicles and transport equipment, and ensure safe

driving.

- Measures to provide welfare to workers and encourage them to take holidays

(4) Overall Project Implementation Relationship

The relationships between the parties involved in the Project implementation are shown in Figure 2-2-4.1.



Note: *JICA's verification is required for Consultant Agreement and Contract.
Source: JICA Preparatory Survey Team

Figure 2-2-4.1 Project Implementation Relationship Diagram

(5) Construction Manager

The Supplier will procure materials and equipment for the construction and rehabilitation of the 34.5/13.8 kV substation and the construction of the 34.5 kV transmission line (overhead line and underground cables), and will also carry out civil and building works related to the Project. In addition, the Supplier will employ local Palauan Suppliers as subcontracts to carry out the work. Therefore, it is necessary for the Supplier to ensure that the subcontractors are fully aware of the construction process, quality, workmanship, and safety measures stipulated in the contract, and the Supplier shall dispatch engineers with experience in similar work overseas to provide guidance and advice to the local Suppliers. In addition, the adjustment and testing of substation equipment and transmission line materials and equipment after installation requires specialized engineers from manufacturers with the prescribed technical level.

2-2-4-5 Quality Control Plan

The Consultant's construction management personnel shall monitor and verify the quality of the materials and equipment procured for the Project and the quality and workmanship of their construction/installation as indicated in the contract documents (technical specifications, working drawings, etc.), based on the following items, and ask the Supplier to make corrections, changes, or revisions if the quality of workmanship is in doubt:

- Verification of production drawings and specifications for materials and equipment
- Attendance at factory inspections of materials and equipment, or verification of factory inspection results
- Verification of packaging, transportation, and on-site temporary storage methods
- Verification of construction drawings and installation manuals for materials and equipment
- Checking of procedures for commissioning, adjustment, testing, and inspection of materials and equipment
- Supervision of on-site installation of materials and equipment, and witnessing of trial operation, adjustment, testing, and inspection
- Verification of equipment installation drawings, fabrication drawings and on-site workmanship
- Verification of construction drawings/manufacturing drawings and on-site workmanship

2-2-4-6 Procurement Plan

The equipment and materials for the transmission and substation facilities to be procured and installed in the Project are not manufactured in Palau. Therefore, in Palau, all substation equipment such as transformers, switchgear, etc. are procured from developed countries such as Japan, the United States, and Taiwan. In recent years, PPUC has started introducing the substation facilities procured from Singapore. With regard to high-voltage substation equipment, only few manufacturers have the necessary after-sales service system in place to deal with accidents, repairs, etc. and to procure replacement parts. Therefore, in selecting suppliers of materials and equipment for the transmission and substation facilities of the Project, it is necessary to consider these local conditions, besides the ease of operation and maintenance of the facilities by Palauan engineers, and the availability of after-sales service systems for procurement of replacement parts and response to breakdowns. PPUC, which will be in charge of the operation and maintenance of the facilities and equipment after the completion of the Project, is confident that the transformers and transmission and distribution equipment made in Japan and procured through past Japanese grant aid are still in good working order at each site, and that the high performance of the main transformer equipment and the after-sales service system of the Japanese manufacturer are reliable. In addition, the high performance of the main substation equipment and the after-sales service system of Japanese manufacturers are reliable. Therefore, it is strongly hoped that the substation equipment and materials for the Project will be made in Japan as much as possible. According to the Director of Aimeliik Power plant, the Power plant, which was procured through a past Japan's Grant Aid, has been operating smoothly and without any problems since the start of its operation. The

Team believes that the request from Palau is reasonable.

As for construction equipment for equipment installation and transportation, 50-ton class cranes and trailers can be leased locally, and there are no particular obstacles to the implementation of the Project.

Based on the above points, the suppliers of materials and equipment to be used in the Project shall be as follows.

(1) Materials and Equipment Procured in Palau

Materials and equipment for construction: Cement, sand, aggregate for concrete, concrete blocks, rebar, lumber, gasoline, diesel oil, construction vehicles, cranes, trailers, and other materials and equipment for temporary construction

(2) Materials and Equipment Procured from Japan

1) Materials and Equipment for Substation Equipment

34.5/13.8 kV transformers

2) Materials and Equipment for Transmission and Distribution Line

34.5 kV transmission line materials and equipment (steel, insulators, etc.)

(3) Materials and Equipment Procured from Third Countries (DAC and ASEAN Countries).

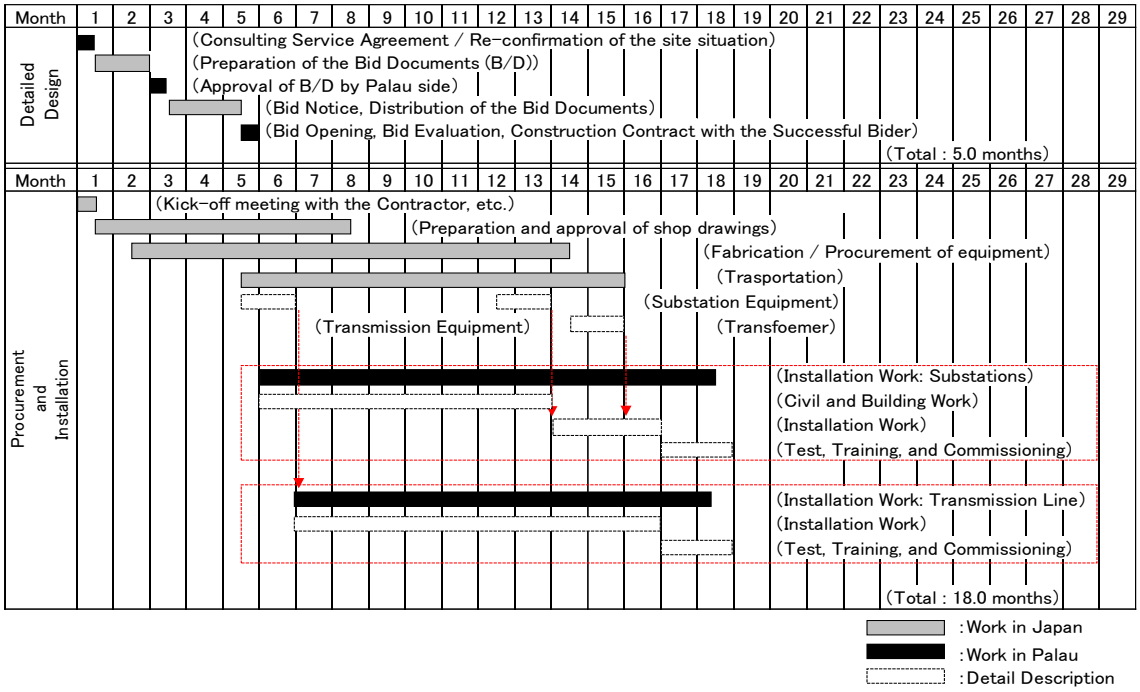
34.5 kV cable, 13.8 kV cable, 34.5 kV switchgear, 13.8 kV switchgear, internal transformers, DC equipment, low-voltage switchboards, etc.

2-2-4-7 Operation Guidance Plan

PPUC shall closely consult with the Consultant and the Supplier to ensure smooth implementation of this guidance plan. PPUC shall closely contact and discuss with the Consultant and the Supplier and appoint a full-time engineer to participate in the on-the-job training (OJT) to ensure smooth implementation of this guidance plan. The appointed PPUC engineers should horizontally deploy their skills to other staff who were not able to participate in the plan, and cooperate with PPUC in improving its maintenance and management capabilities.

2-2-4-8 Implementation Schedule

Based on Japan's Grant Aid scheme, the Project implementation schedule is as shown in Figure 2-2-4.2.



Source: JICA Preparatory Survey Team

Figure 2-2-4.2 Project Implementation Schedule

2-3 Security Plan

Although the target area of the Project is requested to be an area with few security problems, it is necessary to pay sufficient attention to the prevention of theft of equipment and materials and the safety of construction workers. For this reason, it is essential that the Palauan side take necessary safety measures, and the Japanese side should also consider safety measures such as installing a fence at the equipment and materials storage area as part of the temporary construction work and assigning security guards.

2-4 Obligations of Recipient Country

In addition to the issues identified in Appendix 5 and Appendix 6, the following are the major issues that are currently expected to be borne by the parties from a technical perspective. The name of the organization responsible for each item is shown in the rightmost column.

Table 2-2-4.1 Major Undertakings to be Borne by Japan and Palau

No.	Items	Japan side		Palau side		
		Procurement	Installation	Procurement	Installation	In charge
A. Before the Bidding						
1	To sign the banking arrangement (B/A) with a bank in Japan (the Agent Bank) to open bank account for the Grant	-	-	●	●	MOF
2	To issue the authorization to pay (A/P) to the Agent Bank for the payment to the Consultant	-	-	●	●	MOF
3	To bear the following commissions to the Agent Bank for the banking services based upon B/A					MOF
	1) Advising commission of A/P	-	-	●	●	
	2) Payment commission for A/P	-	-	●	●	

No.	Items	Japan side		Palau side		In charge
		Procurement	Installation	Procurement	Installation	
4	To approve EA/EIS (conditions of approval should be fulfilled, if any) and secure the necessary budget for the implementation of EMP and EMoP (and fulfilling conditions of approval, if any)	-	-	●	●	PPUC
5	To secure the necessary budget and implement land acquisition and resettlement (including preparation of resettlement sites), and compensation with full replacement cost in accordance with RAP	-	-	●	●	MOF
6	To implement social monitoring, and to submit the monitoring results to JICA, by using the monitoring form, on a quarterly basis as a part of Project Monitoring Report	-	-	●	●	PPUC
7	To secure and clear the following lands (land acquisition and the compensation, cutting trees, and clearance of obstacles) 1) project sites - for Kokusai Substation, Malakal Power Plant (if necessary) - for 34.5 kV transmission/ 13.8 kV distribution line within the right of way (approx. 32 km of overhead line route and approx. 3 km of underground cable route) 2) temporary storage yard for the equipment and materials	-	-	●	●	MPII/ PPUC
8	To obtain the planning, zoning, building permit from relevant authority (State Government of Koror, Airai, Ngatpang, Ngchesar and/or Others, if any)	-	-	●	●	PPUC
9	To clear, level and reclaim the following sites 1) leveling and reclaiming the sites - for Kokusai Substation, Malakal Power Plant (if necessary)	●	●	-	-	PPUC
10	To submit Project Monitoring Report (with the result of Detailed Design)	-	-	●	●	PPUC
11	To obtain permit for the Project implementation from relevant authority (right of way from road authority, State Government of Koror, Airai, Ngappang and/or Others, if any)	-	-	●	●	PPUC
12	To obtain earthmoving permit from EQPB	-	-	●	●	PPUC
13	To explain the Project to the residents living near the facility construction site and hold stakeholder meetings	-	-	●	●	PPUC
B. During the Project Implementation						
1	To issue A/P to the Agent Bank for the payment to the supplier and the contractor	-	-	●	●	MOF
2	To bear the following commissions to the Agent Bank for the banking services based upon the B/A					MOF
	1) Advising commission of A/P	-	-	●	●	
	2) Payment commission for A/P	-	-	●	●	
3	to ensure prompt unloading and customs clearance at ports of disembarkation in the country of the Recipient and to assist the Supplier(s) with internal transportation therein	-	-	●	●	MPII/ PPUC
4	To accord Japanese physical persons and/or physical persons of third countries whose services may be required in connection with the supply of the products and the services such facilities as may be necessary for their entry into the country of the Recipient and stay therein for the performance of their work	-	-	●	●	MPII/ PPUC

No.	Items	Japan side		Palau side		
		Procurement	Installation	Procurement	Installation	In charge
5	To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the country of the Recipient with respect to the purchase of the products and/or the services be exempted and/or be borne by its designated authority without using the Grant	-	-	●	●	MOF/ MPII
6	To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project	-	-	●	●	MPII/ PPUC
7	To notify JICA promptly of any incident or accident, which has, or is likely to have, a significant adverse effect on the environment, the affected communities, the public or workers	-	-	●	●	PPUC
8	To submit Project Monitoring Report after each work under the contract(s) such as shipping, hand over, installation and operational training	-	-	●	●	PPUC
9	To submit Project Monitoring Report (final) (including as-built drawings, equipment list, photographs, etc.)	-	-	●	●	PPUC
10	To submit a report concerning completion of the Project	-	-	●	●	PPUC
11	To construct access roads (if any) 1) Outside the Project site (access road within the Project site is borne by Japan side)	-	-	●	●	PPUC
12	To provide facilities for distribution of electricity, water supply and drainage and other incidental facilities necessary for the implementation of the Project outside the site(s)	-	-	●	●	PPUC
13	To provide equipment, furniture, facilities necessary for the implementation of the Project in the site(s)	-	-	●	●	PPUC
14	To ensure the safety of persons engaged in the implementation of the Project	-	-	●	●	PPUC
15	To construct fence and gate around substation (However, if the fence needs to be restored due to the work in Airai Substation, this work will be borne by the Japanese side.)	-	-	●	●	PPUC
16	To implement EMP and EMoP	-	-	●	●	PPUC
17	To submit results of environmental monitoring to JICA, by using the monitoring form, on a quarterly basis as a part of Project Monitoring Report	-	-	●	●	PPUC
18	To implement RAP (livelihood restoration program)	-	-	●	●	MPII/PPUC
19	To implement social monitoring, and to submit the monitoring results to JICA, by using the monitoring form, on a quarterly basis as a part of Project Monitoring Report - Period of the monitoring may be extended if affected persons' livelihoods are not sufficiently restored. Extension of the monitoring will be decided based on agreement between PPUC and JICA.	-	-	●	●	PPUC
20	Construction of building and civil work	●	●	-	-	
21	Procurement, installation, testing and adjustment of the Equipment and materials for the Project	●	●	-	-	
22	Procurement of the Spare parts and consumables	●	●	-	-	
23	Procurement of the Maintenance tools	●	●	-	-	
24	On-the-job training (OJT) for the Equipment	●	●	-	-	
	Transmission Line					
25	Survey of underground utilities including water pipes, communication line, unexploded ordnance search and removal (approx. 32 km of overhead line route and approx. 3 km of underground cable route)	-	-	●	●	PPUC

No.	Items	Japan side		Palau side		
		Procurement	Installation	Procurement	Installation	In charge
26	Rearrangement work of the attached equipment of existing poles for installation of 34.5 kV transmission line to be done by Japan side (13.8 kV distribution line, distribution transformer, low voltage distribution line, etc.)	-	-	●	●	PPUC
27	Temporary power outage plan for 34.5 kV transmission line during the work including the notice to the residents	-	-	●	●	PPUC
28	Re-connecting of existing 34.5 kV line to new line, and existing 13.8 kV line to new line for Malakal Power Plant (With the consensus and the presence of the Personnel of PPUC)	●	●	-	-	
29	Restoration of roads after pole erection and buried cables	●	●	-	-	
	Substation					
30	Site creation work for Kokusai Substation	●	●	-	-	
31	Application for transportation permit of heavy goods to relevant authority with improving the existing access roads from the port of Palau to the Project sites, if necessary	-	-	●	●	PPUC
32	Construction of access road within project site and parking lot for Malakal Power Plant	●	●	-	-	
33	Temporary power outage plan for substation during the work including the notice to the residents	-	-	●	●	PPUC
34	Removal and disposal of existing equipment in Airai Substation, Malakal Power Plant, and Other substation (if any) in order to install substation equipment by the Japanese side	-	-	●	●	PPUC
C. After the Project						
1	To implement EMP and EMoP	-	-	●	●	PPUC
2	To submit results of environmental monitoring to JICA, by using the monitoring form, semiannually - The period of environmental monitoring may be extended if any significant negative impacts on the environment are found. The extension of environmental monitoring will be decided based on the agreement between PPUC and JICA	-	-	●	●	PPUC
3	To carry out the following to maintain and use properly and effectively the facilities constructed and equipment provided under the Grant Aid 1) Allocation of maintenance cost 2) Operation and maintenance structure 3) Routine check/Periodical inspection	-	-	●	●	PPUC
4	Disposal of removed existing equipment	-	-	●	●	PPUC

Note:

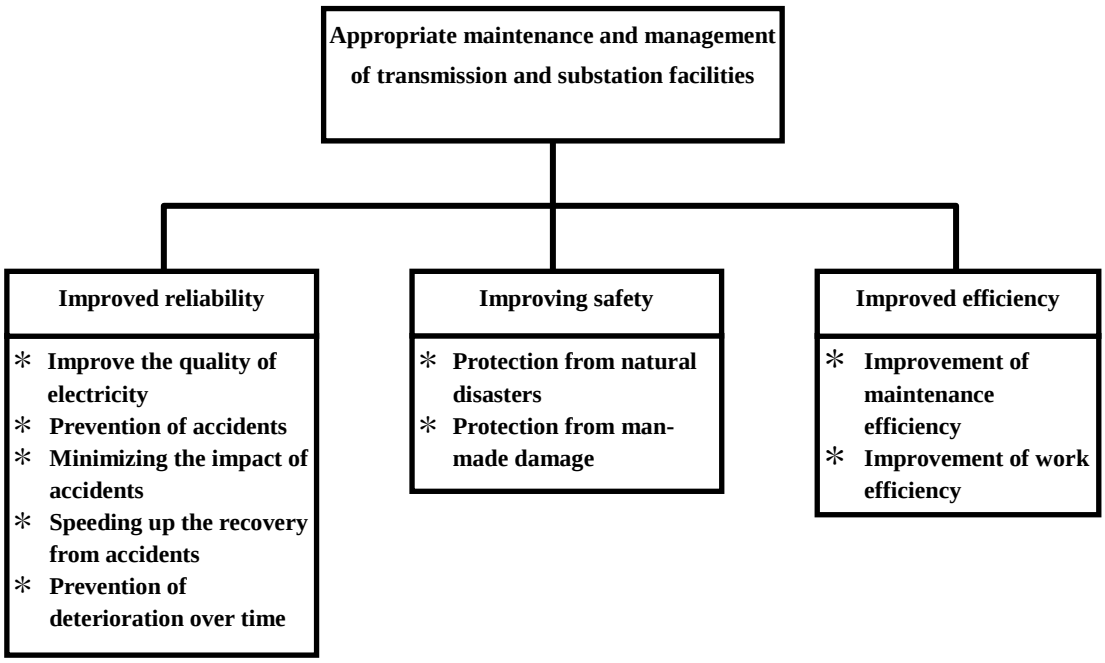
EA : Environmental Assessment
EIS : Environmental Impact Statement
EMP : Environmental Management Plan
EMoP : Environmental Monitoring Plan
EoJ : Embassy of Japan
JICA : Japan International Cooperation Agency
MOF : Ministry of Finance
MPII : Ministry of Public Infrastructure and Industries
PPUC : Palau Public Utilities Corporation

Source: JICA Preparatory Survey Team

2-5 Operation and Maintenance of the Project

2-5-1 Basic Policy

Proper operation and maintenance (O&M) of transmission and substation facilities and preservation of their surrounding environment are essential to improve the reliability of power supply to consumers in the Project area and to ensure stable power supply operation. Therefore, it is desirable to implement appropriate preventive maintenance and O&M aimed at reducing the accident rate of each facility and improving reliability, safety, and efficiency. Figure 2-5-1.1 shows the basic approach to the maintenance and management of transmission and substation facilities. As a result, the maintenance and management of the equipment to be procured and installed in the Project and the facilities to be constructed should be carried out with a focus on preventive maintenance.



Source: JICA Preparatory Survey Team

Figure 2-5-1.1 Basic Approach to the Maintenance and Management of Transmission and Substation Facilities

In the Project, OJT on operation and maintenance of the substation and transmission facilities will be provided by the engineers dispatched by the Supplier during the period of installation and testing and adjustment. At the same time, Japan will provide the necessary replacement parts, test equipment, maintenance tools, and operation and maintenance manuals, and will propose an operation and maintenance management system after the start of service, which will be fully effective.

2-5-2 Daily and Periodical Inspection Items

2-5-2-1 Daily and Periodical Inspection Items for Substation Equipment

The standard periodical inspection items for the substation equipment to be procured and installed in the Project are shown in Table 2-5-2.1. As shown in the table, the inspection of the substation equipment

consists of: (1) "daily inspection" to check the equipment daily for abnormal heat generation, abnormal noise, etc., using the five human senses; (2) a "regular inspection" to check the bolts, etc., of each piece of equipment for tightness, surface contamination of insulators, etc., which cannot be done in the daily inspection; and (3) a "detailed inspection" to check the interconnection between each piece of equipment.. Normally, regular inspections are conducted once every one to two years, and detailed inspections are conducted once every four years. Fuses, gauges, relays, and other components in switchboards, etc., whose performance is deteriorated, whose insulation performance is deteriorated, whose contacts are worn out, or whose characteristics are changed, should be replaced as necessary after checking the characteristics and frequency of use of the components during regular and detailed inspections.

Table 2-5-2.1 Standard Periodical Inspection Items for Substation Equipment and Materials

Inspection Items	Inspection details (method)	Daily inspection	Regular inspection	Detailed inspection
Equipment appearance	Display status of open/close indicator and open/close indicator light	○	○	
	No abnormal sound or smell	○	○	
	Heating discoloration of terminals	○	○	
	Presence of cracks, breakage, and staining of bushings and insulators	○	○	
	Rusting of the installation case, mount, etc.	○	○	
	Temperature abnormality (thermometer)	○	○	
	Tightening condition of bushing terminal (mechanical check)	○	○	
Operating equipment and Control panel	Display status of various instruments	○	○	○
	Indication of operation count meter		○	○
	Status of wetness, rusting, and staining in the operation box and panel		○	○
	Status of oil supply and cleaning		○	○
	Tightening status of wiring terminals	○	○	○
	Checking the status of the open/close indicator		○	○
	Presence of air leakage and oil leakage		○	○
	Pressure check before and after operation (SF6 gas pressure, etc.)		○	○
	Check operation of movement meter		○	○
	Check for rusting, deformation, or damage to the spring (maintenance)	○	○	○
	Check for any abnormality in the pins of each tightening part.		○	○
	Inspection of auxiliary switchgear and relay (maintenance)		○	○
	Inspection of DC control power supply	○		
Measurement and testing	Insulation resistance measurement		○	○
	Measurement of contact resistance			○
	Check for heater disconnection		○	○
	Relay operation test		○	○

Source: JICA Preparatory Survey Team

2-5-2-2 Daily and Periodical Inspection Items for Transmission Line

The maintenance and management of 34.5 kV transmission line and 13.8 kV distribution line is the most important service to be provided to customers. In addition, when ground fault accidents due to contact with trees on transmission and distribution line are expected, it is necessary to take preventive measures such as cutting down trees in advance. The following are the main items to be inspected during daily patrols.

Table 2-5-2.2 Inspection Items for Transmission and Distribution Line

Equipment		Inspection Items
Support	Concrete pole	No cracks, breaks, bends, or tilts
	Guy wire	No corrosion, breakage, looseness
Armature		No curvature, inclination, rusting, or corrosion
Insulator		No cracks, damage, or staining Bindings not detached or broken
electric wire		Whether or not the coating is damaged Proximity between dissimilar wires, arms, etc. Disconnection of lead wire Contact with trees, etc.
Switch		No rusting or corrosion of the case Whether the bushing is cracked, damaged, or stained
Cable	Cable	Whether the cable exterior is damaged or deteriorated
	Pipeline	Whether the protection pipe is damaged, deformed, rusted, or corroded Disconnect the cap of the rising protection pipe.
	Cable Head	Discoloration or deformation of terminal cover due to heating Deterioration or damage to triggers Damage or staining of bushings
Manhole		Check for shifting or rattling of the iron cover Presence of cracks or damage to the iron cover Whether there is a gap between the cover and the road surface

Source: JICA Preparatory Survey Team

2-5-3 Spare Parts Procurement Plan

2-5-3-1 Target Equipment for Spare Parts

Spare parts should be selected on the basis of parts which wear and deteriorate with daily operations and must be replaced regularly. The following spare parts, fulfilling quantities needed for one year, will be procured for the Project.

(1) Substation Equipment

- Transformer
- 34.5 kV switchgear
- Station power supply equipment

(2) Transmission and Transformation Equipment

- Not applicable

2-5-3-2 Procurement Plan for Replacement Parts

The Japanese side plans to procure the minimum required standard spare parts for one year for the Project. These items are given in Table 2-5-3.1 and Table 2-5-3.2. PPUC will be responsible for preparing a budget for purchasing necessary replacement parts after one year of the completion of the Project.

Table 2-5-3.1 Lists of Spare Parts

No.	Spare Part	Unit	Quantity
1	For 34.5/13.8kV transformer		
(1)	gasket (each type)	Set	1
(2)	Buchholz Relay	Set	1
(3)	Oil Temperature Gauge	Set	1
(4)	Oil Level Gauge	Set	1
(5)	34.5 kV Bushing	Set	1
(6)	13.8 kV Bushing	Set	1
2	For 34.5 kV Switchgear		
(1)	Various Fuses (each type)	Set	1
(2)	Various MCCBs (each type)	Set	1
(3)	Various Protection Relays (each type)	Set	1
(4)	Various Auxiliary Relays (each type)	Set	1
(5)	Various Meters (each type)	Set	1
(6)	Various Switches (each type)	Set	1
(7)	Withdrawable Circuit Breaker with Accessory	Set	1
3	For 13.8 kV Switchgear		
(1)	Various Fuses (each type)	Set	1
(2)	Various MCCBs (each type)	Set	1
(3)	Various Protection Relays (each type)	Set	1
(4)	Various Auxiliary Relays (each type)	Set	1
(5)	Various Meters (each type)	Set	1
(6)	Various Switches (each type)	Set	1
(7)	Withdrawable Circuit Breaker with Accessory	Set	1
4	For station service equipment		
(1)	Various Fuses (each type)	Set	1
(2)	Various MCCBs and ELCBs (each type)	Set	1
(3)	Various Meters (each type)	Set	1
(4)	Various Protection Relays (each type)	Set	1

Table 2-5-3.2 Lists of Consumables

No.	Consumables	Unit	Quantity
1	For 34.5/13.8kV transformer		
(1)	Silica gel	Set	1

2-5-3-3 Testing Instrument and Maintenance Tools Plan

Testing equipment and maintenance tools should be considered by the Project for main equipment of transformers and their protection relay devices. Testing equipment and maintenance tools of minimum requirement to be prepared from the beginning of the installation are shown in Table 2-5-3.3 for continuous steady operation and maintenance.

1) Withstand Voltage Testing Device for Insulation Oil of Transformer

Electrical insulating oil is needed to inspect insulation performance by measuring and recording withstand voltage with oil sampling periodically because performance of the oil gradually deteriorates as transformers operate.

Table 2-5-3.3 Lists of Testing Equipment

No.	Testing Equipment	Unit	Quantity
1	Withstand voltage testing device for insulation oil of transformer	Set	1

2-6 Project Cost Estimation

2-6-1 Initial Cost Estimation

(1) Condition of the Estimation

1) Time of estimation: September 2021
2) Exchange rate:
   1 US$ = 111.09 JPY (TTS average from June 2021 to August 2021)
3) Construction/procurement period: Periods for detailed design, equipment procurement and installation are as shown in the construction schedule.
4) Other: The Project is implemented according to the Japan's Grant Aid Scheme.

(2) Costs Borne by Palau

1.54 million US$ (approximately 171 million yen)

The cost borne by Palau by work item is given in Table 2-6-1.1:

Table 2-6-1.1 Breakdown of Costs Borne by Palau

No.	Work Items	Responsibility	Cost (USD)
A. Before the Bidding			
1	To sign the banking arrangement (B/A) with a bank in Japan (the Agent Bank) to open bank account for the Grant	MOF	-
2	To issue the authorization to pay (A/P) to the Agent Bank for the payment to the Consultant	MOF	-
3	To bear the following commissions to the Agent Bank for the banking services based upon B/A	MOF	
	1) Advising commission of A/P		250
	2) Payment commission for A/P		1,000
4	To approve EA/EIS (conditions of approval should be fulfilled, if any) and secure the necessary budget for the implementation of EMP and EMoP (and fulfilling conditions of approval, if any)	PPUC	-
5	To secure the necessary budget and implement land acquisition and resettlement (including preparation of resettlement sites), and compensation with full replacement cost in accordance with RAP	MOF	462,217
6	To implement social monitoring, and to submit the monitoring results to JICA, by using the monitoring form, on a quarterly basis as a part of Project Monitoring Report	PPUC	240

No.	Work Items	Responsibility	Cost (USD)
7	To secure and clear the following lands (land acquisition and the compensation, cutting trees, and clearance of obstacles) 1) project sites - for Kokusai Substation, Malakal Power Plant (if any) - for 34.5 kV transmission/ 13.8 kV distribution line within the right of way (approx. 32 km of overhead line route and approx. 3 km of underground cable route) 2) temporary storage yard for the Equipment and materials	MPII/ PPUC	60,000
8	To obtain the planning, zoning, building permit from relevant authority (State Government of Koror, Airai, Ngatpang, Ngchesar and/or Others, if any)	PPUC	180
10	To submit Project Monitoring Report (with the result of Detailed Design)	PPUC	-
11	To obtain permit for the Project implementation from relevant authority (right of way from road authority, State Government of Koror, Airai, Ngappang and/or Others, if any)	PPUC	420
12	To obtain earthmoving permit from EQPB	PPUC	180
13	To explain the Project to the residents living near the facility construction site and hold stakeholder meetings	PPUC	1,500
	SUB TOTAL (A)		**525,987**
B. During the Project Implementation			
1	To issue A/P to the Agent Bank for the payment to the supplier and the contractor	MOF	-
2	To bear the following commissions to the Agent Bank for the banking services based upon the B/A	MOF	
	1) Advising commission of A/P		250
	2) Payment commission for A/P		22,000
3	to ensure prompt unloading and customs clearance at ports of disembarkation in the country of the Recipient and to assist the Supplier(s) with internal transportation therein	MPII/ PPUC	90
4	To accord Japanese physical persons and/or physical persons of third countries whose services may be required in connection with the supply of the products and the services such facilities as may be necessary for their entry into the country of the Recipient and stay therein for the performance of their work	MPII/ PPUC	90
5	To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the country of the Recipient with respect to the purchase of the products and/or the services be exempted and/or be borne by its designated authority without using the Grant	MOF/ MPII	90
6	To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project	MPII/ PPUC	-
7	To notify JICA promptly of any incident or accident, which has, or is likely to have, a significant adverse effect on the environment, the affected communities, the public or workers	PPUC	45
8	To submit Project Monitoring Report after each work under the contract(s) such as shipping, hand over, installation and operational training	PPUC	90
9	To submit Project Monitoring Report (final) (including as-built drawings, equipment list, photographs, etc.)	PPUC	45
10	To submit a report concerning completion of the Project	PPUC	-
11	To construct access roads (if any) 1) Outside the Project site (access road within the Project site is borne by Japan side)	PPUC	-

No.	Work Items	Responsibility	Cost (USD)
12	To provide facilities for distribution of electricity, water supply and drainage and other incidental facilities necessary for the implementation of the Project outside the site(s)	PPUC	10,000
13	To provide equipment, furniture, facilities necessary for the implementation of the Project in the site(s)	PPUC	-
14	To ensure the safety of persons engaged in the implementation of the Project	PPUC	-
15	To construct fence and gate around substation (However, if the fence needs to be restored due to the work in Airai Substation, this work will be borne by the Japanese side.)	PPUC	100,000
16	To implement EMP and EMoP	PPUC	-
17	To submit results of environmental monitoring to JICA, by using the monitoring form, on a quarterly basis as a part of Project Monitoring Report	PPUC	360
18	To implement RAP (livelihood restoration program)	MPII/PPUC	-
19	To implement social monitoring, and to submit the monitoring results to JICA, by using the monitoring form, on a quarterly basis as a part of Project Monitoring Report - Period of the monitoring may be extended if affected persons' livelihoods are not sufficiently restored. Extension of the monitoring will be decided based on agreement between PPUC and JICA.	PPUC	360
	Transmission Line		
25	Survey of underground utilities including water pipes, communication line, unexploded ordnance search and removal (approx. 32 km of overhead line route and approx. 3 km of underground cable route)	PPUC	42,000
26	Rearrangement work of the attached equipment of existing poles in order to install 34.5 kV transmission line to be borne by Japan side : 13.8 kV distribution line, distribution transformer, low voltage distribution line, etc.	PPUC	200,000
27	Temporary power outage plan for 34.5 kV transmission line during the work including the notice to the residents	PPUC	45,000
	Substation		
31	Application for transportation permit of heavy goods to relevant authority with improving the existing access roads from the port of Palau to the Project sites, if necessary	PPUC	10,000
33	Temporary power outage plan for substation during the work including the notice to the residents	PPUC	15,000
34	Removal and disposal of existing equipment in Airai Substation, Malakal Power Plant, and Other substation (if any) in order to install substation equipment by the Japanese side	PPUC	10,000
	SUB TOTAL (B)		**455,420**
C. After the Project			
1	To implement EMP and EMoP	PPUC	-
2	To submit results of environmental monitoring to JICA, by using the monitoring form, semiannually - The period of environmental monitoring may be extended if any significant negative impacts on the environment are found. The extension of environmental monitoring will be decided based on the agreement between PPUC and JICA	PPUC	180

No.	Work Items	Responsibility	Cost (USD)
3	To carry out the following to maintain and use properly and effectively the facilities constructed and equipment provided under the Grant Aid 1) Allocation of maintenance cost 2) Operation and maintenance structure 3) Routine check/Periodic inspection	PPUC	57,000 /year *1
4	Disposal of removed existing equipment	PPUC	500,000
	SUB TOTAL (C)		**557,180**
	GRAND TOTAL (A+B+C)		**1,538,587**

*1 The Estimate cost is subject to change depend on the operation condition and surrounding environment of the facilities.

2-6-2 Operation and Maintenance Cost

After the commencement of service, Transmission & Distribution Division of PPUC shall be responsible for the operation and maintenance of the equipment procured and installed by the Project. Since the scope of the Project are upgrading existing substations and have already been properly operated and maintained by PPUC, no additional employment is expected.

As for the spare parts and consumables given in Table 2-5-3.1 and Table 2-5-3.2, PPUC must stock them at all times in order to operate the substation properly. This shall require PPUC to budget roughly 43 thousand US dollars (less than 1% of the equipment costs) if necessary. The cost for repair and maintenance of PPUC was about 1,600 thousand US dollars in 2019, and the budget shall cover the O&M costs for the substations of the Project.

CHAPTER 3 PROJECT EVALUATION

Chapter 3 Project Evaluation

3-1 Preconditions

A summary of the preconditions and concerns for the implementation of the Project is given below:

- To minimize the power outage between interconnection of Malakal Power Plant and Aimeliik Power Plant as much as possible.
- New sections of the transmission line shall be constructed in advance to reduce the power outage time.
- Consideration should be given to the use of bypass cables or emergency generators to supply temporary power to critical loads such as the 13.8 kV airport line supplied from Airai Substation, where temporary power outages are not allowed.
- For the protection of transmission line, only the facilities to be procured and installed in the Project are considered, not the existing Aimeliik Power Plant or the generation and substation facilities to be constructed in the IPP Project. Therefore, it is necessary to clarify these conditions, examine them in detail, and select a protection relay system based on the coordination with existing facilities.
- It is a prerequisite for the implementation of the project that there is no significant change in the scope of environmental and social impacts in the project area. It is also necessary to monitor the project to ensure that the private landowners in the project area are compensated.

3-2 Necessary Inputs by the Recipient Country

Section 2-4 (Table 2-2-4.1) has already listed the major undertakings that the Palau side has to fulfill to achieve the overall plan of the Project, and the main ones are described below.

(1) Before the Bidding

1) To approve EA/EIS (conditions of approval should be fulfilled, if any) and secure the necessary budget for the implementation of EMP and EMoP (and fulfilling conditions of approval, if any)

2) To secure the necessary budget and implement land acquisition and resettlement (including preparation of resettlement sites), and compensation with full replacement cost in accordance with RAP

3) To secure and clear the following lands (land acquisition and compensation, tree trimming, removal of obstacles):

- Project site
  - For Kokusai Substation, Malakal Power Plant (if any)
  - For 34.5 kV transmission/ 13.8 kV distribution line within the right of way

(approx. 32 km of overhead line route and approx. 3 km of underground cable route)

- Temporary storage yard for the equipment and materials

4) To obtain the planning, zoning, building permit from relevant authority (State Government of Koror, Airai, Ngatpang, Ngchesar and/or others, if any)

5) To obtain permit for the Project implementation from relevant authority (right of way from road authority, State Government of Koror, Airai, Ngappang and/or others, if any)

6) To obtain earthmoving permit from EQPB

(2) During the Project Implementation

1) To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the country of the Recipient with respect to the purchase of the products and/or the services be exempted and/or be borne by its designated authority without using the Grant

Transmission Line:

2) Survey of underground utilities including water pipes, communication line, unexploded ordnance search and removal

3) Rearrangement work of the attached equipment of existing poles in order to install 34.5 kV transmission line to be borne by Japan side

- 13.8 kV distribution line, distribution transformer, low voltage distribution line, etc.

4) Temporary power outage plan for 34.5 kV transmission line during the work including the notice to the residents

Substation:

5) Application for transportation permit of heavy goods to relevant authority with improving the existing access roads from the port of Palau to the Project sites, if necessary

6) Temporary power outage plan for substation during the work including the notice to the residents

7) Removal and disposal of existing equipment in Airai Substation, Malakal Power Plant, and other substation (if any) in order to install substation equipment by the Japanese side

(3) After the Project

1) To submit results of environmental monitoring to JICA, by using the monitoring form, semiannually

2) The period of environmental monitoring may be extended if any significant negative impacts on the environment are found. The extension of environmental monitoring will be decided

based on the agreement between PPUC and JICA

3) To carry out the following to maintain and use properly and effectively the facilities constructed and equipment provided under Japan's Grant Aid

- Allocation of maintenance cost
- Operation and maintenance structure
- Routine check/Periodic inspection

4) Disposal of removed existing equipment

3-3 Important Assumptions

The external conditions that are prerequisites for the development and sustainment of project effects are as follows.

(1) For Higher-Level Goals

- No change in policy regarding transmission planning in Palau
- Political and economic stability

(2) For Project Objectives

- Sustainable operation and maintenance
- Keeping the electricity tariff collection and financial support
- Ensuring the security of the facility

(3) For Expected Outcomes

- The power generation equipment will be fully operational.
- The operation and maintenance plan will be implemented.
- Residents (government) can bear the cost of connection and electricity charges.
- There will be no significant delay in the commencement of operation of the PV facilities through the IPP Project.

3-4 Project Evaluation

3-4-1 Relevance

As shown below, the Project will contribute to the realization of Palau's development plan and energy policy, bring benefits to the general public, and is therefore considered to be highly appropriate.

(1) Project Beneficiaries

With the implementation of the Project, stable and reliable electricity will be supplied to approximately 14,800 residents[1] in the states of Koror, Airai, Ngchesar, and Ngatpang in Palau.

[1] According to the 2015 Census of Population, the above population is about 84% of the national population of Palau. 2015 Census of Population, Housing and Agriculture Tables, Ministry of Finance

(2) Urgency

In Palau, accidental power outages and planned power outages due to problems with natural disasters or transmission and substation facilities have been occurring frequently, causing problems such as deterioration in the living environment of residents, a decline in public services, and damage to the tourism industry, which must be urgently remedied through the implementation of the Project.

(3) Contribute to the Stable Operation of Public Facilities

Frequent power outages in Palau have hindered the stable operation of airport facilities, public hospitals, water supply and sewage facilities, etc., forcing emergency measures such as the deployment of emergency generators whenever a large-scale power outage occurs.

Implementation of the Project will improve the reliability of power supply, thereby avoiding power outages at public facilities and contributing to the stable operation of these facilities.

(4) Operation and Maintenance Capabilities

The PPUC routinely operates and maintains transmission facilities, distribution facilities and substation facilities; and it has sufficient experience in the operation and maintenance of similar facilities. Therefore, the transmission and distribution facilities and substation facilities to be procured and installed in the Project can be operated and maintained sufficiently with the technical capabilities of PPUC, the executing agency, and there are no particular problems in the implementation of the Project.

(5) Projects that Contribute to Palau's Development Plan

The Government of Palau developed the “Palau Energy Roadmap” in 2017 and announced it as its part of the NDC in the Paris Agreement in August 2017. The NDC recommends that a roadmap be implemented to achieve a low-carbon society by setting targets for reducing greenhouse gas emissions in the energy, waste, and transportation sectors. In addition, the priority projects listed in "Electrical Power System Prioritization Plan 2021-2025" summarized by PPUC include the development of the transmission network and substation facilities planned in the Project.

The Project will contribute to the improvement of the living environment of the residents and the reduction of greenhouse gas emissions by improving the reliability and stability of the power supply and promoting the introduction of renewable energy on the islands of Malakal, Koror and Babeldaob through the construction of transmission and transformation facilities, thereby contributing to the realization of the energy policy and development plan of the Government of Palau as described above.

(6) Impact on Environmental and Social Aspects

The study was conducted in accordance with Palau's environmental laws and JICA's Guideline for

Environmental and Social Considerations. As a result, it was evaluated that the air pollution, noise and vibrations generated during the construction will have a minor impact, but will be below the Palau and international standard values, and that the current situation can be improved. In addition, it is considered possible to avoid or reduce the impact of other items by taking measures.

As a result, the Project will not have any particular impact on the environment and society.

(7) Consistency with Japan's Grant Aid Policy

The Project can be implemented without any particular difficulties, as the Project contents and process plan have been formulated within the framework of Japan's Grant Aid scheme, such as the completion of the Project within the E/N deadline.

3-4-2 Effectiveness

The objectives of this project are to improve the reliability and stability of the electric power supply, promote the introduction of renewable energy, reduce greenhouse gas emissions, and improve of the quality of life of residents. In order to evaluate the effectiveness of the project, we focused on transformer capacity, greenhouse gas emissions, and the duration and frequency of power outages as quantitative effectiveness indicators. In addition, qualitative effects, such as improvements in the living quality of life of residents, are also included.

The expected effects of the implementation of the Project are as follows.

(1) Quantitative Effects

Performance Indicators	Reference value (2021) Actual value	Target value (2027) (3 years after the start of service)
Transformer capacity (MVA)	51.05	61.05 （+10）
Reduction of transmission loss (MWh)	0	If not be implemented: 68,200 To be implemented: 65,540 Difference: 2,660
Reduction in CO_2 emissions (t-CO_2/year) -due to reduction of transmission loss	0	1,921
Reduction in CO_2 emissions (t-CO_2/year) -due to reduction of solar PV facilities by IPP Project (For reference)	0	9,709 *
SAIDI (Duration of power outage) (minutes/year/household)	1,621	1,169
SAIFI (Frequency of power outage) (times/year/household)	30.82	23.67

Remarks: The transformer capacity (MVA) is the difference between Airai Substation (5 MVA) and Malakal Power Plant (5 MVA), for a total increase of 10 MVA. The other given conditions and basis for calculation of quantitative effects are detailed in Appendices 9 and 10.

* If the solar PV facilities by the IPP Project cannot be commissioned into operation, the effect of reduction in CO_2 emission is estimated to decrease.

(2) Qualitative Effects (Overall Project)

Current status and problems	Measures to be taken in the Project (Projects subject to cooperation)	Effectiveness of the plan and degree of improvement
In Palau, there is only a single transmission line from Malakal Power Plant to Aimeliik Power Plant, and the Airai Substation is connected to the line by T-branch. Since it is not possible to disconnect only the faulted section from the grid, the restoration time in the event of a fault will be longer.	Construction of 34.5 kV transmission line and 34.5/13.8 kV substation.	The construction of the 34.5 kV transmission line will reduce the area and duration of power outages in case of failure, thus reducing the burden on PPUC staff.
In Palau, while the demand for electricity is increasing, the transmission and substation facilities are significantly lacking in capacity and aging, which is a major factor in supply instability.	Construction of 34.5 kV transmission line and 34.5/13.8 kV substation.	The construction of the 34.5 kV substation will improve the reliability of power supply throughout Palau and the economic activities are promoted.
As the construction of PV power generation facilities is carried out by IPP, the current grid will have insufficient transmission capacity, such as the transformer at Airai Substation will estimate to overload (approximately 307%) in 2027, and even if the PV power generation facilities including IPP Phase 2 are operated, the supply will have to be cut off.	Construction of 34.5 kV transmission line and 34.5/13.8 kV substation.	The IPP will be able to supply the full capacity of the generated electricity even if the construction of solar power generation facilities is implemented.

APPENDICES

1. Member List of the Survey Team

1. Member List of the Survey Team

(1) First Field Survey

Name	Assignment	Organization
Susumu YUZURUO	Team Leader	Japan International Corporation Agency
Yoshio NAKAGAWA	Deputy Team Leader	Japan International Corporation Agency
Makoto ABE	Chief Consultant/ Transmission and Substation Planning	Yachiyo Engineering Co., Ltd.
Hiroki KAJINO	Substation Facilities	Yachiyo Engineering Co., Ltd
Kazuhiko KOEDA	Transmission Facilities	Yachiyo Engineering Co., Ltd.
Kyohei KUROHANE	Power System Analysis	Yachiyo Engineering Co., Ltd
Masataka SATO	Procurement / Cost Estimation	Yachiyo Engineering Co., Ltd
Hisayuki YAMAMOTO	Facility Planning / Natural Condition	Yachiyo Engineering Co., Ltd
Ichiro MASUDA	Construction / Cost Estimation	Yachiyo Engineering Co., Ltd
Kazuhiro ISHIURA	Environmental and Social Considerations	Yachiyo Engineering Co., Ltd
Yasuo IIJIMA	Soil Investigation	Yachiyo Engineering Co., Ltd.

(2) Second Field Survey

Name	Assignment	Organization
Makoto ABE	Chief Consultant/ Transmission and Substation Planning	Yachiyo Engineering Co., Ltd.
Hiroki KAJINO	Substation Facilities	Yachiyo Engineering Co., Ltd
Masataka SATO	Procurement / Cost Estimation	Yachiyo Engineering Co., Ltd

2. Survey Schedule

2. Survey Schedule

Table 1 First Field Survey Schedule

№	Date	Day	Contents of Survey		Accom-modation
			Consultant (Chief Consultant)	Consultant (Other Consultants)	
1	29-Aug	Sun	-	・Trip 【Tokyo1650→Guam2135 by UA197】 ・Trip 【Guam2220→Palau2325 by UA157】	Malakal
2	30-Aug	Mon	: Courtesy call to JICA Palau Office, Explanation and discussion of the schedule of the field survey and project contents : Courtesy call and technical discussion (MPIIC: explanation of Japan Grant aid scheme, implementation plan, requested component, prioritization of project components, obligations of Palau side, etc.) : Courtesy call and explanation of the survey (PPUC: IC/R, the schedule of the field survey, questionnaire, requested component, confirmation of the counterpart / office room / the methodology of the site survey, etc.) : Technical discussion (PPUC counterpart: requested component, national development plan, power supply and demand, activities of other donors, power sector structural reform, process of tax exemption, balance of payments, electricity tariff, socioeconomic conditions, etc.)		Malakal
3	31-Aug	Tue	: Field survey for transmission line route / Substation : Technical discussion (PPUC counterpart: requested component, national development plan, power supply and demand, activities of other donors, power sector structural reform, process of tax exemption, balance of payments, electricity tariff, socioeconomic conditions, etc.)		Malakal
4	1-Sep	Wed	・Confirmation of answer for questionnaire ・Field survey for transmission line route / Substation ・Configuration of power flow model for analysis ・Topographic survey / Soil Investigation at project site ・Technical discussion with PPUC		Malakal
5	2-Sep	Thu	・Submission/discussion on the draft M/D with PPUC		Malakal
6	3-Sep	Fri	・Proposals and discussion of component ・Signing of the M/D (MPIIC and PPUC)		Malakal
7	4-Sep	Sat	・Field survey		Malakal
8	5-Sep	Sun	・Arrangement of collected data		Malakal
9	6-Sep	Mon	(Labor Day) ・Field survey		Malakal
10	7-Sep	Tue	・Confirmation of answer for questionnaire ・Field survey for transmission line route / Substation ・Configuration of power flow model for analysis ・Topographic survey / Soil Investigation at project site		Malakal
11	8-Sep	Wed	(same as above)		Malakal
12	9-Sep	Thu	(same as above)		Malakal
13	10-Sep	Fri	(same as above)		Malakal
14	11-Sep	Sat	・Field survey ・Market surve		Malakal
15	12-Sep	Sun	・Reviewing the Documents, Sorting the collected Data		Malakal
16	13-Sep	Mon	・Field survey for transmission line route / Substation ・Configuration of power flow model for analysis ・Market survey of Equipment, Materials, Construction machinery, Shipping, Subcontractor, etc. ・Topographic survey / Soil Investigation at project site ・Study on Environmental and Social Consideration ・Preparation of Field Report / Technical Specifications		Malakal
17	14-Sep	Tue	(same as above)		Malakal
18	15-Sep	Wed	(same as above)		Malakal
19	16-Sep	Thu	(same as above)		Malakal
20	17-Sep	Fri	(same as above)		Malakal
21	18-Sep	Sat	・Field survey ・Market surve		Malakal
22	19-Sep	Sun	・Reviewing the Documents, Sorting the collected Data ・Preparation of Field Report / Technical Specifications		Malakal
23	20-Sep	Mon	・Confirmation of answer for additional questionnaire ・Preparation of Field Report / Technical Specifications		Malakal
24	21-Sep	Tue	(same as above)		Malakal
25	22-Sep	Wed	(same as above)		Malakal
26	23-Sep	Thu	: Explanation and discussion of Field Report to PPUC ・Signing of the Field Report with PPUC (Copy to MPII) [16:00]		Malakal
27	24-Sep	Fri	: Report to EoJ and JICA Palau office and EoJ		Malakal
28	25-Sep	Sat	・Preparation of Technical Specifications		Malakal
29	26-Sep	Sun	・Preparation of Technical Specifications		Malakal
30	27-Sep	Mon	・Trip 【Palau0110→Guam0415 by UA158】 ・Trip 【Guam1210→Tokyo1500 by UA196】		-

Table 2 Second Field Survey Schedule

№	Date	Day	Contents of Survey	Accom-modation
1	Jun. 19	Sun	● Trip 【Tokyo1700→Guam2255 by UA197】 ● Trip 【Guam2245→Palau2350 by UA157】	Malakal
2	Jun. 20	Mon	● Discussion on the other technical matter with PPUC 1. Answer to the questionnaire 2. Collection of additional information/data on the operation of the distribution lines 3. Discussion on the draft Technical Specifications with PPUC 4. Review of the progress of the IPP project	Malakal
3	Jun. 21	Tue	● Field Survey with PPUC 1. Confirmation and discussion of underground cable locations along the transmission route 2. Confirmation of the exact location of section switchgear on the distribution line (Myuns line) ● Discussion on the Preparatory Survey Report with MPII and PPUC 1. Submission/explanation of the Preparatory Survey Report to PPUC and MPII 2. Other technical issue, if any. (Response to the power outage and the installation process at the Airai substation)	Malakal
4	Jun. 22	Wed	● Discussion on the other technical matter with PPUC 1. Survey of cable route of JP bridge 2. Survey of power outage and the installation process at the Airai substation 3. Survey of the existing foundation dimensions for installation of the main transformer of the Malakal Power Plant 4. Purifier of the Transformer Oil ● Discussion with JICA (Online) ● Field Survey with PPUC	Malakal
5	Jun. 23	Thu	● Meeting with Minister Charles Obichang of MPII - Ministers Conference Room (Adjacent to the Minister's Office, 2nd Floor of the Airport/PIAC Building) ● Bureau of Customs and Border Protection - Research on tax exemption procedures, Bureau of Customs and Border Protection ● Discussion with PPUC - Preparation and discussion on draft Technical Note with PPUC ● Bureau of Revenue and Tax, Bureau of Customs and Border Protection with PPUC - Research on tax exemption procedures, Bureau of Revenue and Tax	Malakal
6	Jun. 24	Fri	● PCR test ● Signing of Technical Note	Malakal
7	Jun. 25	Sat	● Reviewing the Documents	Malakal
8	Jun. 26	Sun	● Reviewing the Documents	Malakal
9	Jun. 27	Mon	● Trip 【Palau0105→Guam0410 by UA158】 ● Trip 【Guam0700→Tokyo0955 by UA828】	Malakal

【Remarks】(Alphabetical order)

EoJ : Embassy of Japan
JICA : Japan InternCCational Cooperation Agency
MOF : Ministry of Finance
MPII : Ministry of Public Infrastructure and Industries
PPUC : Palau Public Utilities Corporation

3. List of Parties Concerned in the Recipient Country

3. List of Parties Concerned in the Recipient Country

Ministry of Public Infrastructure & Industries (MPII)

Mr. Charles Obichang	Minister

Palau Public Utility Corporation (PPUC)

Mr. Frank Kyota	Chief Executive Officer (CEO)
Mr. Anthony Rudimch	Manager, Project Planning & Implementation Division
Mr. Hansen Uchel	SCD IT/Meter Tech.
Mr. Robert Patris	Manager, Transmissino & Distribution Division
Mr. Ramon M. Adelbai	Mechanical Engineer, Project Planning & Implementation Division
Mr. Keyukl T. Siabang	Procurement/Inventory Clerk
Mr. Ronald Ngiratrang	Surveyors/Estimator/Planner
Mr. David Bai	Environment Safeguard Officer, Project Planning & Implementation Division
Mr. Tito Cabunagan	Manager, Power Generation Division
Mr. James Mengeolt	Manager, System Control Division, Electric Power Operations
Mr. Aloysius Pablo	App Mechnical Engineer

Environmental Quality Protection Board (EQPB)

Ms. Keliu Basilius	Manager, Education and Outreach Program
Ms. Metrik Kimie Ngirchechol	Laboratory Supervisor

Bureau of Land and Survey (BLS)

Mr. Jovan Isaac	Chief

Palau Conservation Society (PCS)

Ms. Michelle Ngirutang	Director

Palau Automated Land and Resource Information System (PALARIS)

Ms. Darlynne Takawo	GIS Analysist II

Ngatpang State Government

Ms. Francesca Otong	Governor

Airai State Government

Mr. Collins	Special Assistant

Asian Development Bank (ADB)

Mr. Masayuki Kanda	Senior Public-Private Partnership Specialist

JICA Palau Office

Ryutaro Kobayashi	Resident Representative
Yasutoshi Sagami	Project Formulation Advisor
Olga Sigeo	Program Officer

4. Minutes of Discussions

Minutes of Discussions
on the Preparatory Survey for the Project for
Upgrading Power Grid in the Republic of Palau

Based on the several preliminary discussions between the Government of the Republic of Palau (hereinafter referred to as "Palau") and JICA Palau Office, Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched the Preparatory Survey Team for the Outline Design (hereinafter referred to as "the Team") of the Project for Upgrading Power Grid (hereinafter referred to as "the Project") to Palau. The Team held a series of discussions with the officials of the Government of Palau and conducted a field survey. In the course of the discussions, both sides have confirmed the main items described in the attached sheets.

Koror, 2 September, 2021

YUZURIO Susumu
Leader
Preparatory Survey Team
Japan International Cooperation Agency
Japan

Gregorio Dengokerong
Chief Executive Officer
Palau Public Utilities Corporation
The Republic of Palau

Ngiraimetuchel R. Belechl
Chairman
Board of Directors
Palau Public Utilities Corporation
The Republic of Palau

Charles I. Obichang
Minister
Ministry of Public Infrastructure and Industries
The Republic of Palau

ATTACHMENT

1. Objective of the Project
The objective of the Project is to improve sustainability of power supply by/through construction and rehabilitation of substations and transmission lines, thereby contributing to social and economic development and to accelerate the use of renewable energy in Palau.

2. Title of the Preparatory Survey
Both sides confirmed the title of the Preparatory Survey as "the Preparatory Survey for the Project for Upgrading Power Grid in the Republic of Palau".

3. Project site
Both sides confirmed that the sites of the Project are in Islands of Babeldaob, Koror, and Malakal which is shown in Annex 1.

4. Responsible authority for the Project
Both sides confirmed the authorities responsible for the Project are as follows:

4-1. The Palau Public Utilities Corporation will be the executing agency for the Project (hereinafter referred to as "the Executing Agency"). The Executing Agency shall coordinate with all the relevant authorities to ensure smooth implementation of the Project and ensure that the undertakings for the Project shall be managed by relevant authorities properly and on time. The organization chart is shown in Annex 2-A.

4-2. The Ministry of Public Infrastructure and Industries shall be responsible for supervising the Executing Agency on behalf of the Government of Palau. The organization chart is shown in Annex 2-B.

5. Items requested by the Government of Palau

5-1. As a result of discussions, both sides confirmed that the items requested by the Government of Palau are as follows:

- Construction of new Koror substation and connecting works between existing transmission line and distribution line.
- Expansion of Kokusai and Malakal substation (Expansion of switchgears and connecting works between existing transmission line and distribution line).
- Construction of new transmission lines between Malakal and Kokusai.

5-2. JICA will assess the feasibility of the above requested items through the survey and will report the findings to the Government of Japan. The final scope of the Project will be decided by the Government of Japan.

5-3. The Government of Palau shall submit an official request to the Government of Japan through a diplomatic channel before the appraisal of the Project, which is scheduled in December, 2021.

6. Procedures and Basic Principles of Japanese Grant

6-1. The Palauan side agreed that the procedures and basic principles and basic principles of Japanese Grant (hereinafter referred to as "the Grant") as described in Annex 3 shall be applied to the Project.

As for the monitoring of the implementation of the Project, JICA requires Palauan side to submit the Project Monitoring Report, the form of which is attached as Annex 4.

6-2. The Palauan side agreed to take the necessary measures, as described in Annex 5, for smooth implementation of the Project. The contents of the Annex 5 will be elaborated and refined during the Preparatory Survey and be agreed in the mission dispatched for explanation of the Draft Preparatory Survey Report.

The contents of Annex 5 will be updated as the Preparatory Survey progresses, and eventually, will be used as an attachment to the Grant Agreement.

7. Schedule of the Survey

7-1. The Team will proceed with further survey in Palau until 27 September, 2021.

7-2. An official request to the Government of Japan will be submitted before December, 2021.

7-3. JICA will prepare a draft Preparatory Survey Report in English and dispatch a mission to Palau in order to explain its contents around February 2022.

7-4. If the contents of the draft Preparatory Survey Report are accepted and the undertakings for the Project are fully agreed by the Palauan side, JICA will finalize the Preparatory Survey Report and send it to Palau around June 2022.

7-5. The above schedule is tentative and subject to change.

8. Environmental and Social Considerations

8-1. The Palauan side confirmed to give due environmental and social considerations before and during implementation, and after completion of the Project, in accordance with the JICA Guidelines for Environmental and Social Considerations

(April, 2010).

8-2. The Project is categorized as "B" from the following considerations:

The project is not located in a sensitive area, nor has sensitive characteristics, nor fall s into sensitive sectors under the JICA guidelines for environmental and social considerations (April 2010), and its potential adverse impacts on the environment are not likely to be significant.

The Palauan side confirmed to conduct the necessary procedures concerning the environmental assessment (including stakeholder meetings, Environmental Impact Assessment (EIA) /Initial Environmental Examination (IEE) and information disclosure, etc.) and make EIA/IEE report of the Project. The EIA/IEE approval shall be received from the responsible authorities and submitted to JICA by April 2022.

9. Other Relevant Issues

9-1. Prioritizing contents of the project

The Japanese side explained that items that requested from Palau, mentioned in 5-1, will be studied and made prioritizing from the viewpoints of its urgency and effectiveness contribution to stable power supply in Islands of Babeldaob, Koror, and Malakal.

9-2. The Palauan side requested that the leveling works at the project site, item No. 9 of (1) Before the Bid in the Major Undertakings to be taken by the Government of Palau (Annex 5), be done by the Japanese side since they cannot secure the budget in timely manner. The Japanese side stated it would consider to include in the Project scope.

9-3. The Palauan side requested consideration for of construction of the large-loop transmission line. Additionally in consideration of the impact of typhoon on the grid, Palauan side request JICA's consideration for using underground cable in the Babeldaob island. Though the Japanese side understood the needs of the large-loop transmission line, it explained that the proposed alignment is preferable because it should be designed and constructed to efficiently accommodate the planned IPP project and effectively improve power supply reliability. Furthermore, considering that Palau has shifted from distributed solar farms (including north side of Babeldaob) to more centralized approach closer to load center, large loop may not be as urgent. The Japanese side also explained that it would study appropriate measures to improve resilience taking into consideration cost and effectiveness. Underground transmission lines may not be feasible because it significantly

increases costs but also further study would be needed.

9-4. The Palauan side requested to include protection system study in this project to counter expected grid instability due to increase in solar power generation. Since the budget allocated for the preparatory study it is not enough to cover the said study, and it is not possible to design appropriate protection system without comprehensive power transmission and operation plans, the Japanese side requested the Palauan side to seek other resources to conduct protection study for the full grid. JICA will consider protection study necessary for initial operation of all new assets covered under the Grant in accordance with information of IPP project (Phase I) received from the Palauan side. JICA requested the Palauan side to submit the information before September 10, 2021. The Palauan side agreed to it.

9-5. Both sides confirmed that it is necessary to coordinate data acquisition and control system, such as proposed communication infrastructure (optical fibers) and the national control center, between the IPP project (Phase I) and the Project.

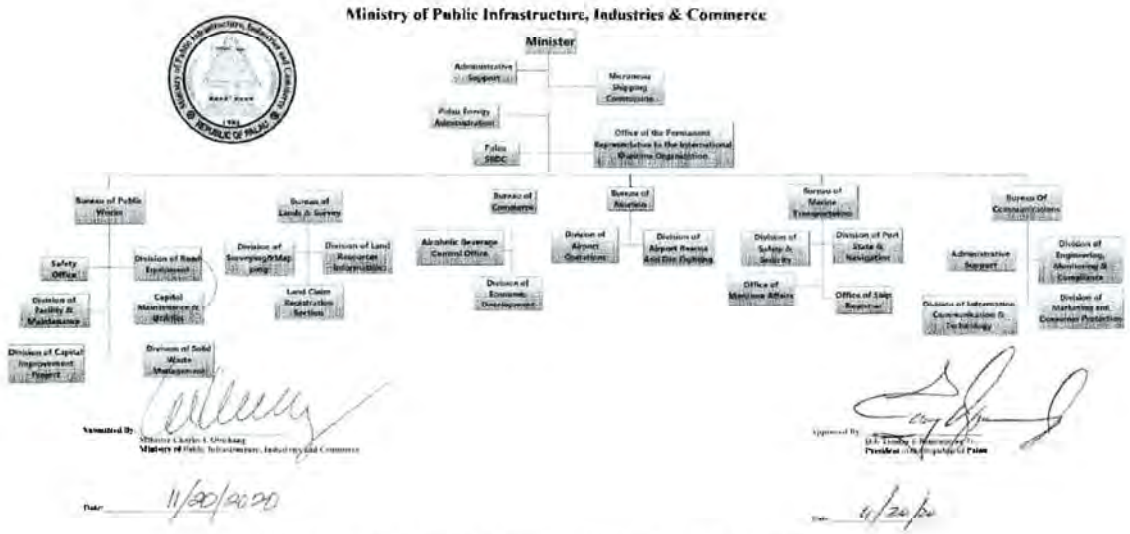
9-6. In the case additional activities are deemed necessary, the both sides will discuss how to deal with them.

Annex 1 Project Site
Annex 2 Organization Chart
Annex 3 Japanese Grant
Annex 4 Project Monitoring Report (template)
Annex 5 Major Undertakings to be taken by the Government of Palau
Annex 6 Tax Exemption Information Sheet
Annex 7 Tentative Schedule of the Project

A4-3

Annex 1 Project Site

Location Map of the Project Site



Organization chart of Ministry of Public Infrastructure, Industries & Commerce: MPIIC

Annex-2 Chart of Responsible and Implementing Agency

Organization Chart of Palau Public Utility Corporation: PPUC

JAPANESE GRANT

The Japanese Grant is non-reimbursable fund provided to a recipient country (hereinafter referred to as "the Recipient") to purchase the products and/or services (engineering services and transportation of the products, etc.) for its economic and social development in accordance with the relevant laws and regulations of Japan. Followings are the basic features of the project grants operated by JICA (hereinafter referred to as "Project Grants").

1. Procedures of Project Grants

Project Grants are conducted through following procedures (See "PROCEDURES OF JAPANESE GRANT" for details):

(1) Preparation
- The Preparatory Survey (hereinafter referred to as "the Survey") conducted by JICA

(2) Appraisal
-Appraisal by the government of Japan (hereinafter referred to as "GOJ") and JICA, and Approval by the Japanese Cabinet

(3) Implementation

Exchange of Notes
-The Notes exchanged between the GOJ and the government of the Recipient

Grant Agreement (hereinafter referred to as "the G/A")
-Agreement concluded between JICA and the Recipient

Banking Arrangement (hereinafter referred to as "the B/A")
-Opening of bank account by the Recipient in a bank in Japan (hereinafter referred to as "the Bank") to receive the grant

Construction works/procurement
-Implementation of the project (hereinafter referred to as "the Project") on the basis of the G/A

(4) Ex-post Monitoring and Evaluation
-Monitoring and evaluation at post-implementation stage

2. Preparatory Survey

(1) Contents of the Survey

The aim of the Survey is to provide basic documents necessary for the appraisal of the the Project made by the GOJ and JICA. The contents of the Survey are as follows:

- Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of relevant agencies of the Recipient necessary for the implementation of the Project.
- Evaluation of the feasibility of the Project to be implemented under the Japanese Grant from a technical, financial, social and economic point of view.
- Confirmation of items agreed between both parties concerning the basic concept of the Project.
- Preparation of an outline design of the Project.
- Estimation of costs of the Project.
- Confirmation of Environmental and Social Considerations

The contents of the original request by the Recipient are not necessarily approved in their initial form. The Outline Design of the Project is confirmed based on the guidelines of the Japanese Grant.

JICA requests the Recipient to take measures necessary to achieve its self-reliance in the implementation of the Project. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the executing agency of the Project. Therefore, the contents of the Project are confirmed by all relevant organizations of the Recipient based on the Minutes of Discussions.

(2) Selection of Consultants

For smooth implementation of the Survey, JICA contracts with (a) consulting firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms.

(3) Result of the Survey

JICA reviews the report on the results of the Survey and recommends the GOJ to appraise the implementation of the Project after confirming the feasibility of the Project.

3. Basic Principles of Project Grants

(1) Implementation Stage

1) The E/N and the G/A

After the Project is approved by the Cabinet of Japan, the Exchange of Notes (hereinafter referred to as "the E/N") will be singed between the GOJ and the Government of the Recipient to make a pledge for assistance, which is followed by the conclusion of the G/A between JICA and the Recipient to define the necessary articles, in accordance with the E/N, to implement the Project, such as conditions of disbursement, responsibilities of the Recipient, and procurement conditions. The terms and conditions generally applicable to the Japanese Grant are stipulated in the "General Terms and Conditions for Japanese Grant (January 2016)."

2) Banking Arrangements (B/A) (See "Financial Flow of Japanese Grant (A/P Type)" for details)

a) The Recipient shall open an account or shall cause its designated authority to open an account under the name of the Recipient in the Bank, in principle. JICA will disburse the Japanese Grant in Japanese yen for the Recipient to cover the obligations incurred by the Recipient under the verified contracts.

b) The Japanese Grant will be disbursed when payment requests are submitted by the Bank to JICA under an Authorization to Pay (A/P) issued by the Recipient.

3) Procurement Procedure

The products and/or services necessary for the implementation of the Project shall be procured in accordance with JICA's procurement guidelines as stipulated in the G/A.

4) Selection of Consultants

In order to maintain technical consistency, the consulting firm(s) which conducted the Survey will be recommended by JICA to the Recipient to continue to work on the Project's implementation after the E/N and G/A.

5) Eligible source country

In using the Japanese Grant disbursed by JICA for the purchase of products and/or services, the eligible source countries of such products and/or services shall be Japan and/or the Recipient. The Japanese Grant may be used for the purchase of the products and/or services of a third country as eligible, if necessary, taking into account the quality, competitiveness and economic rationality of products and/or services necessary for achieving the objective of the Project. However, the prime contractors, namely, constructing and procurement firms, and the prime consulting firm, which enter into contracts with the Recipient, are limited to "Japanese nationals", in principle.

6) Contracts and Concurrence by JICA

The Recipient will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be concurred by JICA in order to be verified as eligible for using the Japanese Grant.

7) Monitoring

The Recipient is required to take their initiative to carefully monitor the progress of the Project in order to ensure its smooth implementation as part of their responsibility in the G/A, and to regularly report to JICA about its status by using the Project Monitoring Report (PMR).

8) Safety Measures

The Recipient must ensure that the safety is highly observed during the implementation of the Project.

9) Construction Quality Control Meeting

Construction Quality Control Meeting (hereinafter referred to as the "Meeting") will be held for quality assurance and smooth implementation of the Works at each stage of the Works. The member of the Meeting will be composed by the Recipient (or executing agency), the Consultant, the Contractor and JICA. The functions of the Meeting are as followings:

a) Sharing information on the objective, concept and conditions of design from the Contractor, before start of construction.

b) Discussing the issues affecting the Works such as modification of the design, test, inspection, safety control and the Client's obligation, during of construction.

(2) Ex-post Monitoring and Evaluation Stage

1) After the project completion, JICA will continue to keep in close contact with the Recipient in order to monitor that the outputs of the Project is used and maintained properly to attain its expected outcomes.

2) In principle, JICA will conduct ex-post evaluation of the Project after three years from the completion. It is required for the Recipient to furnish any necessary information as JICA may reasonably request.

(3) Others

1) Environmental and Social Considerations

The Recipient shall carefully consider environmental and social impacts by the Project and must comply with the environmental regulations of the Recipient and JICA Guidelines for Environmental and Social Considerations (April, 2010).

2) Major undertakings to be taken by the Government of the Recipient

For the smooth and proper implementation of the Project, the Recipient is required to undertake necessary measures including land acquisition, and bear an advising commission of the A/P and payment commissions paid to the Bank as agreed with the GOJ and/or JICA. The Government of the Recipient shall ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the Recipient with respect to the purchase of the Products and/or the Services be exempted or be borne by its designated authority without using the Grant and its accrued interest, since the grant fund comes from the Japanese taxpayers.

3) Proper Use

The Recipient is required to maintain and use properly and effectively the products and/or services under the Project (including the facilities constructed and the equipment purchased), to assign staff necessary for this operation and maintenance and to bear all the expenses other than those covered by the Japanese Grant.

4) Export and Re-export

The products purchased under the Japanese Grant should not be exported or re-exported from the Recipient.

Project Monitoring Report
on
Project Name
Grant Agreement No. XXXXXXX
20XX, Month

Organizational Information

Signer of the G/A (Recipient)	Person in Charge	(Designation)
	Contacts	Address: Phone/FAX: Email:
Executing Agency	Person in Charge	(Designation)
	Contacts	Address: Phone/FAX: Email:
Line Ministry	Person in Charge	(Designation)
	Contacts	Address: Phone/FAX: Email:

General Information:

Project Title	
E/N	Signed date: Duration:
G/A	Signed date: Duration:
Source of Finance	Government of Japan: Not exceeding JPY _____ mil. Government of (_____): _____

1: Project Description

1-1 Project Objective

1-2 Project Rationale

- Higher-level objectives to which the project contributes (national/regional/sectoral policies and strategies)
- Situation of the target groups to which the project addresses

1-3 Indicators for measurement of "Effectiveness"

Quantitative indicators to measure the attainment of project objectives		
Indicators	Original (Yr)	Target (Yr)
Qualitative indicators to measure the attainment of project objectives		

2: Details of the Project

2-1 Location

Components	Original *(proposed in the outline design)*	Actual
1.		

2-2 Scope of the work

Components	Original* *(proposed in the outline design)*	Actual*
1.		

Reasons for modification of scope (if any).
(PMR)

2-3 Implementation Schedule

Items	Original *(proposed in the outline design)*	Original *(at the time of signing the Grant Agreement)*	Actual

Reasons for any changes of the schedule, and their effects on the project (if any)

2-4 Obligations by the Recipient

2-4-1 Progress of Specific Obligations
See Attachment 2.

2-4-2 Activities
See Attachment 3.

2-4-3 Report on RD
See Attachment 11.

2-5 Project Cost

2-5-1 Cost borne by the Grant(Confidential until the Bidding)

Components			Cost (Million Yen)	
	Original *(proposed in the outline design)*	Actual *(in case of any modification)*	Original[1),2)] *(proposed in the outline design)*	Actual
	1.			
Total				

Note: 1) Date of estimation:
2) Exchange rate: 1 US Dollar = Yen

2-5-2 Cost borne by the Recipient

Components			Cost (1,000 Taka)	
	Original *(proposed in the outline design)*	Actual *(in case of any modification)*	Original[1),2)] *(proposed in the outline design)*	Actual
	1.			

Note: 1) Date of estimation:
2) Exchange rate: 1 US Dollar =

Reasons for the remarkable gaps between the original and actual cost, and the countermeasures (if any)

(PMR)

2-6 Executing Agency

- Organization's role, financial position, capacity, cost recovery etc,
- Organization Chart including the unit in charge of the implementation and number of employees.

Original *(at the time of outline design)* name: role: financial situation: institutional and organizational arrangement (organogram): human resources (number and ability of staff):
Actual *(PMR)*

2-7 Environmental and Social Impacts

- The results of environmental monitoring based on Attachment 5 (in accordance with Schedule 4 of the Grant Agreement).
- The results of social monitoring based on in Attachment 5 (in accordance with Schedule 4 of the Grant Agreement).
- Disclosed information related to results of environmental and social monitoring to local stakeholders (whenever applicable).

3: Operation and Maintenance (O&M)

3-1 Physical Arrangement

- Plan for O&M (number and skills of the staff in the responsible division or section, availability of manuals and guidelines, availability of spareparts, etc.)

Original *(at the time of outline design)*
Actual *(PMR)*

3-2 Budgetary Arrangement

- Required O&M cost and actual budget allocation for O&M

Original *(at the time of outline design)*

Actual *(PMR)*

4: Potential Risks and Mitigation Measures

- Potential risks which may affect the project implementation, attainment of objectives, sustainability
- Mitigation measures corresponding to the potential risks

Assessment of Potential Risks *(at the time of outline design)*

Potential Risks	Assessment
1. (Description of Risk)	Probability: High/Moderate/Low
	Impact: High/Moderate/Low
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action required during the implementation stage:
	Contingency Plan (if applicable):
2. (Description of Risk)	Probability: High/Moderate/Low
	Impact: High/Moderate/Low
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action required during the implementation stage:
	Contingency Plan (if applicable):
3. (Description of Risk)	Probability: High/Moderate/Low
	Impact: High/Moderate/Low
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action required during the implementation stage:

	Contingency Plan (if applicable):
Actual Situation and Countermeasures	
(PMR)	

5: Evaluation and Monitoring Plan (after the work completion)

5-1 Overall evaluation

Please describe your overall evaluation on the project.

5-2 Lessons Learnt and Recommendations

Please raise any lessons learned from the project experience, which might be valuable for the future assistance or similar type of projects, as well as any recommendations, which might be beneficial for better realization of the project effect, impact and assurance of sustainability.

5-3 Monitoring Plan of the Indicators for Post-Evaluation

Please describe monitoring methods, section(s)/department(s) in charge of monitoring, frequency, the term to monitor the indicators stipulated in 1-3.

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Attachment

1. Project Location Map
2. Specific obligations of the Recipient which will not be funded with the Grant
3. Monthly Report submitted by the Consultant

Appendix - Photocopy of Contractor's Progress Report (if any)
- Consultant Member List
- Contractor's Main Staff List

4. Check list for the Contract (including Record of Amendment of the Contract/Agreement and Schedule of Payment)
5. Environmental Monitoring Form / Social Monitoring Form
6. Monitoring sheet on price of specified materials (Quarterly)
7. Report on Proportion of Procurement (Recipient Country, Japan and Third Countries) (PMR (final)only)
8. Pictures (by JPEG style by CD-R) (PMR (final)only)
9. Equipment List (PMR (final)only)
10. Drawing (PMR (final)only)
11. Report on RD (After project)

Attachment 7

Report on Proportion of Procurement (Recipient Country, Japan and Third Countries)
(Actual Expenditure by Construction and Equipment each)

	Domestic Procurement (Recipient Country) A	Foreign Procurement (Japan) B	Foreign Procurement (Third Countries) C	Total D
Construction Cost	(A/D%)	(B/D%)	(C/D%)	
Direct Construction Cost	(A/D%)	(B/D%)	(C/D%)	
others	(A/D%)	(B/D%)	(C/D%)	
Equipment Cost	(A/D%)	(B/D%)	(C/D%)	
Design and Supervision Cost	(A/D%)	(B/D%)	(C/D%)	
Total	(A/D%)	(B/D%)	(C/D%)	

Attachment 6

Monitoring sheet on price of specified materials

1. Initial Conditions (Confirmed)

	Items of Specified Materials	Initial Volume A	Initial Unit Price (¥) B	Initial total Price C=A×B	1% of Contract Price D	Condition of payment	
						Price (Decreased) E=C−D	Price (Increased) F=C+D
1	Item 1	●●t	●	●	●	●	●
2	Item 2	●●t	●	●	●		
3	Item 3						
4	Item 4						
5	Item 5						

2. Monitoring of the Unit Price of Specified Materials
(1) Method of Monitoring : ●●

(2) Result of the Monitoring Survey on Unit Price for each specified materials

	Items of Specified Materials	1st ●month, 2015	2nd ●month, 2015	3rd ●month, 2015	4th	5th	6th
1	Item 1						
2	Item 2						
3	Item 3						
4	Item 4						
5	Item 5						

(3) Summary of Discussion with Contractor (if necessary)
-
-
-

Annex 5

Major Undertakings to be taken by the Government of Palau

(1) Before the Bid

NO	Items	Deadline	In charge	Estimated Cost	Ref.
1	To sign the banking arrangement (B/A) with a bank in Japan (the Agent Bank) to open bank account for the Grant	within 1 month after the signing of the G/A	MOF		
2	To issue A/P to the Agent Bank for the payment to the consultant	within 1 month after the signing of the contract(s)	MOF		
3	To bear the following commissions to the Agent Bank for the banking services based upon B/A		MOF		
	1) Advising commission of A/P	within 1 month after the signing of the contract(s)			
	2) Payment commission for A/P	every payment			
4	To approve IEE/EIA(Conditions of approval should be fulfilled, if any) and secure the necessary budget for implementation for EMP and EMoP (and fulfilling conditions of approval, if any).	within 1 month after the signing of the G/A	PPUC		
5	To secure the necessary budget and implement land acquisition and resettlement (including preparation of resettlement sites), and compensation with full replacement cost in accordance with RAP	before notice of the bidding documents	MOF/ MPII		
6	To implement social monitoring, and to submit the monitoring results to JICA, by using the monitoring form, on a quarterly basis as a part of Project Monitoring Report	until land acquisition and resettlement complete	PPUC		
7	To secure and clear the following lands1) project sites - for New Koror Substation (approx.15,800m^2) - for Kokusai Substation, Malakal Substation (if any) - for Transmission/Distribution line (30km) 2) temporary strage yard for the Equipment and materials	before notice of the bidding documents	MPII/ PPUC		
8	To obtain the planning, zoning, building permit	before notice of the bidding documents	PPUC		
9	To clear, level and reclaim the following sites 1) leveling and reclaiming the sites - for New Koror Substation (approx.15,800m^2) - for Kokusai Substation, Malakal Substation (if nesecccry)	before notice of the bidding documents	PPUC		
10	To submit Project Monitoring Repor (with the result of Detailed Design)	before preparation of the bidding documents	PPUC		

(2) During the Project Implementation

NO	Items	Deadline	In charge	Estimated Cost	Ref.
1	To issue A/P to the Agent Bank for the payment to the supplier and the contractor	within 1 month after the signing of the contract(s)	MOF		
2	To bear the following commissions to the Agent Bank for the banking services based upon the B/A		MOF		
	1) Advising commission of A/P	within 1 month after the signing of the contract(s)			
	2) Payment commission for A/P	every payment			
3	to ensure prompt unloading and customs clearance at ports of disembarkation in the country of the Recipient and to assist the Supplier(s) with internal transportation therein	during the Project	MPII/ PPUC		
4	To accord Japanese physical persons and/or physical persons of third countries whose services may be required in connection with the supply of the products and the services such facilities as may be necessary for their entry into the country of the Recipient and stay therein for the performance of their work	during the Project	MPII/ PPUC		
5	To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the country of the Recipient with respect to the purchase of the products and/or the services be exempted and/or be borne by its designated authority without using the Grant	during the Project	MPII/ MOF		
6	To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project	during the Project	MPII/ PPUC		
7	To notify JICA promptly of any incident or accident, which has, or is likely to have, a significant adverse effect on the environment, the affected communities, the public or workers.	during the construction	PPUC		
8	To submit Project Monitoring Report after each work under the contract(s) such as shipping, hand over, installation and operational training	within 1 month after completion of each work	PPUC		
9	To submit Project Monitoring Report (final) (including as-built drawings, equipment list, photographs, etc.)	within 1 month after issuance of Certificate of Completion for the works under the contract(s)	PPUC		
10	To submit a report concerning completion of the Project	To submit a report concerning completion of the Project within 6 months after completion of the Project	PPUC		
11	To construct access roads 1) Outside the site	3 months before commencement of the construction	MPII/ PPUC		
12	To provide facilities for distribution of electricity, water supply and drainage and other incidental facilities necessary for the implementation of the Project.	before start of the construction	PPUC		

Annex 5 Tax Exemption Information Sheet

(Sheet1) Tax with respect to corporate income (Corporate Tax)

[Units of Amount]

[Reference]

Items	Exemption	How to exempt	Applicable Law	rate(%)	How to calculation	Necessary Information	Previous Results, Lessons and Learned, etc
(e.g.) Corporate tax levied on the Japanese companies	O	Exempt(Advanced)	General tax Code	30%	The calculation is fixed by the Code Général des Impôts. Palauese companies are subject to CIT on the total amount of the profits realized in Palau during a given financial year ("FY").	Filing of CIT returns and payments of CIT The deadline for submitting the CIT return of the year is 30 April following the end of the respective FY. Companies are required to make advance payments of CIT in two installments by 15 February and 30 April. The installments are calculated on the basis of the result of the previous FY, with one third due on each installment. The first installment may not be lower than the IMF. If the taxpayer is aware that the first installment already paid is higher than the amount he needs to pay on 30 April, he can refrain from the second installment by providing the tax authorities a duly signed notification. Such notification shall be sent no later than 30 April. Subsequently, the balance shall be paid by 15 June.	Any company which carries out works for a period of more than 6 months is considered a permanent establishment and therefore subject to corporation tax, and no exemption except if there is a convention between Palau and Japan.
Corporate tax levied on on 3rd conlries' employees							
Corporate tax levied on the companies in Palau							
Corporate tax levied on the companies in Palau							
Withholding Tax							
(else)							

O Exempt(Advanced)
- Exempt(borne by the Recipient)
Reimburse

NO	Items	Deadline	In charge	Estimated Cost	Ref.
13	To provide equipment, furniture, facilities necessary for the implementation of the Project in the site(s)	before start of the construction	PPUC		
14	To ensure the safety of persons engaged in the implementation of the Project		PPUC		
15	To construct fences aroud substations	before energizing the site			
16	To implement EMP and EMoP		PPUC		
17	To submit results of environmental monitoring to JICA, by using the monitoring form, on a quarterly basis as a part of Project Monitoring Report		PPUC		
18	To implement RAP (livelihood restoration program) if necessary		MPII/ PPUC		
19	To implement social monitoring, and to submit the monitoring results to JICA, by using the monitoring form, on a quarterly basis as a part of Project Monitoring Report - Period of the monitoring may be extended if affected persons' livelihoods are not sufficiently restored. Extension of the monitoring will be decided based on agreement between PPUC and JICA.		PPUC		

(3) After the Project

NO	Items	Deadline	In charge	Estimated Cost	Ref.
1	To implement EMP and EMoP	for a period based on EMP and EMoP	PPUC		
2	To submit results of environmental monitoring to JICA, by using the monitoring form, semiannually - The period of environmental monioring may be extended if any significant negative impacts on the environment are found. The extension of environmental monitoring will be decided based on the agreement between PPUC and JICA.	for 3 years after the Project	PPUC		
3	To maintain and use properly and effectively the facilities constructed and equipment provided under the Grant Aid 1) Allocation of maintenance cost 2) Operation and maintenance structure 3) Routine check/Periodic inspection	After completion of the construction	PPUC		

Annex 7 Tentative Schedule of the Project

Steps \ Year	2021					2022											2023			2024		
	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	・・・	12	1	・・・	12
1st Preperatory Survey (Present Stage)		△																					
Examination (Developing outline design, Estimation, Undertakings etc.)																							
2nd Preperatory Survey (Explanation of Draft Preparatory Survey Report)							△																
Cabinet meeting/approval										△													
E/N, G/A												△											
Construction supervision contract													△										
Detailed design																							
Bid/contract																							
Construction schedule (Procurement, Installation, Test and Inspection)																		2 or 3 years					

Legend: : Work in Palau : Work in Japan

Annex 6 Tax Exemption Information Sheet

(Sheet2) Tax with respect to personal income (Personal Income Tax)

[Points of Attention]

[Reference]

Items	Exemption	How to exempt	Applicable Law	rate(%)	How to calculation	Necessary Information	Previous Results, Lessons and Learned, etc
Personal income Tax imposed on Japanese employees							
Personal income Tax imposed on 3'rd contiries' employees							
Personal income Tax imposed on employees in Palau							
(else)							

(Sheet3) Indirect tax etc (such as VAT, Commercial Tax)

[Points of Attention]

[Reference]

Items	Exemption	How to exempt	Applicable Law	rate(%)	How to calculation	Necessary Information	Previous Results, Lessons and Learned, etc
Indirect Tax (VAT)							
(else)							

(Sheet4) Duties etc.

[Points of Attention]

[Reference]

Items	Exemption	How to exempt	Applicable Law	rate(%)	How to calculation	Necessary Information	Previous Results, Lessons and Learned, etc
Duties and related fiscal charges with respect to the import and/or re-export of materials and equipment (Customs)							
(else)							

(Sheet5) Other taxes and levies

[Points of Attention]

[Reference]

Items	Exemption	How to exempt	Applicable Law	rate(%)	How to calculation	Necessary Information	Previous Results, Lessons and Learned, etc

Minutes of Discussions
on the Preparatory Survey for the Project for
Upgrading Power Grid in the Republic of Palau
(Explanation on Draft Preparatory Survey Report)

With reference to the minutes of discussions signed between Palau Public Utilities Corporation and the Japan International Cooperation Agency (hereinafter referred to as "JICA") on 2 September, 2021 and in response to the request from the Government of the Republic of Palau (hereinafter referred to as "Parau") dated 3 June, 2022, JICA dispatched the Preparatory Survey Team (hereinafter referred to as "the Team") for the explanation of Draft Preparatory Survey Report (hereinafter referred to as "the Draft Report") for the Project for Upgrading Power Grid (hereinafter referred to as "the Project").

As a result of the discussions, both sides agreed on the main items described in the attached sheets. The both parties acknowledge and agree that the signing of this Minutes of Discussions may be executed by electronic signature, which is considered as an original signature, and therefore has the same force and effect as an original signature. "Electronic signature" includes electronically scanned and transmitted versions (e.g. via pdf) of an original signature.

Koror, 16 June, 2022
Tokyo, 16 June, 2022

SATO Akira
Leader
Preparatory Survey Team
Japan International Cooperation Agency
Japan

Frank Kyota
Chief Executive Officer
Palau Public Utilities Corporation
Republic of Palau

Charles I. Obichang
Minister
Ministry of Public Infrastructure and Industries
Republic of Palau

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ATTACHEMENT

1. Objective of the Project
   The objective of the Project is to improve sustainability of power supply by/through construction and rehabilitation of substations and transmission lines, thereby contributing to social and economic development and to accelerate the use of renewable energy in Palau.

2. Title of the Preparatory Survey
   Both sides confirmed the title of the Preparatory Survey as "the Preparatory Survey for the Project for Upgrading Power Grid in the Republic of Palau".

3. Project site
   Both sides confirmed that the sites of the Project are in Islands of Babeldaob, Koror, and Malakal, which is shown in Annex 1.

4. Responsible authority for the Project
   Both sides confirmed the authorities responsible for the Project are as follows:
   4-1. The Palau Public Utilities Corporation will be the executing agency for the Project (hereinafter referred to as "the Executing Agency"). The Executing Agency shall coordinate with all the relevant authorities to ensure smooth implementation of the Project and ensure that the undertakings for the Project shall be taken care by relevant authorities properly and on time. The organization charts are shown in Annex 2.
   4-2. The line ministry of the Executing Agency is the the Ministry of Public Infrastructure and Industries. The Ministry of Public Infrastructure and Industries shall be responsible for supervising the Executing Agency on behalf of the Government of Palau. The organization chart is shown in Annex 2.

5. Contents of the Draft Report
   After the explanation of the contents of the Draft Report by the Team, the Palauan side agreed to its contents. JICA will finalize the Preparatory Survey Report based on the confirmed items. The report will be sent to the Palauan side around September, 2022.

6. Cost estimate
   Both sides confirmed that the cost estimate explained by the Team is provisional and will be examined further by the Government of Japan for its approval.

7. Confidentiality of the cost estimate and technical specifications
   Both sides confirmed that the cost estimate and technical specifications of the Project should never be disclosed to any third parties until all the contracts under the Project are concluded.

8. Procedures and Basic Principles of Japanese Grant
   The Palauan side agreed that the procedures and basic principles of Japanese Grant (hereinafter referred to as "the Grant") as described in Annex 3 shall be applied to the Project. In addition, the Palauan side agreed to take necessary measures according to the procedures.

9. Timeline for the project implementation
   The Team explained to thePalauan side that the expected timeline for the project implementation is as attached in Annex 4.

10. Expected outcomes and indicators
    Both sides agreed that key indicators for expected outcomes are as follows. The Palauan side will be responsible for the achievement of agreed key indicators targeted in year 2027 and shall monitor the progress for Ex-Post Evaluation based on those indicators.
    [Quantitative indicators]

Performance Indicators	Reference value (2021) Actual value	Target value (2027) (3 years after the start of service)
Transformer capacity (MVA)	51.05	61.05 (+10)
Reduction of transmission loss (MWh)	-	If not be implemented: 68,200 To be implemented: 65,240* Difference: 2,960 *
Reduction in CO_2 emissions (t-CO_2/year) -due to reduction of transmission loss	-	1,678 *
Reduction in CO_2 emissions (t-CO_2/year) -due to reduction of solar PV facilities by IPP Project (For reference)	-	7,620
SAIDI (Duration of power outage) (minutes/year/household)	1621	924
SAIFI (Frequency of power outage) (times/year/household)	30.82	19.82

* to be recalculated due to scope change

[Qualitative indicators]

- The reliability of power supply is improved and the economic activities are promoted
- The power transmission facilities will be improved to enable the transmission of the entire output of the solar power generation facilities to be built by the IPP project.

11. Ex-Post Evaluation

JICA will conduct ex-post evaluation after three (3) years from the project completion, in principle, with respect to five evaluation criteria (Relevance, Effectiveness, Efficiency, Impact, Sustainability). The result of the evaluation will be publicized. The Palaua side is required to provide necessary support for the data collection.

12. Undertakings of the Project

Both sides confirmed the undertakings of the Project as described in Annex 5. With regard to exemption of customs duties, internal taxes and other fiscal levies as stipulated in (2) No.5 of Annex 5, both sides confirmed that such customs duties, internal taxes and other fiscal levies, which shall be clarified in the bid documents by Palau Public Utilities Corporation during the implementation stage of the Project.
The Palauan side assured to take the necessary measures and coordination including allocation of the necessary budget which are preconditions of implementation of the Project. It is further agreed that the costs are indicative, i.e. at Outline Design level. More accurate costs will be calculated at the Detailed Design stage.
Both sides also confirmed that the Annex 5 will be used as an attachment of G/A.

13. Monitoring during the implementation

The Project will be monitored by the Executing Agency and reported to JICA by using the form of Project Monitoring Report (PMR) attached as Annex 6. The timing of submission of the PMR is described in Annex 5.

14. Project completion

Both sides confirmed that the project completes when all the facilities constructed and equipment procured by the Grant are in operation. The completion of the Project will be reported to JICA promptly by the Executing Agency, but in any event not later than six months after completion of the Project.

15. Environmental and Social Considerations

15-1 General Issues

15-1-1 Environmental Guidelines and Environmental Category

The Team explained that 'JICA Guidelines for Environmental and Social Considerations (April 2010)' (hereinafter referred to as "the Guidelines") is applicable for the Project. The Project is categorized as B because the project is not considered to be a large-scale transmission/transformation and distribution project, is not located in a sensitive area, and has none of the sensitive characteristics under the JICA guidelines for environmental and social considerations(April 2010), it is not likely to have a significant adverse impact on the environment.

15-1-2 Environmental Checklist

The environmental and social considerations including major impacts and mitigation measures for the Project are summarized in the Environmental Checklist attached as Annex 7. Both sides confirmed that in case of major modification of the content of the Environmental Checklist, the Palaun side shall submit the modified version to JICA in a timely manner.

15-2 Environmental Issues

15-2-1 Environmental Impact Assessment (EIA)

Both sides confirmed the EIA report is not required for the Project in the country's legal system.

15-2-2 Environmental Management Plan and Environmental Monitoring Plan

Both sides confirmed Environmental Management Plan (EMP) and Environmental Monitoring Plan (EMoP) of the Project is as Annex 8, respectively. Both side agreed that environmental mitigation measures and monitoring shall be conducted based on the EMP and EMoP, which may be updated during the detailed design stage.

15-3 Social Issues

15-3-1 Land Acquisition and Resettlement

Both sides confirmed the 5,426.90 m^2 of land would be secured for the implementation of the Project.

Necessary measures to mitigate social impacts will be implemented based on the Abbreviated Resettlement Action Plan (ARAP) which will be prepared in line with

the Guidelines. The ARAP will be finalized only after review by JICA. The Palaun side shall authorize the ARAP before the signing of the G/A. Draft ARAP is attached as Annex 9.

15-4 Environmental and Social Monitoring

15-4-1 Environmental Monitoring

Both sides agreed that the Palauan side will submit results of environmental monitoring to JICA with PMR by using the monitoring form attached as Annex 10. The timing of submission of the monitoring form is described in Annex 5.

15-4-2 Social Monitoring

Both sides confirmed that the Palauan side side will implement social monitoring about land acquisition proposed in the ARAP. The Palauan side and the Team agreed that Palau Public Utilities Corporation will submit results of social monitoring to JICA with PMR by using the monitoring form attached as Annex 10.

15-4-3 Information Disclosure of Monitoring Results

Both sides confirmed that the Palauan side will disclose results of environmental and social monitoring to local stakeholders through their website.

The Palauan side agreed JICA will disclose results of environmental and social monitoring submitted by the Palauan side as the monitoring forms attached as Annex 10 on its website.

16. Other Relevant Issues

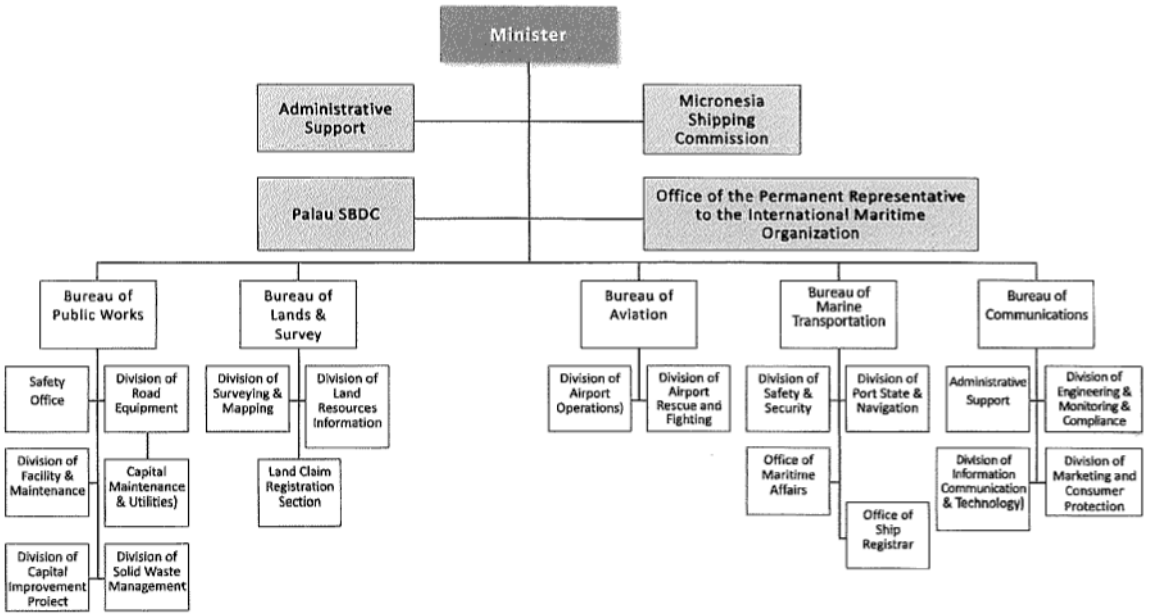
16-1. Disclosure of Information

Both sides confirmed that the Preparatory Survey Report from which project cost is excluded will be disclosed to the public after completion of the Preparatory Survey. The comprehensive report including the project cost will be disclosed to the public after all the contracts under the Project are concluded.

16-2. Regarding of the new Koror sustation

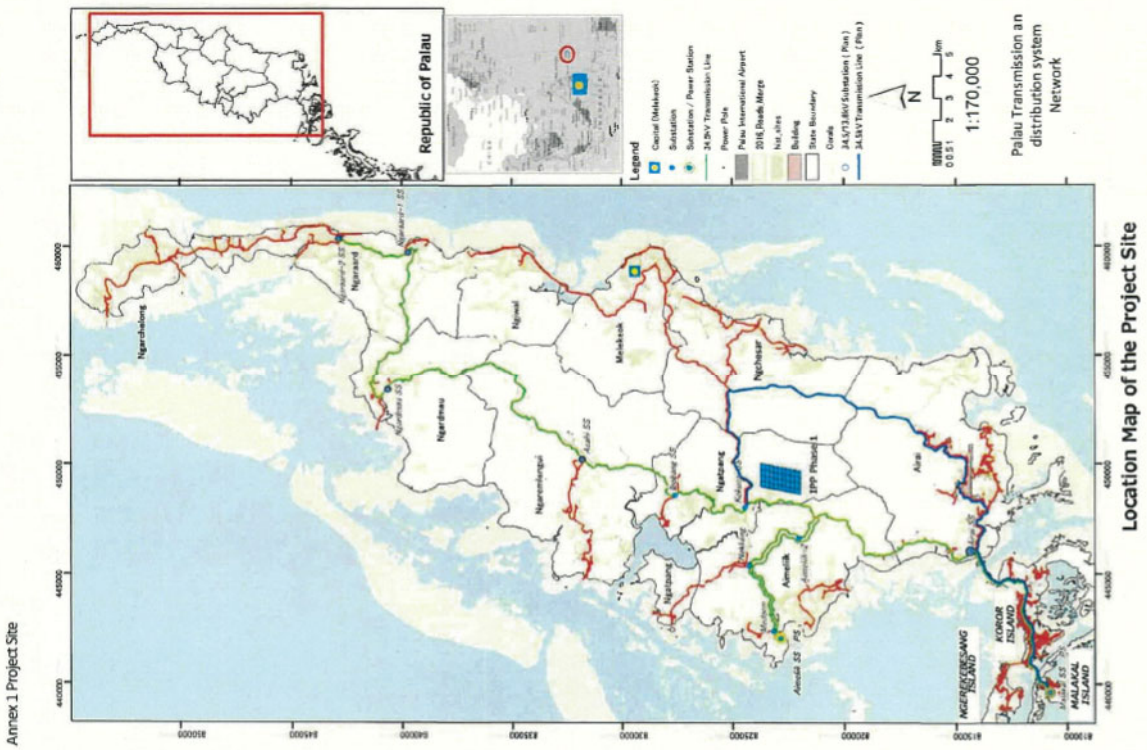
The Palauan side informed the JICA side on 18 February, 2022 that the originally planned site will be used for constructing a new hotel and that a new Koror substation cannot be constructed on the site. Therefore, the Palauan side requested to exclude the new Koror substation from the Project because the Parauan side could not secure the alternative land in a short period. The both sides confirmed that the new Koror substation will be constructed in future.

Annex 2 Organization Chart



Organization chart of Ministry of Public Infrastructure, Industries: MPII

Annex 1 Project Site



Annex 3

JAPANESE GRANT

The Japanese Grant is non-reimbursable fund provided to a recipient country (hereinafter referred to as "the Recipient") to purchase the products and/or services (engineering services and transportation of the products, etc.) for its economic and social development in accordance with the relevant laws and regulations of Japan. Followings are the basic features of the project grants operated by JICA (hereinafter referred to as "Project Grants").

1. Procedures of Project Grants

Project Grants are conducted through following procedures (See "PROCEDURES OF JAPANESE GRANT" for details):

(1) Preparation
- The Preparatory Survey (hereinafter referred to as "the Survey") conducted by JICA

(2) Appraisal
-Appraisal by the government of Japan (hereinafter referred to as "GOJ") and JICA, and Approval by the Japanese Cabinet

(3) Implementation

Exchange of Notes
-The Notes exchanged between the GOJ and the government of the Recipient

Grant Agreement (hereinafter referred to as "the G/A")
-Agreement concluded between JICA and the Recipient

Banking Arrangement (hereinafter referred to as "the B/A")
-Opening of bank account by the Recipient in a bank in Japan (hereinafter referred to as "the Bank") to receive the grant

Construction works/procurement
-Implementation of the project (hereinafter referred to as "the Project") on the basis of the G/A

(4) Ex-post Monitoring and Evaluation
-Monitoring and evaluation at post-implementation stage

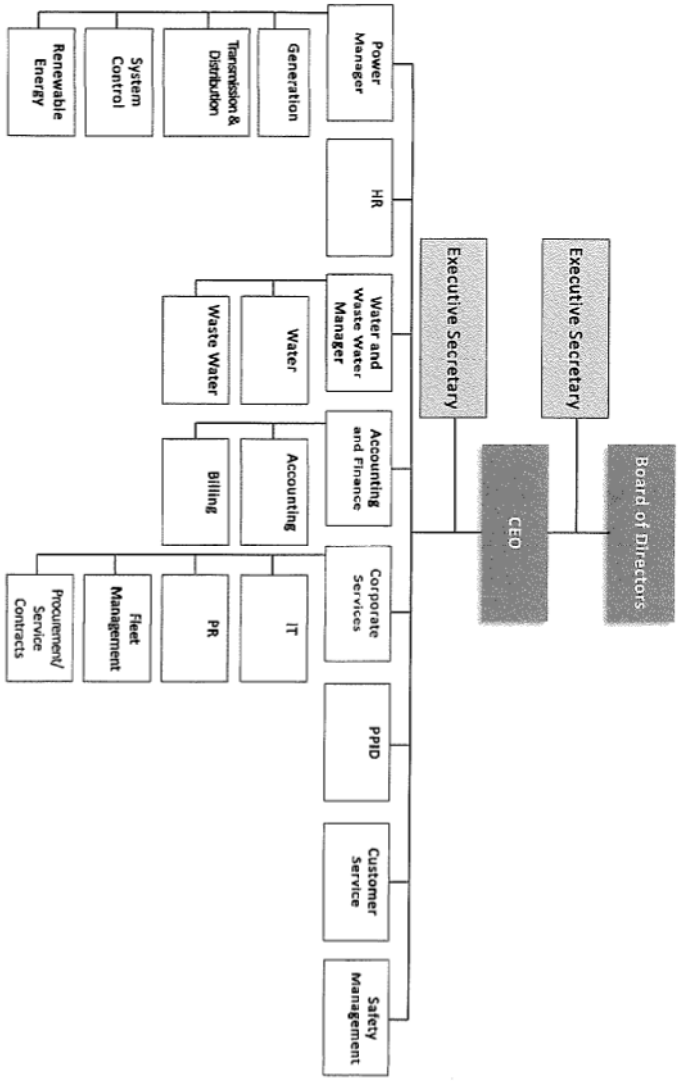
2. Preparatory Survey

(1) Contents of the Survey

The aim of the Survey is to provide basic documents necessary for the appraisal of the the Project made by the GOJ and JICA. The contents of the Survey are as follows:

- Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of

Annex 2 Organization Chart



Organization Chart of Palau Public Utility Corporation: PPUC 2

relevant agencies of the Recipient necessary for the implementation of the Project.

- Evaluation of the feasibility of the Project to be implemented under the Japanese Grant from a technical, financial, social and economic point of view.
- Confirmation of items agreed between both parties concerning the basic concept of the Project.
- Preparation of an outline design of the Project.
- Estimation of costs of the Project.
- Confirmation of Environmental and Social Considerations

The contents of the original request by the Recipient are not necessarily approved in their initial form. The Outline Design of the Project is confirmed based on the guidelines of the Japanese Grant.

JICA requests the Recipient to take measures necessary to achieve its self-reliance in the implementation of the Project. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the executing agency of the Project. Therefore, the contents of the Project are confirmed by all relevant organizations of the Recipient based on the Minutes of Discussions.

(2) Selection of Consultants

For smooth implementation of the Survey, JICA contracts with (a) consulting firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms.

(3) Result of the Survey

JICA reviews the report on the results of the Survey and recommends the GOJ to appraise the implementation of the Project after confirming the feasibility of the Project.

3. Basic Principles of Project Grants

(1) Implementation Stage

1) The E/N and the G/A

After the Project is approved by the Cabinet of Japan, the Exchange of Notes (hereinafter referred to as "the E/N") will be singed between the GOJ and the Government of the Recipient to make a pledge for assistance, which is followed by the conclusion of the G/A between JICA and the Recipient to define the necessary articles, in accordance with the E/N, to implement the Project, such as conditions of disbursement, responsibilities of the Recipient, and procurement conditions. The terms and conditions generally applicable to the Japanese Grant are stipulated in the "General Terms and Conditions for Japanese Grant (January 2016)."

2) Banking Arrangements (B/A) (See "Financial Flow of Japanese Grant (A/P Type)" for details)

a) The Recipient shall open an account or shall cause its designated authority to open an account under the name of the Recipient in the Bank, in principle. JICA will disburse the Japanese Grant in Japanese yen for the Recipient to cover the obligations incurred by the Recipient under the verified contracts.

b) The Japanese Grant will be disbursed when payment requests are submitted by the Bank to JICA under an Authorization to Pay (A/P) issued by the Recipient.

3) Procurement Procedure

The products and/or services necessary for the implementation of the Project shall be procured in accordance with JICA's procurement guidelines as stipulated in the G/A.

4) Selection of Consultants

In order to maintain technical consistency, the consulting firm(s) which conducted the Survey will be recommended by JICA to the Recipient to continue to work on the Project's implementation after the E/N and G/A.

5) Eligible source country

In using the Japanese Grant disbursed by JICA for the purchase of products and/or services, the eligible source countries of such products and/or services shall be Japan and/or the Recipient. The Japanese Grant may be used for the purchase of the products and/or services of a third country as eligible, if necessary, taking into account the quality, competitiveness and economic rationality of products and/or services necessary for achieving the objective of the Project. However, the prime contractors, namely, constructing and procurement firms, and the prime consulting firm, which enter into contracts with the Recipient, are limited to "Japanese nationals", in principle.

6) Contracts and Concurrence by JICA

The Recipient will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be concurred by JICA in order to be verified as eligible for using the Japanese Grant.

7) Monitoring

The Recipient is required to take their initiative to carefully monitor the progress of the Project in order to ensure its smooth implementation as part of their responsibility in the G/A, and to regularly report to JICA about its status by using the Project Monitoring Report (PMR).

8) Safety Measures

The Recipient must ensure that the safety is highly observed during the implementation of the Project.

9) Construction Quality Control Meeting

Construction Quality Control Meeting (hereinafter referred to as the "Meeting") will be held for quality assurance and smooth implementation of the Works at each stage of the Works. The member of the Meeting will be composed by the

Recipient (or executing agency), the Consultant, the Contractor and JICA. The functions of the Meeting are as followings:

a) Sharing information on the objective, concept and conditions of design from the Contractor, before start of construction.

b) Discussing the issues affecting the Works such as modification of the design, test, inspection, safety control and the Client's obligation, during of construction.

(2) Ex-post Monitoring and Evaluation Stage

1) After the project completion, JICA will continue to keep in close contact with the Recipient in order to monitor that the outputs of the Project is used and maintained properly to attain its expected outcomes.

2) In principle, JICA will conduct ex-post evaluation of the Project after three years from the completion. It is required for the Recipient to furnish any necessary information as JICA may reasonably request.

(3) Others

1) Environmental and Social Considerations

The Recipient shall carefully consider environmental and social impacts by the Project and must comply with the environmental regulations of the Recipient and JICA Guidelines for Environmental and Social Considerations (April, 2010).

2) Major undertakings to be taken by the Government of the Recipient

For the smooth and proper implementation of the Project, the Recipient is required to undertake necessary measures including land acquisition, and bear an advising commission of the A/P and payment commissions paid to the Bank as agreed with the GOJ and/or JICA. The Government of the Recipient shall ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the Recipient with respect to the purchase of the Products and/or the Services be exempted or be borne by its designated authority without using the Grant and its accrued interest, since the grant fund comes from the Japanese taxpayers.

3) Measures to ensure more efficient implementation of the Grant

i) In the event that the E/N and the G/A concerning a project cannot be signed by the end of the following Japanese fiscal year of the cabinet decision concerned by the GOJ, the authorities concerned of the two Governments will discuss the cancellation of the project.

ii) In the event that the period, specified in the G/A, during which the grant is available expires before the completion of the disbursement, the authorities concerned of the GOJ will thoroughly review the status, situation and perspective of the implementation of the project concerned before extending the said period. The authorities concerned of the two Governments will discuss the termination of the project including a refund, unless there are concrete prospects for its completion.

iii) Regardless of the period mentioned in 2) above, the authorities concerned of the two Governments will, in the event that five years have passed since the cabinet decision concerned by the GOJ before the completion of the disbursement, except as otherwise confirmed between them, discuss the termination of a project including a refund, unless there are concrete prospects for its completion.

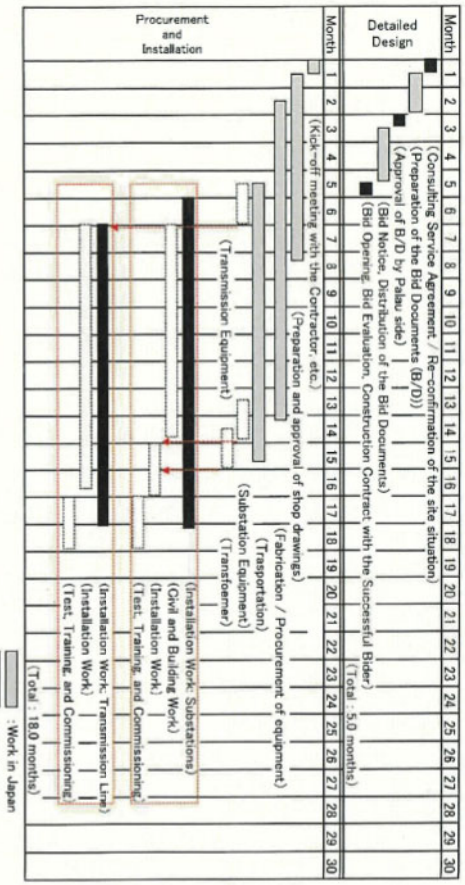
4) Proper Use

The Recipient is required to maintain and use properly and effectively the products and/or services under the Project (including the facilities constructed and the equipment purchased), to assign staff necessary for this operation and maintenance and to bear all the expenses other than those covered by the Japanese Grant.

5) Export and Re-export

The products purchased under the Japanese Grant should not be exported or re-exported from the Recipient.

Annex 4 Project Implementation Schedule



Annex 5

Major Undertakings to be taken by the Government of Palau

1. Specific obligations of the Government of Palau which will not be funded with the Grant

(1) Before the Bid

NO	Items	Deadline	In charge	Estimated Cost	Ref.
1	To sign the banking arrangement (B/A) with a bank in Japan (the Agent Bank) to open bank account for the Grant	within 1 month after the signing of the G/A	MOF/MPII	-	
2	To issue the authorization to pay (A/P) to the Agent Bank for the payment to the Consultant	within 1 month after the signing of the contract(s)	MOF/MPII	-	
3	To bear the following commissions to the Agent Bank for the banking services based upon B/A		MOF/MPII		
	1) Advising commission of A/P	within 1 month after the signing of the contract(s)		250	
	2) Payment commission for A/P	every payment		1,000	
4	To approve IEE/EIA(Conditions of approval should be fulfilled, if any) and secure the necessary budget for implementation for EMP and EMoP (and fulfilling conditions of approval, if any).	within 1 month after the signing of the G/A	PPUC	-	
5	To finalize ARAP.	before signing of the G/A	PPUC		
6	To secure the necessary budget and implement land acquisition and resettlement (including preparation of resettlement sites), and compensation with full replacement cost in accordance with RAP	before notice of the bidding documents	MOF/ MPII	462,217	
7	To implement social monitoring, and to submit the monitoring results to JICA, by using the monitoring form, on a quarterly basis as a part of Project Monitoring Report	until land acquisition and resettlement complete	PPUC	240	
8	To secure and clear the following lands (land acquisition and the compensation, cutting trees, and clearance of obstacles) 1) project sites - for Kokusai Substation, Malakal Power Plant (if necessary) - for 34.5 kV transmission/ 13.8 kV distribution line within the right of way (approx. 32 km of overhead line route and approx. 3 km of underground cable route) 2) temporary storage yard for the equipment and materials	before notice of the bidding documents	MPII/ PPUC	60,000	
9	To obtain the planning, zoning, building permit	before notice of the bidding documents	PPUC	180	
10	To submit Project Monitoring Report (with the result of Detailed Design)	before preparation of the bidding documents	PPUC	-	
11	To obtain permit for the Project implementation from relevant authority (right of way from road authority, State Government of Airai, Ngappang and/or Others, if any)	before notice of the bidding documents	PPUC	420	
12	To obtain earthmoving permit from EQPB	before notice of the bidding documents	PPUC	180	
13	To explain the Project to the residents living near the facility construction site and hold stakeholder meetings	before notice of the bidding documents	PPUC	1,500	

(2) During the Project Implementation

NO	Items	Deadline	In charge	Estimated Cost	Ref.
1	To issue A/P to the Agent Bank for the payment to the supplier and the contractor	within 1 month after the signing of the contract(s)	MOF/MPII	-	
2	To bear the following commissions to the Agent Bank for the banking services based upon the B/A		MOF/MPII		
	1) Advising commission of A/P	within 1 month after the signing of the contract(s)		250	
	2) Payment commission for A/P	every payment		22,000	
3	To ensure prompt unloading and customs clearance at ports of disembarkation in the country of the Recipient and to assist the Supplier(s) with internal transportation therein	during the Project	MPII/ PPUC	90	
4	To accord Japanese physical persons and/or physical persons of third countries whose services may be required in connection with the supply of the products and the services such facilities as may be necessary for their entry into the country of the Recipient and stay therein for the performance of their work	during the Project	MPII/ PPUC	90	
5	To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the country of the Recipient with respect to the purchase of the products and/or the services be exempted by its designated authority without using the Grant	during the Project	MPII/ MOF	90	
6	To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project	during the Project	MPII/ PPUC	240	
7	To notify JICA promptly of any incident or accident, which has, or is likely to have, a significant adverse effect on the environment, the affected communities, the public or workers.	during the construction	PPUC	45	
8	To submit Project Monitoring Report after each work under the contract(s) such as shipping, hand over, installation and operational training	within 1 month after completion of each work	PPUC	90	
9	To submit Project Monitoring Report (final) (including as-built drawings, equipment list, photographs, etc.)	within 1 month after issuance of Certificate of Completion for the works under the contract(s)	PPUC	45	
10	To submit a report concerning completion of the Project	To submit a report concerning completion of the Project within 6 months after completion of the Project	PPUC	-	
11	To construct access roads 1) Outside the site	3 months before commencement of the construction	MPII/ PPUC	-	
12	To provide facilities for distribution of electricity, water supply and drainage and other incidental facilities necessary for the implementation of the Project.	before start of the construction	PPUC	10,000	
13	To provide equipment, furniture, facilities necessary for the implementation of the Project in the site(s)	before start of the construction	PPUC	-	
14	To ensure the safety of persons engaged in the implementation of the Project	during the Project	PPUC	-	
15	To construct fences aroud substations	before energizing the site	PPUC	100,000	
16	To implement EMP and EMoP	during the Project	PPUC	-	
17	To submit results of environmental monitoring to JICA, by using the monitoring form, on a quarterly basis as a part of Project Monitoring Report	during the Project	PPUC	360	
18	To implement RAP (livelihood restoration program) if necessary	during the Project	MPII/ PPUC	-	
19	To implement social monitoring, and to submit the monitoring results to JICA, by using the monitoring form, on a quarterly basis as a part of Project Monitoring Report - Period of the monitoring may be extended if affected persons' livelihoods are not sufficiently restored. Extension of the monitoring will be decided based on agreement between PPUC and JICA.	during the Project	PPUC	360	
	Transmission Line				
20	Survey of underground utilities including water pipes, communication line, unexploded ordnance search and removal (approx. 32 km of overhead line route and approx. 3 km of underground cable route)	during the Project	PPUC	42,000	
21	Rearrangement work of the attached equipment of existing poles for installation of 34.5 kV transmission line to be done by Japan side	during the Project	PPUC	200,000	
22	(13.8 kV distribution line, distribution transformer, low voltage distribution line, etc.)	during the Project	PPUC	45,000	
	Substation				
23	Application for transportation permit of heavy goods to relevant authority with improving the existing access roads from the port of Palau to the Project sites, if necessary	during the Project	PPUC	10,000	
24	Temporary power outage plan for substation during the work including the notice to the residents	during the Project	PPUC	15,000	
25	Removal and disposal of existing equipment in Airai Substation, Malakal Power Plant, and Other substation (if any) in order to install substation equipment by the Japanese side	during the Project	PPUC	10,000	

(3) After the Project

NO	Items	Deadline	In charge	Estimated Cost	Ref.
1	To implement EMP and EMoP	for a period based on EMP and EMoP	PPUC	-	
2	To submit results of environmental monitoring to JICA, by using the monitoring form, semiannually - The period of environmental monitoring may be extended if any significant negative impacts on the environment are found. The extension of environmental monitoring will be decided based on the agreement between PPUC and JICA.	for 3 years after the Project	PPUC	180	
3	To maintain and use properly and effectively the facilities constructed and equipment provided under the Grant Aid 1) Allocation of maintenance cost 2) Operation and maintenance structure 3) Routine check/Periodic inspection	After completion of the construction	PPUC	57,000 / year *	
4	Disposal of removed existing equipment	After completion of the construction	PPUC	500,000	

(B/A: Banking Arrangement, A/P: Authorization to pay)

* The estimate cost is subjected to change depend on the operation condition and surrounding environment of the facilities

2. Other obligations of the Government of Palau funded with the Grant

NO	Items	Deadline	Amount (Million Japanese Yen)*
1	To construct transmission/distribution facilities and provide equipment 1) To conduct the following transportation a) Marin (Air) transportation of the products from Japan to the country of the Recipient b) Internal transportation from the port of disembarkation to the project site	September, 2024	
	2) To provide equipment with installation and commissioning 1.Construction of 34.5 kV transmission line (Malakal – Kokusai line) 2.Construction of 13.8 kV distribution line (up to the existing connection point) 3.Expansion of Malakal Power Plant 4.Renewal of Airai Substation 5.Expansion of Kokusai substation		
2	To implement detailed design, bidding support and procurement supervision (Consulting Service)		
	Total		

*The Amount is provisional. This is subject to the approval of the Government of Japan.

A4-25

Annex 6
G/A NO. XXXXXXX
PMR prepared on DD/MM/YY

Project Monitoring Report
on
Project Name
Grant Agreement No. XXXXXXX
20XX, Month

Organizational Information

Signer of the G/A (Recipient)	Person in Charge	(Designation)
	Contacts	Address: Phone/FAX: Email:
Executing Agency	Person in Charge	(Designation)
	Contacts	Address: Phone/FAX: Email:
Line Ministry	Person in Charge	(Designation)
	Contacts	Address: Phone/FAX: Email:

General Information:

Project Title	
E/N	Signed date: Duration:
G/A	Signed date: Duration:
Source of Finance	Government of Japan: Not exceeding JPY _____ mil. Government of (_____): _____

1: Project Description

1-1 Project Objective

1-2 Project Rationale

- Higher-level objectives to which the project contributes (national/regional/sectoral policies and strategies)
- Situation of the target groups to which the project addresses

1-3 Indicators for measurement of "Effectiveness"

Quantitative indicators to measure the attainment of project objectives		
Indicators	Original (Yr)	Target (Yr)
Qualitative indicators to measure the attainment of project objectives		

2: Details of the Project

2-1 Location

Components	Original *(proposed in the outline design)*	Actual
1.		

2-2 Scope of the work

Components	Original* *(proposed in the outline design)*	Actual*
1.		

Reasons for modification of scope (if any).

(PMR)

2-3 Implementation Schedule

Items	Original *(proposed in the outline design)*	Original *(at the time of signing the Grant Agreement)*	Actual

Reasons for any changes of the schedule, and their effects on the project (if any)

2-4 Obligations by the Recipient

2-4-1 Progress of Specific Obligations
See Attachment 2.

2-4-2 Activities
See Attachment 3.

2-4-3 Report on RD
See Attachment 11.

2-5 Project Cost

2-5-1 Cost borne by the Grant(Confidential until the Bidding)

Components			Cost (Million Yen)	
	Original *(proposed in the outline design)*	Actual *(in case of any modification)*	Original[1),2)] *(proposed in the outline design)*	Actual
	1.			
Total				

Note: 1) Date of estimation:
2) Exchange rate: 1 US Dollar = Yen

2-5-2 Cost borne by the Recipient

Components			Cost (1,000 Taka)	
	Original *(proposed in the outline design)*	Actual *(in case of any modification)*	Original[1),2)] *(proposed in the outline design)*	Actual
	1.			

Note: 1) Date of estimation:
2) Exchange rate: 1 US Dollar =

Reasons for the remarkable gaps between the original and actual cost, and the countermeasures (if any)

(PMR)

2-6 Executing Agency

- Organization's role, financial position, capacity, cost recovery etc,
- Organization Chart including the unit in charge of the implementation and number of employees.

Original *(at the time of outline design)* name: role: financial situation: institutional and organizational arrangement (organogram): human resources (number and ability of staff):
Actual *(PMR)*

2-7 Environmental and Social Impacts

- The results of environmental monitoring based on Attachment 5 (in accordance with Schedule 4 of the Grant Agreement).
- The results of social monitoring based on in Attachment 5 (in accordance with Schedule 4 of the Grant Agreement).
- Disclosed information related to results of environmental and social monitoring to local stakeholders (whenever applicable).

3: Operation and Maintenance (O&M)

3-1 Physical Arrangement

- Plan for O&M (number and skills of the staff in the responsible division or section, availability of manuals and guidelines, availability of spareparts, etc.)

Original *(at the time of outline design)*
Actual *(PMR)*

3-2 Budgetary Arrangement

- Required O&M cost and actual budget allocation for O&M

Original *(at the time of outline design)*

Actual *(PMR)*

4: Potential Risks and Mitigation Measures

- Potential risks which may affect the project implementation, attainment of objectives, sustainability
- Mitigation measures corresponding to the potential risks

Assessment of Potential Risks *(at the time of outline design)*

Potential Risks	Assessment
1. (Description of Risk)	Probability: High/Moderate/Low
	Impact: High/Moderate/Low
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action required during the implementation stage:
	Contingency Plan (if applicable):
2. (Description of Risk)	Probability: High/Moderate/Low
	Impact: High/Moderate/Low
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action required during the implementation stage:
	Contingency Plan (if applicable):
3. (Description of Risk)	Probability: High/Moderate/Low
	Impact: High/Moderate/Low
	Analysis of Probability and Impact:
	Mitigation Measures:
	Action required during the implementation stage:

	Contingency Plan (if applicable):

Actual Situation and Countermeasures
(PMR)

5: Evaluation and Monitoring Plan (after the work completion)

5-1 Overall evaluation

Please describe your overall evaluation on the project.

5-2 Lessons Learnt and Recommendations

Please raise any lessons learned from the project experience, which might be valuable for the future assistance or similar type of projects, as well as any recommendations, which might be beneficial for better realization of the project effect, impact and assurance of sustainability.

5-3 Monitoring Plan of the Indicators for Post-Evaluation

Please describe monitoring methods, section(s)/department(s) in charge of monitoring, frequency, the term to monitor the indicators stipulated in 1-3.

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Attachment

1. Project Location Map
2. Specific obligations of the Recipient which will not be funded with the Grant
3. Monthly Report submitted by the Consultant

Appendix - Photocopy of Contractor's Progress Report (if any)
- Consultant Member List
- Contractor's Main Staff List

4. Check list for the Contract (including Record of Amendment of the Contract/Agreement and Schedule of Payment)
5. Environmental Monitoring Form / Social Monitoring Form
6. Monitoring sheet on price of specified materials (Quarterly)
7. Report on Proportion of Procurement (Recipient Country, Japan and Third Countries) (PMR (final)only)
8. Pictures (by JPEG style by CD-R) (PMR (final)only)
9. Equipment List (PMR (final)only)
10. Drawing (PMR (final)only)
11. Report on RD (After project)

Attachment 7

Report on Proportion of Procurement (Recipient Country, Japan and Third Countries)
(Actual Expenditure by Construction and Equipment each)

	Domestic Procurement (Recipient Country) A	Foreign Procurement (Japan) B	Foreign Procurement (Third Countries) C	Total D
Construction Cost	(A/D%)	(B/D%)	(C/D%)	
Direct Construction Cost	(A/D%)	(B/D%)	(C/D%)	
others	(A/D%)	(B/D%)	(C/D%)	
Equipment Cost	(A/D%)	(B/D%)	(C/D%)	
Design and Supervision Cost	(A/D%)	(B/D%)	(C/D%)	
Total	(A/D%)	(B/D%)	(C/D%)	

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Attachment 6

Monitoring sheet on price of specified materials

1. Initial Conditions (Confirmed)

	Items of Specified Materials	Initial Volume A	Initial Unit Price (¥) B	Initial total Price C=A×B	1% of Contract Price D	Condition of payment	
						Price (Decreased) E=C−D	Price (Increased) F=C+D
1	Item 1	●●t	●	●	●	●	●
2	Item 2	●●t	●	●	●		
3	Item 3						
4	Item 4						
5	Item 5						

2. Monitoring of the Unit Price of Specified Materials
(1) Method of Monitoring : ●●

(2) Result of the Monitoring Survey on Unit Price for each specified materials

	Items of Specified Materials	1st ●month, 2015	2nd ●month, 2015	3rd ●month, 2015	4th	5th	6th
1	Item 1						
2	Item 2						
3	Item 3						
4	Item 4						
5	Item 5						

(3) Summary of Discussion with Contractor (if necessary)
-
-
-

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Classification	Environmental item	Main items to be checked	Yes: Y No: N	Environmental and social considerations
		(b) Does the site contain habitats of valuable species that are required to be protected under the laws of the country or international conventions? (c) If there is concern about significant impacts on ecosystems, will measures be taken to reduce impacts on ecosystems? (d) Will measures be taken to block the migration routes of wildlife and livestock, and to fragment their habitats? (e) Will the Project result in deforestation, poaching, desertification, drying of wetlands, etc.? (e) Will the Project result in deforestation, poaching, desertification, drying up of wetlands, etc.? Is there a risk of disturbance of the ecosystem due to the introduction of exotic species (species that have not lived in the area before), pests, etc.? What measures will be taken against these? (f) If the Project is to be constructed in an undeveloped area, will the natural environment be significantly damaged by the development of the new area?	(d)N (e)N (f)N	There are no endangered species in the Project sites. However, in case that endangered species are confirmed by any chance during construction, some measures, such as the change of the span of power poles, should be taken. (d) The Project will not cause blockage of livestock and wildlife migration routes, habitat fragmentation, etc. (e) The Project will not disrupt the ecosystem as feared. (f) The Project site is located in an existing substation, and along an existing road, which is already under development.
	(3) Geomorphology and geology	(a) Are there any areas of poor geology on the transmission and distribution line routes where landslides or landslides are likely to occur? If so, will appropriate measures be taken in terms of construction methods? (b) Will landslides or collapses be caused by civil engineering works such as embankments and cuts? Are appropriate measures taken to prevent soil collapse and landslides? (c) Will soil runoff occur from embankments, cut areas, soil dumping sites, and soil extraction sites? Will appropriate measures be taken to prevent soil runoff?	(a)N (b)N (c)N	(a) N/A. Geographic change does not occur. (b) N/A. Geographic change does not occur. (c) N/A. Geographic change does not occur.
4. Social environment	(1) Resettlement	(a) Will involuntary resettlement occur as a result of project implementation? If so, will efforts be made to minimize the impact of relocation? (b) Will the relocating residents be provided with appropriate explanations on compensation and livelihood restoration measures prior to relocation?	(a) (b) (c) (d) (e) (f)	(a) Involuntary resettlement does not occur. (b) Stakeholder meetings will be held. Explanation/clarification on compensation and livelihood restoration assistance will be provided to affected people. Affected people will conclude the agreement with PPUC.

Annex 7 Environmental Checklist

Classification	Environmental item	Main items to be checked	Yes: Y No: N	Environmental and social considerations
1. Licensing and Explanation	(1) EIA and environmental permits	(a) Has an Environmental Assessment Report (EIA Report) been prepared? (b) Has the EIA report been approved by the government of the country concerned? (c) Are there any conditions attached to the approval of the EIA report? If so, are these conditions met? (d) In addition to the above, if necessary, have environmental permits and approvals been obtained from local authorities?	(a)N (b)N (c)N (d)N	(a) (a)–(c) EIA report is not required. (d) Earth Moving Permit is required from EQPB for the rehabilitation of existing substations (Malakal, Kokusai) and will be obtained before the start of the Project.
	(2) Explanation to local stakeholders	(a) Have the Project contents and impacts been properly explained to local stakeholders, including information disclosure, to obtain their understanding? (b) Have comments from local residents and other stakeholders been reflected in the Project contents?	(a) (b)	(a) Meetings with local stakeholders have been planned in accordance with JICA guideline. (b) The first stakeholder consultation was held on September 23, 2021, and the stakeholders expressed their preference for a method other than the overhead as the transmission method for the KB Bridge
	(3) Examination of alternatives	(a) Have multiple alternatives to the Project plan been considered (including items pertaining to the environment and society when considering them)?	(a)Y	(a) Alternatives were also compared for the transmission method of the KB Bridge. Specifically, the overhead, submarine cable, and installation to existing check box were compared. Considering the natural and social environment, installation to existing check box was adopted.
2. Pollution control	(1) Water quality	(a) Will the water quality in the downstream of the surrounding rivers be degraded by soil runoff from exposed areas of topsoil such as embankments and cut areas? If so, will countermeasures be provided?	(a)N	(a) Large-scale geographic change does not occur. The impact of turbid water due to construction is assumed, but the impact is minimized because gutters and basins are installed to drain wastewater after the settlement of suspended matter.
3. Natural Environment	(1) Protected areas	(a) Is the site located in a protected area as defined by the laws of the country and international conventions? (b) Will the Project have an impact on a protected area?	(a)N	(a) Protected areas are scattered along the road where the power poles are planned, but the plan should avoid the protected areas.
	(2) Ecosystem	(a) Does the site contain primary forests, natural tropical forests, or ecologically important habitats (coral reefs, mangrove swamps, tidal flats, etc.)?	(a)N (b)N (c)N	(a) – (c) The Project site is located within the existing substation, and along the existing road, and there are no ecologically important habitats.

Classification	Environmental item	Main items to be checked	Yes: Y No: N	Environmental and social considerations
		legislation of the country concerned be taken into account?		
	(4) Landscape	(a) Will the Project have an adverse effect on landscapes that require special consideration, if any? If so, will the necessary measures be taken?	(a)N	(a) The Project site and its surroundings are already developed, and the Project will not significantly damage the landscape.
	(5) Ethnic minorities, indigenous peoples	(a) Is consideration given to reducing the impact on the culture and way of life of ethnic minorities and indigenous peoples of the country? (b) Are the rights of minorities and indigenous peoples to their lands and resources respected?	(a)N/A (b)N/A	(a)–(b) There are no indigenous peoples affected by the Project.
	(6) Working environment	(a) Will the working environment laws of the country to be observed in the Project be observed? (b) Will the Project take into consideration the safety of project personnel in terms of hardware, such as the installation of safety equipment to prevent occupational accidents and the management of hazardous substances? (c) Are soft measures planned and implemented for project personnel, such as the formulation of safety and health plans and the implementation of safety education for workers and others (including traffic safety and public health)? (d) Will appropriate measures be taken to ensure that security personnel involved in the Project do not infringe on the safety of project personnel and local residents?	(a)Y (b)Y (c)Y (d)Y	(a)–(d) It is the responsibility of PPUC to comply with Palau's working environment laws. (a)–(b) Workers will be required to wear helmets and protective equipment, and safety training will be thoroughly provided to ensure the safety of workers during construction and during service.
5. Others	(1) Impacts during construction	(a) Are there mitigation measures for pollution during construction (noise, vibration, turbid water, dust, exhaust gas, waste, etc.)? (b) Will the construction have an adverse effect on the natural environment (ecosystem)? Will mitigation measures be provided? (c) Will the construction have an adverse effect on the social environment?	(a)Y (b)Y (c)Y	(a) Possible impacts include noise and vibration, dust, exhaust gas, and waste. (b) There are protected areas scattered along the road where the poles are planned, but the impact can be minimized by avoiding the protected areas. (c) Construction may cause traffic congestion on the roads around the site. PPUC will remind the Contractor not to concentrate vehicles at certain times of the day. PPUC will also inform the residents of the power outage plan in advance via radio, internet, text messages, etc.

Classification	Environmental item	Main items to be checked	Yes: Y No: N	Environmental and social considerations
		(e) Will a survey for resettlement be conducted and a resettlement plan be developed, including compensation at replacement cost and restoration of livelihoods after resettlement? (d) Will compensation payments be made prior to relocation? (e) Is there a written compensation policy in place? (f) Does the plan give appropriate consideration to socially vulnerable groups, especially women, children, the elderly, the poor, and ethnic minorities and indigenous peoples, among the relocated residents? (g) Can the relocated residents reach a consensus before the relocation? (h) Is there a system in place to ensure proper implementation of the resettlement? Will there be sufficient implementation capacity and budgetary provision? (i) Will there be a plan to monitor the impact of the resettlement? (j) Is there a grievance redress mechanism in place?	(g) (h) (i) (j)	(c) A survey of the asset of all affected people lost due to the Project was conducted. ARAP includes compensation and livelihood restoration programs. (d) Compensation will be paid prior to the resettlement. (e) Compensation policy was described in ARAP (including eligibility for compensation, entitlement matrix etc.). (f) ARAP considers socially vulnerable groups such as low income, elderly and/or female, to improve living standards. (g) Involuntary resettlement does not occur. (h) PPUC is responsible for the implementation of ARAP. (i) Monitoring of land acquisition and grievance redress will be conducted. A monitoring plan was developed in ARAP. (j) A grievance redress committee will be established.
	(2) Life and livelihood	(a) Will the Project have an adverse impact on the livelihoods of residents? (b) Will there be a risk of disease outbreaks (including HIV and other infectious diseases) due to population influx from other areas? (b) Will there be a risk of disease outbreaks (including HIV and other infectious diseases) due to population influx from other areas? Will appropriate public health considerations be taken into account as necessary? (c) Will there be radio interference caused by steel towers, etc.? If significant radio wave interference is expected, will appropriate measures be considered? (d) Will compensation for the construction of transmission line be provided in accordance with national laws?	(a) (b) (c) (d)	(a) An economic displacement such as the loss of crops and agricultural land is expected. ARAP was developed and the loss will be compensated at full replacement cost. (b) No influx of population from outside of the Project site is predicted. (c) The Project will not cause radio interference. (d) Compensation under power line will be paid according to the local laws and ARAP.
	(3) Cultural heritage	(a) Is there a risk that the Project will damage archaeological, historical, cultural, or religious heritage or sites? (b) Is the Project likely to damage archaeological, historical, cultural, or religious heritage or sites, and will the measures provided for in the national	(a) N	(a) Historic areas are scattered along the road where the utility poles are planned, so the power poles are planned avoiding the historical areas.

Annex 8 Environmental Management Plan/Environmental Monitoring Plan

Environmental Management Plan

No	Category	Impact	Countermeasures	1.Reponsible Organization 2.Supervision Organization	Cost
Before Construction					
	Land acquisition. Social institutions such as social infrastructure and local decision-making institutions	Loss of assets, income and livelihood due to resettlement	In accordance with JICA guideline and WB OP4.12, an ARAP will be prepared based on the consensus with project affected people, and full compensation at replacement cost and support will be provided.	1.PPUC 2.MFII	Budget by PPUC
Construction Stage					
1	Air Pollution	Emission gases and dusts are generated by operation of construction vehicles and machineries.	Pollution will be minimized by sprinkling water. The Contractor will use the latest type of construction machinery in a good gas emission condition.	1.Contractor 2.PPUC	Included in construction cost
2	Water Pollution	Turbid water is drained in rivers.	The Contractor will install gutters and basins to catch turbid water and to reduce turbidity before draining.	1.Contractor 2.PPUC	Included in construction cost
3	Noise and Vibration	Noise and vibration are generated by construction machinery.	The Contractor will install a fence to minimize the noise and will use low noise/vibration machinery.	1.Contractor 2.PPUC	Included in construction cost
4	Existing Social Infrastructure and Social Services	Traffic jam due to construction vehicles.	Traffic condition will be controlled around the sites. Operation time will be scheduled adequately. Power outage schedule will be informed to affected people in advance by internet and newspapers.	1.Contractor 2.PPUC	Included in construction cost
5	Accident	Accident in construction works.	The Contractor will provide safe driving instructions. Based on occupational safety and health standards, the Contractor will make workers wear safety protector such as gloves, helmet, safety belts, etc.	1.Contractor 2.PPUC	Included in construction cost
6	Protected areas, ecosystem, cultural heritage	Impacts to protected areas by of etc. construction power poles	The Contractor will construct power poles to avoid protected areas etc. In case that endangered species are confirmed by any chance during construction, the Contractor will change the span of power poles	1.Contractor 2.PPUC	Included in construction cost
Operation Stage					

Classification	Environmental item	Main items to be checked	Yes: Y No: N	Environmental and social considerations
6. Notes	(2) Monitoring	(a) Will the monitoring of the Project be planned and implemented for the above environmental items that may have an impact? (b) Are the items, methods, frequency, etc. of the plan appropriate? (c) Is the monitoring system (organization, personnel, equipment, budget, etc. and its continuity) to be established? (d) Are the methods, frequency, etc. of reporting from the supplier to the competent authorities specified?	(a)Y (b)Y (c)Y (d)Y	(a)–(d) PPUC will monitor environmental items (permits, water quality, accidents) that may have an impact. The Project does not require an environmental assessment, but PPUC is the competent authority of EQPB.
	Reference to other environmental checklists	(a) If necessary, the applicable check items in the checklist for roads shall also be added for evaluation.	(a)N/A	(a) There are no additional relevant checks to be made.
	Notes on the use of environmental checklists	(a) If necessary, also identify the impact on transboundary or global environmental issues (e.g., possible factors related to transboundary disposal of waste, acid rain, ozone depletion, and global warming issues).	(a)N/A	(a) The impact of the Project is limited in terms of geography and duration, and no extensive environmental impact is expected.

No	Category	Impact	Countermeasures	1.Responsible Organization 2.Supervision Organization	Cost
1	Accidents	Electrocution caused by contacting with wire or power poles	Safety training on the maintenance of facilities	1.PPUC 2.MPII	Included in operation & maintenance cost
2	Soil Pollution	Insulating oil for the transformer may cause, soil pollution.	The Contractor will construct the concrete wall to prevent soil pollution.	1.PPUC 2.MPII	Included in operation & maintenance cost

Environmental Monitoring Plan

Time	Classification	Monitoring Item	Monitoring Point	Frequency	Method	1.Responsible organization 2.Supervision organization
Before Construction	1. Social institutions such as social infrastructure and local decision-making institutions	Compensation payment	-	When necessary until the start of construction	Check of compensation payment and grievance redress	1.PPUC 2.MPII
Construction Stage	1. Water Quality	Free of visible floating materials, oils	Before and after discharge point to ocean	During construction work Once a week	Visual check	1.The Contractor 2.PPUC and EQPB
	2. Existing Social Infrastructure and Social Services	Traffic conditions Confirming a power outage plan	Surrounding areas of construction sites	When necessary during construction	Visual check Photographic records Monthly work report	1.The Contractor 2.PPUC
	3. Accident	Safety training to prevent accidents	-	When necessary during construction	Visual check Photographic records Monthly work report	1.The Contractor 2.PPUC
Operation Stage	1. Accident	Safety training to prevent accidents	-	Once a week	Visual check Photographic records Monthly work report	1.PPUC 2.MPII

Table of Contents

INTRODUCTION

1.1 Background

The Japan International Cooperation Agency (JICA) and the Palau Public Utilities Corporation (PPUC) are jointly undertaking a preliminary survey on the upgrade to the power grid in the Republic of Palau. This survey is being financed by JICA and has hired Yachiyo Engineering Co., Ltd., a Japanese firm, to do the initial work.

The objective of this project is to improve the power transmission network of Republic through the following activities:

- Additional transmission lines between the Malakal power station and the Airai substation;
- New transmission lines between the Airai substation and the Kokusai substation along the east side of Babeldaob Island (Airai, Ngchesar and Ngatpang States);
- These new transmission lines will require installation of new power poles at 50 meter intervals; and
- Repair of existing substations in Malakal (Koror), Ngetkib (Airai) and Kokusai (Ngatpang).

The installation of the new power poles and overhead transmission lines will impact numerous properties along the entire utility corridor. Around 119 individual properties will be affected by this proposed project. Impacted lots include approximately 29 private properties while the rest are government-owned.

1.2 Legal Basis of the Land Acquisition

Palau has legal basis for land acquisition for public purpose under the Palau Constitution. There are also Statues (Palau National Code Title 35), agency rules and regulations, and previous court rulings that contain detailed provisions concerning eminent domain and related concepts and procedures.

Further explanation of this subject is detailed in Section 3.1

1.3 Objectives of RAP

This document is an Abbreviated Resettlement Action Plan (ARAP), a planning document that describes what the project implementers will do to address the direct social and economic impacts associated with involuntary displacement as a result of this project.

The main objective of this ARAP is to ensure that the following land acquisition issues, all persons affected by it are properly consulted, made available to affordable and accessible grievance mechanisms and compensated at replacement cost or market value (which ever higher) for their losses. They will also be provided with rehabilitation measures so that they are at least as well off as they would have been in the absence of this proposed project.

This abbreviated document has been prepared in accordance with the World Bank resettlement policy (OP 4.12), where impacts on the entire displaced population are minor, or fewer than 200 people are displaced.

THE PREPARATORY SURVEY
FOR THE
POWER GRID UPGRADE PROJECT
IN
THE REPUBLIC OF PALAU

ABBREVIATED RESETTLEMENT ACTION PLAN (ARAP)

May 2022

JAPAN INTERNATIONAL COOPERATION AGENCY

YACHIYO ENGINEERING CO., LTD.

Annex 9 Abbreviated Resettlement Action Plan

EXECUTIVE SUMMARY

Japan International Cooperation Agency (JICA) and the Palau Public Utilities Corporation (PPUC) are jointly undertaking a Preparatory Survey for the Power Grid Upgrade in the Republic of Palau. This survey is being financed by JICA.

The objective of this project is to improve the power transmission network of Republic through the following activities:

- Additional transmission lines between the Malakal power station and the Airai substation;
- New transmission lines between the Airai substation and the Kokusai substation along the east side of Babeldaob Island (Airai, Ngchesar and Ngatpang States);
- These new transmission lines will require installation of new power poles at 50 meter intervals; and
- Repair of existing substations in Malakal (Koror), Ngetkib (Airai) and Kokusai (Ngatpang).

This document is an Abbreviated Resettlement Action Plan (ARAP), a planning document that describes what the project implementers will do to address the direct social and economic impacts associated with involuntary displacement as a result of this project. This abbreviated document has been prepared in accordance with the World Bank resettlement policy (OP 4.12), where impacts on the entire displaced population are minor, or fewer than 200 people are displaced.

The ARAP explains the project goals and identification of affected lands, participation and consultation procedures, eligibility criteria for project affected people (PAPs), legal framework and institutional involvement, defines valuation methodology, establishes compensation entitlements and unit rates, and grievance redress mechanism and the project implementation schedule.

There are total of 119 project affected parcels, among them 27 are privately owned land parcels while the remainder are all government (National and State) Lands. The breakdown by state is as follows: 49 properties (10 private) in Koror State, 52 parcels (12 private) in Airai State, 12 parcels (5 private) in Ngchesar State and 6 parcels (2 private) in Ngatpang State.

Regarding crops and plants, multiple fruit trees, coconut trees, betelnut trees and ornamental plants will be affected by the project.

No homes, buildings or other structures are going to be affected and no people are going to be resettled or livelihoods are expected to be impacted from this project.

2.1.1 Koror State

	Cadastral Lot No.	Owner	Land Use	Zoning	Area (m^2)
1	062 B 04	Private	Elementary School	Residential/Commercial	190.86
2	030 B 17	Private	Business	Residential/Commercial	54.90
3	030 B 18	Private	Business	Residential/Commercial	57.72
4	030 B 24	Private	Elementary & High School	Residential	338.63
5	092 B 01	Private	Residential	Residential/Commercial	264.56
6	022 B 07	Private	Business	Residential/Commercial	56.76
7	022 B 12	Private	Business	Residential/Commercial	203.02
8	021 B 08	Private	Farm land/Vacant	Residential/Commercial	109.32
9	055 B 02	Private	Farm	Residential/Commercial	469.74
10	055 B 01	Private	Farm/Business	Residential/Commercial	393.52
				Total	2,139.03

2.1.2 Airai State

	Cadastral Lot No.	Owner	Land Use	Zoning	Area (m^2)
1	024 N 14	Private	Business	Residential/Commercial	181.46
2	024 N 12	Private	Community/Church	Residential/Commercial	50.49
3	069 N 01	Private	Community facility	Residential/Commercial	102.39
4	024 N 15	Private	Residential	Residential/Commercial	83.14
5	025 N 10	Private	Business/Residential	Residential/Commercial	276.40
6	025 N 09	Private	Residential	Residential/Commercial	268.85
7	025 N 08	Private	Business	Residential/Commercial	99.43
8	009 N 01	Private	Residential	Residential/Commercial	413.85
9	009 N 03	Private	Residential	Residential/Commercial	128.85
10	009 N 20	Private	Residential	Residential/Commercial	117.49
11	002 N 01	Private	Church/Residential	Residential/Commercial	40.23
12	059 N 01	Private	School/Business	Residential/Commercial	137.54
				Total	1,900.12

2.1.3 Ngchesar State

	Cadastral Lot No.	Owner	Land Use	Area (m^2)
1	064 P 18	Private	Business	147.99
2	045 P 09	Private	Vacant/Unimproved	407.46
3	059 P 01	Private	Vacant/Unimproved	97.16
4	069 P 04	Private	Vacant/Unimproved	217.66
5	069 P 03	Private	Vacant/Unimproved	169.19
			Total	1,039.46

Ngchesar State does not have Zoning laws.

2.1.4 Ngatpang State

	Cadastral Lot No.	Owner	Land Use	Area (m^2)
1	024 P 18	Private	Vacant/Unimproved	122.84
2	023 L 03	Private	Vacant/Unimproved	225.45
			Total	348.29

Ngatpang State does not have Zoning laws.

2.2 Types of the Affected Land

As stated in Section 2.1 above, impacted lands from the proposed project are adjacent to the main road and include lands used for school grounds, businesses, farms, residential and vacant/unimproved lots. Majority of the affected lands in Koror and Airai are in residential, business and school use. Affected areas in Ngchesar and Ngatpang are mainly vacant and unimproved properties.

2.3 Economic Condition of Landowners

A total of 101 people are affected by the proposed new power pole installations. In addition to the landowners who reside on their land with their families, there are 43 tenants renting units in rental buildings. These rental properties are all located in Koror.

Out of the 6 power pole-affected private properties with residential dwellings, 5 of these properties are in Airai and are owned by family clans. Adult individuals in these households are employed while others earn their livelihood through other occupation such as small-scale farming. Number of the household members range between 3 and 10.

Table 2-1: Age and Gender Structure of PAPs and Percentage of PAPs in each Age Category

Age	Male	Female	Total	Percentage
0-9	2	1	3	2.9%
10-19	0	1	1	0.9%
20-29	5	2	7	6.9%
30-39	33	10	43	42.6%
40-49	5	8	13	12.9%
50-59	14	4	18	17.8%
60-69	7	7	14	13.9%
70 +	2	0	2	1.9%
Total	**68**	**33**	**101**	**100%**

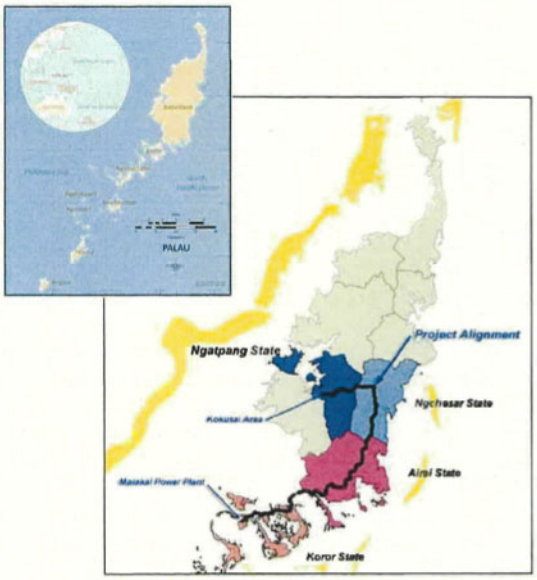
In regards to income, a majority of the PAPs are earning the minimum wage of $3.50/hr in their jobs. The highest earners are the landowners that are either renting out housing units on their properties, have on-site commercial buildings, or have businesses elsewhere. The table below shows a simple breakdown of the income for the project-affected people:

Table 2-2: Monthly Income of PAPs and Percentage of PAPs in each Income Category

Monthly Income of PAPs		
Category (USD)	No. of PAPs	Percentage
<300	16	15.84%
300-599	57	56.44%
600-999	8	7.92%
1000-1499	8	7.92%
1500-2500	2	1.98%
>2500	10	9.90%
Total	101	100.00%

1.4 Project Location and Impact Area

The project location extends from the Malakal Power Station on Malakal Island through Koror Island to Airai, Ngchesar and Ngatpang States on Babeldaob Island. Refer to the figure below for the entire project alignment.



1.5 Status of the Land Acquisition

The process for land acquisition for the proposed power upgrade project is in its early stages. Private landowners are being consulted about the project and the impacts to their properties. The process will be based on voluntary sales agreements with each landowner. However, because majority of the impacted properties are fairly small and the project only impacts a small portion of these properties, compensation of utility easements may be an option that the landowners may be more open to, rather than giving up or selling their land. Refer to Section 2.1 for additional information.

The consultation process was performed by PPUC staff through meetings with the individual land owners to discuss the anticipated impacts to their properties and their initial thoughts on the project. They were informed that there will be later consultations to discuss potential compensation, if necessary, for the impacts to their properties. The compensation meetings with landowners will be scheduled at a later date to be determined by PPUC.

The compensation policy in JICA's Guidelines for Environmental and Social Considerations is to compensate at full replacement cost for the loss of affected assets. In order to comply with the Guidelines, the agreed compensation amount needs to be comparable with the replacement cost. The replacement cost is described in Section 3.6.

2. Census Survey Results

2.1 Affected Land Use and Landowners

The proposed construction of new power poles and transmission lines will impact lands that are adjacent to the main roadways that used for school grounds, businesses, farms, residential and vacant/unimproved lots.

According to the Bureau of Lands and Survey, there are total of 119 project affected parcels, with 29 being privately owned land parcels while the remainder are all government (National and State) Lands.

Government properties affected by this project are mostly lands leased for business and residential use. PPUC will work with the State Governments to secure utility easements in these affected properties for the project. There may be leased lands in Koror that will have issues with power poles and overhead transmission lines. This is further discussed in Section 2.5, below.

The areas in the following tables below shows the estimated areas within each impacted private lot that falls under the overhead transmission lines and power poles. The area is calculated using the length of the overhead line and a 2.44-meter (8 ft.) wide corridor. The 2.44-meter wide utility corridor was proposed by PPUC as a minimum area for the overhead transmission lines and thus minimizing the loss of available land on the affected properties as they are fairly small in size. Since the overhead transmission lines will be adjacent to the main roads, PPUC is able to use the road and shoulders to gain access to the power poles and transmission lines for maintenance purposes.

					ensure power pole location does not impact existing driveway access.
21	Ngchesar	Simiiru	064 P 18		No issue with the proposed project.
22	Ngchesar	Ngersaul	045 P 09		No problem with the proposed project. Just ensure power pole location does not impact their planned future access.
23	Ngchesar	Ngersaul	059 P 01		No issue with the proposed project.
24	Ngchesar	Simiiru	069 P 04		No problem with the proposed project.
25	Ngchesar	Ngersaul	069 P 03		No issue with the proposed project.
26	Ngatpang	Teluul Liis	024 L 18		No owner determined at the moment.
27	Ngatpang	Teluul Liis	023 L 03		No issue with the proposed project.

It should be noted that there may be leaseholders in Koror State that will have issues if the power poles are placed within their leased lands. While the majority of the alignment within Koror is along the main road, there are a couple of known instances that will cause difficulties to the leaseholder. One instance is the Palau Community College (PCC) campus. A recent conversation with the PPC President indicated that PCC has spent large amount of resources to place all the utilities underground to improve the campus infrastructure and aesthetics. New poles and transmission lines in front of the campus will not be appreciated. Placing the transmission line underground or overhead transmission lines across the street would be PCC's preference.

Another instance is the large lot across the National Congress building that is the planned future site of a Sheraton Hotel. The project proponent has asked PPUC to relocate the existing power poles and transmission lines to the other side of the street to avoid interference with the planned development.

2.6 Perspectives on the Project

All but one impacted private landowners that were consulted were agreeable with the project, however the majority of landowners wanted to know the exact location of the power poles to ensure that it does not affect existing or proposed future access and structures within their properties.

For the Koror and Airai states' leased lots, there may be instances that the proposed alignment of the new transmission line to be reconsidered based on individual circumstances of the lessees of the lands. PPUC should work further with the public land authorities of the respective states to address such situations.

The existing Airai substation will be improved and used for this project. There was an plan to construct a new substation in Koror near the Ngesaol area but was rejected due to future development plans at one site and construction cost at the other. One of these possible locations was an existing quarry site, however future planned development at this site, after the quarrying activities were completed, would not allow for a power substation. The other site is a submerged piece of land which would result in a substantial cost for reclamation of the site for construction of a new power substation.

3 Policy of the Acquisition

3.1 Palau's Legal Authority for Land Acquisition

As stated in Section 1.2, Palau has legal basis for land acquisition for public purpose under the Palau Constitution. Article IV, Section 6 of the Constitution states that, "the government shall take no ... property without due process of law nor shall private property be taken except for a recognized public use and for just compensation in money or in kind." Furthermore, Article VIII, Section 7 provides that, "[t]he national government shall have the power to take property for public use upon payment of just compensation. The state government shall have the power to take private property for public use upon payment of just compensation. No property shall be taken by the national government without prior consultation with the government of the state in which the property is located. This power shall not be used for the benefit of a foreign entity. This power shall be used sparingly and only as a final resort after all means of good faith negotiation with the land owner have been exhausted." Please refer to **Attachment 1** for legal documentation on land dealings in the Republic of Palau.

There are also Statues (Palau National Code Title 35), agency rules and regulations, and previous court rulings that contain detailed provisions concerning eminent domain and related concepts and procedures

There are also provisions in the lease agreements of State lands that reserve rights of way and easements for public use such as needed utility corridors. Koror, Airai and Ngchesar have such provisions in their lease agreements. Ngatpang State has not developed a formal lease agreement.

3.2 Comparative Analysis with JICA's Guidelines and World Bank's Safeguard Policy

This section compares Palau's land acquisition procedure with JICA's Guidelines for Environmental and Social Considerations. For the items which have inconsistencies, the measures in Table 3-1 shall be applied to make the procedure conform to JICA's Guidelines.

Table 3-1 Comparative Analysis with JICA's Guidelines

	Item	JICA's Guidelines	Current Procedure	Measures for correcting inconsistencies
1	Approval of compensation recipients	All affected people are approved as candidate recipients of compensation regardless of their status as legal/ illegal dwellers	Since the process is for private land acquisition, compensation not only been considered for private landowners.	Lessees of government lands are eligible to request compensation if they are affected.
2	Enhancement of public participation in planning and implementation of the ARAP	Appropriate participation by the affected people and their communities should be promoted in planning, implementation and	Opportunities of public participation have not been prepared since the acquisition is based on the individual agreement.	Consultation meetings were held between January and March 2022 with the affected landowners.

Impacted commercial/business properties are mainly owned by local businessmen. Some properties include multiple buildings that include homes, rental units and commercial buildings. The impacted school properties in Koror belong to the Catholic Mission. Impacted community facilities in Airai State include a community meeting facility and a basketball court.

Land uses for the affected properties include the following:

Uses of Affected Properties	
Residence	6
Rental Housing	5
Commercial Retail/Service/Office Building	9
Community/School Facilities	5
Farm	2
Undeveloped	3

2.4 Stakeholder Engagement

Engagement with the affected landowners were initially conducted though individual meetings to introduce the project and its anticipated impacts to their properties. Personnel from PPUC led the meetings. Discussions on land acquisition or other possible options were considered. A description of the project and an initial reaction from the landowner was noted. The landowner was informed that a subsequent meeting will be held to discuss compensation, if necessary, for the impact to their property once the project timeline has been confirmed.

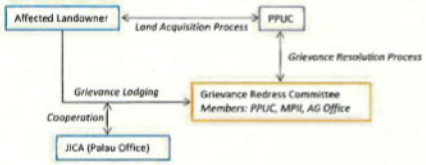
2.5 Results of the Consultation with the Affected Private Landowners

	State	Hamlet	Lot No.	Owner	Comments
1	Koror	Ngerkesaol	062 B 08		Support the proposed project. However wants to see the exact location of power poles to ensure that they do not interfere with student access and pedestrian walkway.
2	Koror	Ngerkesaol	030 B 17		No problems with the proposed project. However wants PPUC assurance that there will be no lateral power lines over his property to inhibit future development of his lot.
3	Koror	Ngerkesaol	030 B 24		Same as #1
4	Koror	Ngerkesaol	092 B 01		No issues with the proposed project.
5	Koror	Ngerkesaol	022 B 07		No issues if the power pole does not affect access to his property. *Note: possible relocation of the power pole may avoid impact to this property.*
6	Koror	Ngerkesaol	022 B 12		No problem with the proposed project. Just move the power pole location several meters to avoid existing driveway.

7	Koror	Ngerchemai	021 B 08		No problem with the proposed project. However wants to see the actual locations to ensure it does not interfere with future development.
8	Koror	Ngerchemai	055 B 02		Proposed power poles and lines will interfere with planned development of his properties and result in the loss of more than 50 trees. Mature trees may be worth $1,000. May reconsider if Gov't can provide land as compensation. Also, if the transmission line is put underground, he may be more open to this idea.
9	Koror	Ngerchemai	055 B 01		Same as #8
10	Airai	Ngeruloobel	024 N 14		No issue with the proposed project. Just ensure power pole location does not impact existing trees and driveway.
11	Airai	Ngeruloobel	024 N 12		No problem with the proposed project. Just ensure power pole location does not impact the driveway access.
12	Airai	Ngerusar	024 N 15		No issue with the proposed project. Just ensure power pole location does not impact existing coconut trees.
13	Airai	Ngerusar	025 N 10		No problem with the proposed project. Just ensure power pole location does not impact the driveway access.
14	Airai	Ngerusar	025 N 09		No problem with the proposed project. Asked project proponent to reconsider reducing the number of poles along the property. *Note: Project will utilize existing poles with only one additional pole proposed on the eastern boundary of the property.*
15	Airai	Ngerusar	025 N 08		No problem with the proposed project. Just ensure power pole location does not impact the driveway access.
16	Airai	Ngerusar	009 N 01		No problem with the proposed project. Just ensure power pole location does not impact proposed driveway.
17	Airai	Ngerusar	009 N 03		Proposed project will use existing pole location. No additional poles needed therefore no additional impact.
18	Airai	Ngerusar	009 N 20		No issue with the proposed project.
19	Airai	Ngerusar	002 N 01		No issue with the proposed project. Just ensure power pole location does not impact existing driveway access.
20	Airai	Ngerusar	059 N 01		No issue with the proposed project. Just

4 Institutional Responsibility for Implementation

PPUC has overall responsibility for the implementation of the land acquisition as the executing agency of the project. The Palau's Ministry of Public Infrastructure and Industries (MPII) and the office of the Attorney General (AG) shall help the procedure in cases where grievance resolution is required as members of the Grievance Redress Committee. The JICA Palau office in shall also assist in the grievance resolution process as needed.



5 Grievance Redress Process

The grievance redress process is established with the main consideration of the possible impacts on individual's living standards and vulnerable households as part of this proposed project.

In the grievance mechanism, affected persons can request assistance or lodge a complaint in the case of the following:

- In the event that the living standards become worse due to the land acquisition, affected persons can request PPUC to provide opportunities for restoring and improving their living standards; for example, providing employment opportunity and job training at PPUC if they are able and qualified.
- In the event that the affected persons are identified as a socially vulnerable household such as low-income, elderly and/or female head of household, the affected persons can request PPUC to provide special considerations appropriate to the situation, to improve living standards diminished due to the land acquisition.
- In the event of any other issues related to the land acquisition, affected persons can lodge the complaint to PPUC/Grievance Redress Committee to discuss the solution.

Three stages are established to discuss the submitted request and/or complaint, including court proceeding as a last resort. PPUC will be liable for all administrative and legal fees that will be required through the resolution process.

1. First Stage: Initial Meeting with PPUC
2. Second Stage: Request/Complaint with Grievance Redress Committee
3. Third Stage: Court Proceedings

6 Monitoring and Evaluation

Monitoring will be conducted to ensure effective and reasonable implementation the project through the following indicators:

- Progress of the acquisition, and
- Grievances and requests from the project affected persons and the solutions.

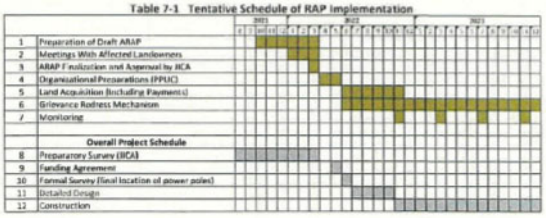
The results of these indicators will be prepared by PPUC and reported to JICA.

7 Implementation Schedule

Expected time schedule of implementation of RAP is presented in Table 7-1. The land acquisitions by PPUC will be initiated after the RAP is approved by JICA. The grievances redress mechanism shall be prepared by the time the land acquisition process begins. Monitoring will be also be implemented after the acquisition process begins on a quarterly basis.

The schedule may be adjusted in the next phase after the preparatory survey.

Table 7-1 Tentative Schedule of RAP Implementation



		monitoring during the project period		
3	Grievance redress mechanism	Grievance redress system must be formulated and must function appropriately	Grievance redress mechanism will be established prior to the acquisition of lands needed for the project.	Grievance redress process is prepared.
4	Compensation rate	Replacement cost should be applied.	Market price is applied based on the appraisal results.	Appraised market value is used as the replacement cost.

3.3 Entitlement Matrix

Entitlement for each type of loss of this project is presented in Table 3-2.

Table 3-2 Entitlement Matrix

	Type of loss	Eligible persons	Entitlements	Remarks
1	Loss of Land	Land owners affected by the proposed project.	Compensation based on the replacement cost.	
2	Loss of Structures	Owners of structures potentially impacted by proposed project. (There are no structures anticipated to be impacted by the project.)	Compensation based on the replacement cost.	Compensation shall be made at the same time as the land acquisition because the owner of structure is the same as the landowner.
3	Loss of Trees	Owners of trees impacted by the proposed project.	Compensation based on the replacement cost. Other options may be considered such as trimming or transplant.	Compensation shall be made at the same time as the land acquisition because owner of tree is the same as the landowner.
4	Loss of Crops	Owners of crops impacted by the proposed project.	Owners are allowed to harvest the crops prior to the construction.	After the date of the agreement, planting/seeding of crops is prohibited. In the case of an easement, certain crops may be allowed.

3.4 Cut-off Date

Cut-off date is established to decide the eligibility of the affected persons. According to the World Bank's safeguard policy, persons who encroach onto the project area after the cut-off date are not entitled to compensation or any other form of resettlement assistance.

For this project, the cut-off date is June 30, 2022, which is the date after the formal survey has been completed. After the cut-off date, persons who encroach on the area are not entitled to any assistance described in this RAP.

3.5 Replacement Cost

It is the policy stated in JICA's Guidelines to compensate the loss of assets at full replacement cost. As the replacement cost needs to be based on fair market value, the current market price of the affected properties in their respective areas is presented in Table 3-3. The price was determined by a licensed land appraiser. The land values shall ensure that the acquisition of land for this project will comply with JICA's Guidelines.

Table 3-3 Fair Market Assessed Valuation of Lands and Trees

Item		Unit	Unit Price (USD)
Land	Koror		
	Commercial	m^2	200
	Residential/Commercial	m^2	120
	Residential	m^2	90
	Airai		
	Commercial	m^2	70
	Residential/Commercial	m^2	26
	Residential and Farm Land	m^2	10
	Ngchesar		
	Vacant (no zoning)	m^2	9.40*
	Ngatpang		
	Vacant (no zoning)	m^2	6.60*
Trees	Coconut (full grown and fruiting)	each	300
	Coconut (small)	each	150
	Fruit trees (large)	each	300
	Medium trees (fruit/ornamental)	each	150

* *Land values based on highest appraised cost for Ngchesar & Ngatpang*

In regards to potentially impacted trees and other crops, an alternative redress option is to offer technical mitigation measures to prevent the loss of the tree/plant within the utility corridor. If it is feasible, trimming or transplantation of the tree/plant may be possible mitigative actions. A detailed list of potentially impacted trees in included as **Appendix 2.**

A potential structural interference may exist in Koror. The existing roof of the Palau Central Hotel may pose an obstruction with the proposed new transmission line alignment. This potential issue should be investigated and addressed.

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Subj: Legal Authorities Pertaining to Lands Contemplated for Use by the Government to Improve the Electrical Grid from Koror to Ngatpang

This legal report is made based on the following general scenario: replacing, improving, or supplementing the existing electrical grid from Koror State to Ngatpang State along the eastern portion of the Compact Road.

What follows is an overview of the various legal authorities pertaining to land acquisition for public use as they exist on November 8, 2021. Exactly how each legal requirement applies or dictates in any given situation is dependent on the facts, especially on the issue of who owns the land in each instance. For the states of Koror and Airai, ownership of most lands should already be determined and finalized but there is the possibility that ownership of some other lands are still undergoing adjudication and registration with the Land Court.[1] Wherever the planned grid is to be situated should reveal the lands at issue for which the ownership status can be investigated at the Bureau of Lands & Surveys and the Land Court.

Unless and until specific facts are presented to the undersigned attorney as to a particular land—e.g., who is the owner; is the owner an individual or a group; is the owner a lineage or a clan or a public land authority; or if ownership is not yet determined then who are the land claimants—an analysis including possible legal outcomes, options, and recommendations as to that particular land cannot be put forth.

Accordingly, the following rules are presented with the expectation that they would be reviewed first and then questions can be generated for further legal analysis as to each particular land for which there are more questions than answers.

[1] This statement as to the status of land ownership is made based on the experienced of the undersigned as former Senior Judge of the Land Court from 2007-2018.

The following rules generally follow the hierarchy of laws in Palau, starting with the Constitution being the Supreme Law of the Land and ending with leases which are contracts enforceable only between persons and entities.

1. **The Palau Constitution**

   a. Article IV, Section 6 provides in pertinent part that, "the government shall take no . . . property without due process of law nor shall private property be taken except for a recognized public use and for just compensation in money or in kind."

   b. Article XIII, Section 7 provides that, "[t]he national government shall have the power to take property for public use upon payment of just compensation. The state government shall have the power to take private property for public use upon payment of just compensation. No property shall be taken by the national government without prior consultation with the government of the state in which the property is located. This power shall not be used for the benefit of a foreign entity. This power shall be used sparingly and only as a final resort after all means of good faith negotiation with the land owner have been exhausted."

   c. Caselaw interpreting Article XIII, Section 7

      i. Several cases have interpreted Article XIII, Section 7 but probably the most relevant for present purposes is the case of *Airai State Gov't v. Ngiketiil Clan*, 11 ROP 261 (Tr. Div. 2004) (see Attachment 1). In this case, the Trial Division held that Airai State cannot use its eminent domain power to take private property to benefit a foreign entity being a foreign golf course business. Thus, for the present electrical grid project, if a foreign entity is involved in any work on the land and the power of eminent domain is to be invoked, the Government must first take the land by eminent domain for the benefit of Palauans only and not for the benefit of foreigners. Alternatively, the government can obtain easements which are not government takings because they are entered into by consensus. Easements should not trigger the bar on foreign interests accommodated by eminent domain. Easements was what the Palau Government generally used to obtain rights of way along the Compact Road.

2. **Palau's Statutes**

   a. Title 35 of the Palau National Code contains the detailed provisions concerning eminent domain and related concepts and procedures. The relevant provisions (§ 301 to § 410) are attached as Attachment 2.

3. **Agency Rules and Regulations**

   a. If only portions of lands are to be taken by eminent domain or through easements or other use rights, they should be surveyed to obtain a legal description (metes

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8 Cost and Budget

The cost for the land acquisition is estimated in Table 8-1, below. The areas of each private property to be acquired include the power pole location and an 8-foot (2.44 m) wide utility easement under the transmission line.

Since the exact location of the power poles needs to be determined by a licensed surveyor, the final size of the areas to be acquired shall be updated and the budget adjusted based on the survey results.

The number of trees to be removed includes trees on private and leased lands. The types of trees included fruit trees or species that are commercially valuable such as coconuts, fruit trees, betelnut and mahogany. There were no cultivated trees that will be potentially impacted within the project limits in the states of Ngchesar and Ngatpang.

As stated in Section 3.5, alternative methods to minimize the removal of affected trees may be implemented on a case-by-case basis.

The budget will be updated by PPUC.

Table 8-1 Cost Estimation for Implementing RAP

Item		Quantity	Unit	Unit Price (USD)	Amount (USD)
Acquisition of land	Koror	2,139.03	m^2	varies (S120/S90)	246,525.15
	Airai	1,900.12	m^2	$26/m^2$	49,403.15
	Ngchesar	1,039.46	m^2	$9.40/m^2$*	9,770.90
	Ngatpang	348.29	m^2	$6.60/m^2$*	2,298.69
Acquisition of trees		387	each	varies	112,200.00
Contingency Cost		10	%	-	42,019.79
Grand Total					**$ 462,217.68**

* *Land values based on highest appraised cost for Ngchesar & Ngatpang*

ATTACHMENT 1

LEGAL DOCUMENTATION

A
O

AIRAI STATE GOVERNMENT,
Plaintiff,

v.

NGKEKIIL CLAN,
Defendant.

CIVIL ACTION NO. 03-207

Supreme Court, Trial Division
Republic of Palau

Decided: August 3, 2004
1262
ARTHUR NGIRAKLSONG, Chief Justice:

BACKGROUND

At issue in this case is land located in Oikull Hamlet in Airai State, listed as Lots N-153 and N-091, which both sides agree is owned by Defendant in fee simple. The disputed property is part of a larger tract of land upon which Plaintiff hopes a golf course will be built. To that end, the Airai State Public Lands Authority (hereinafter "ASPLA") has entered into a lease agreement with Resort Trust, Inc. (hereinafter "RTI"), a Japanese corporation established under the laws of Japan with its principal place of business at Nagoya, Japan.

Pursuant to the terms of the agreement between ASPLA and RTI, the lands authority will lease 120 hectares of land referred to as Olsiukl, including the property at issue in this case, to RTI for 25 years for the purpose of "any lawful business, including but not limited to construction and operation of a golf course, hotel(s) and condominium(s), and assorted facilities." RTI Palau, a wholly-owned subsidiary of RTI, has been granted a Foreign Investment Approval Certificate for the operation of the golf course and accompanying facilities.

After Defendant was judicially determined to own the disputed property, the Clan rejected ASPLA's offer to lease the land. Plaintiff brought this action seeking to use its power of eminent domain to condemn the disputed property. Defendant has moved for summary judgment.

DISCUSSION

Article X, Section 2 of the Airai State Constitution provides in relevant part: "The State Government shall have the power to take private property for public use upon payment of just compensation. . . . This power shall not be used for the benefit of a foreign entity . . . ."[1]

Defendant argues that Article X, Section 2 prohibits the proposed condemnation here because Airai State wants to use its eminent domain power for the benefit of RTI, a foreign entity. Plaintiff claims that the true beneficiaries would be the citizens of Airai, who would benefit from the money the Airai State Government stands to make in the transaction.

Even if Plaintiff's argument is correct, the Airai Constitution on its face prohibits the use of the eminent domain power because the 1263 condemnation would be for the benefit of a foreign entity. The Constitution does not require the foreign entity to be the "sole" beneficiary, and it does not include an exception for situations in which the citizens of Airai might also benefit. Very simply, it prohibits the use of the power "for the benefit of a foreign entity," which is exactly what the proposed condemnation would be.

From its inception, the Court has held that, where the language of a Constitution or statute is clear, that is the end of the inquiry. *Tellames v. Congressional Reapportionment Comm'n*, 8 ROP Intrm. 142, 143 (2000) ("When constitutional language is clear and unambiguous, we must apply its plain meaning."); *The Senate v. Nakamura*, 7 ROP 212, 217 (1999) ("We have stated time and again that courts must presume that a legislature says in a statute what it means and means in a statute what it says there. When the words of a statute are unambiguous, then, this first canon is also the last: 'judicial inquiry is complete.'") (quoting *Conn. Nat'l Bank v. Germain*, 112 S. Ct. 1146, 1149 (1992)); *Ngiraklubech v. Nabeyama*, 5 ROP Intrm. 117, 119-20 (1995). ("Where the language of a statute is plain and admits of no more than one meaning, the language of the statute controls without resort to other materials."); *Kano v. Kadoi*, 3 ROP Intrm. 174, 182 (1992) ("[W]here the language in a statute is unambiguous, courts are to find legislative intent in the ordinary meaning of the language alone."); *Remeliik v. The Senate*, 1 ROP Intrm. 1 (Tr. Div. 1981) ("[I]t is a cardinal rule of constitutional construction, that if a constitutional provision is positive and free from all ambiguity, it must be accepted by the courts as it is written.").

Even assuming there are ambiguities in the words "benefit" or "foreign entity" or in how the condemnation provision of the Airai Constitution is read, the guiding principle of constitutional construction is that the intent of the framers must be given effect. *Remeliik*, 1 ROP Intrm. at 5; *Palau Chamber of Commerce v. Ucherbelau*, 5 ROP Intrm. 300, 302 (Tr. Div. 1995). Although the plain language of Article X, Section 2 of the Airai Constitution is sufficient for this Court to decide the constitutionality of this condemnation proceeding,[2] a look at the history of the identical language in the national constitution, as discussed in *Gibbons v. Salii*, 1 ROP Intrm.

[1]The Palau Constitution also prohibits the use of the power of eminent domain "for the benefit of a foreign entity." Palau Const. art. XIII, § 7. The recently passed Airai State Public Law No. A-3-15-01, however, prohibits the use of the eminent domain power only when it is used "for the *sole* benefit of a foreign entity" (emphasis added). To the extent that A-3-15-01 purports to give the State a broader power of eminent domain than it has under either the State or national Constitution, the law is invalid. *See* Airai Const. art. II, § 2 ("Any law or act of the Government of the State of Airai which conflicts with this Constitution shall be invalid to the extent of such conflict."); Palau Const. art II, § 1 ("This Constitution is the supreme law of the land."). Consequently, it is only necessary to determine whether Airai State's attempted condemnation violates the state Constitution.

[2]*See Ngeremdengui State Council of Chiefs v. Ngeremalengui State Gov't*, 8 ROP Intrm. 178, 181 (2000) ("[T]he courts are required to give effect to the intent of the framers as expressed in the plain meaning of the language used in the constitution."); *The Senate*, 7 ROP Intrm. at 214 ("In determining the framers' intent, we look first to the language chosen.").

and bounds or a cadastral lot with clear dimensions and area size). The Bureau of Lands and Surveys has its rules and regulations concerning such surveys. If this is a government project, it is to be expected that cooperation from the Bureau of Lands and Surveys will be forthcoming as to these surveying requirements.

4. Court Rules

a. If the land belongs to a lineage or clan and will be purchased by the Government with the cooperation of the lineage or clan then such a transaction has to be consented to by all senior strong members of the lineage or clan. Such a sale should undergo the public notice requirements set forth under Rule 24 of the Rules and Regulations of the Land Court, as amended by Order dated October 8, 2001 (copy attached as Attachment 3). If public notices are issued then anyone who had notice but did not file an objection within the 30-day window should be barred from later raising objections to undo the transaction.

b. If the land belongs to a lineage or clan and will be utilized under a lease, easement, public dedication, or some other form of use right, consent of the senior strong members of the clan is also required. *See generally, Demei v. Segiyama*, 2021 Palau 2 (holding that leasing of clan lands to non-clan members requires the consent of all senior strong members of the clan) (attached as Attachment 4); public notices should also be issued pursuant to Rule 24 of the Rules and Regulations of the Land Court, as amended by Order dated October 8, 2001 (copy attached as Attachment 3).

5. Leases of Public Lands

a. Reservations for Rights of Way: most public land leases in Koror and possibly Airai contain provisions reserving rights of way and easements. A sample page (pg. 9 of 17) from one such lease with the Koror State Public Lands Authority is attached as Attachment 5 page 1. If the land at issue is a public land subject to a leasehold and is covered by such a provision then the issue is clearer as to what can be done as to the electrical grid.

b. Eminent Domain: Most public land leases in Koror and possibly Airai also contain provisions recognizing the possibility of eminent domain action. A sample page from one such lease with the Koror State Public Lands Authority is attached as Attachment 5. If the land at issue is a public land subject to a leasehold and is covered by such a provision then the issue is clearer as to what can be done as to the electrical grid. That is, the Lessee will have acknowledged ahead of time that their lease or a portion thereof can be taken by eminent domain for public use.

6. Private Leases

If the land at issue is privately-owned but has been leased by the owner to a lessee then the terms of such lease should be reviewed with respect to any reservations for public utilities. If no such provisions exist then consent by the Lessee and the Lessor should be obtained for the electrical grid requirements otherwise eminent domain may have to be exercised. END.

Sincerely,

C. Quay Tellei, Esq.

Chapter 3
Eminent Domain

Subchapter I
General Provisions

§ 301. Purpose.

It is the purpose of this chapter to set up procedures to be followed by the national government in the exercise of its inherent power to acquire real property by eminent domain.

Source
(Code 1966, § 1301; Code 1970 tit. 30, § 1; 10 TTC § 1, modified

Cross-reference
ROP Const., Art. XIII, § 7

Notes
Walls v. ROP, 16 ROP 19, 23 (2008)
Ngiraibuu v. Trust Territory, 4 TTR 517 (App. Div. 1969)
In re Ngiraibuu, 3 TTR 303 (1967)

§ 302. Private corporations not to have right of eminent domain.

No private corporation except as may be authorized by the Olbiil Era Kelulau shall have the right of eminent domain in the Republic.

Source
(Code 1966, § 1303; Code 1970 title 30, § 2; Department of Interior Order No. 2969, § 8(a); 10 TTC § 2 modified

Notes
Walls v. ROP, 16 ROP 19, 23 (2008)

§ 303. Definitions.

In this chapter:

(a) "Eminent domain" means the right of the national government to condemn property for public use or purposes and to appropriate the ownership and possession of such property for such public use upon paying the owner a just compensation to be ascertained according to the law.

(b) "Public use" shall be construed to cover any use determined by the President to be a public use.

Source
(Code 1966, § 1302; Code 1970, title 30, § 3; Department of Interior Order No. 2969, § 8(b); 10 TTC § 3, modified

Notes
Walls v. ROP, 16 ROP 19, 23 (2008)
Ngiraibuu v. Trust Territory, 4 TTR 517 (App. Div. 1969)
In re Ngiraibuu, 3 TTR 303 (1967)

Subchapter II
Procedure

§ 311. Complaint.

A complaint must be brought in the Trial Division of the Supreme Court in the name of and on behalf of the national government as plaintiff by the Attorney General. The complaint must contain:

(a) the names of all owners and claimants of the property, if known, or a statement that they are unknown, who must be called defendants.

(b) a statement of the right or authority of the plaintiff.

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333 (1986), confirms that the framers intended to prohibit the use of the power of eminent domain in situations such as this one.[1] On the question of what constitutes a "foreign entity," the Constitutional Convention's Committee on General Provisions defined "foreign entity" to include "any entity whether a person, a 1264 government, a corporation, or other association or group, which is neither a citizen of Belau nor totally owned by citizens of Belau." SCR No. 30 (March 4, 1979). Since RTI is a Japanese company and RTI Palau is a wholly-owned subsidiary of RTI, both clearly are foreign entities.

As for the question of what constitutes a "benefit," the history of the constitutional provision shows that Article XIII, Section 7 prohibits the use of the power of eminent domain for the benefit of a foreign entity even if the Palauan people might also benefit. The 1979 Rosenblatt cable seeking changes in the proposed constitution to avoid conflicts with the Compact of Free Association warned that the proposed text, "*public use* does not include use by a foreign entity" might "be inconsistent with the U.S. responsibility for and authority in the defense of Palau under the Compact" (emphasis added), putting the Compact at risk. Instead of abandoning the sentence, however, the framers decided to amend it in a way that makes it clear that it applies to situations such as the one here, settling on the current language that the "[eminent domain] power shall not be used for the benefit of a foreign entity." The limit on the power of eminent domain remained even after the Drafting Commission proposed deleting the sentence from Article XIII, Section 7 because keeping the provision "would seriously undermine the ability of the constitutional government of Palau to fulfill its obligations under a compact of free association and thus close the door to a political relationship of free association." *Report to the Palau Legislature from the Palau Constitutional Drafting Commission*, at 6 (Aug. 21, 1979).

Thus, the framers risked losing the Compact and the benefits it would bring to the people of Palau in order to protect a citizen's right not to have his property taken by the government. Therefore, the history of the provision at issue shows that the framers wanted to preclude the use of the power of eminent domain for the benefit of a foreign entity, even if the people would also benefit.

The Appellate Division reached the same conclusion in *Gibbons*, which considered the constitutionality of a provision of the Compact of Free Association and Military Use and Operating Rights Agreement that obligated Palau to make available land and water areas designated by the United States for use by the United States military. *Gibbons*, 1 ROP Intrm. at 333. After finding that the United States qualified as a "foreign entity," the Court rejected the Republic of Palau's claim that the benefit to the United States was not relevant because the Compact would also benefit the people of Palau.

This reasoning would render meaningless the constitutional position against

[1]Although this case arises out of the Airai Constitution, it is appropriate to look at the history of the national Constitution in order to interpret the relevant language. *See, e.g.*, *Gotina v. ROP*, 8 ROP Intrm. 65 (1999) (looking to United States case law because Palau's constitutional prohibition against excessive fines is derived from a comparable clause in the U.S. Constitution); *State v. Ramirez*, 597 N.W.2d 795 (Iowa 1999) (noting the propriety of looking to the United States Constitution in order to interpret a provision of the Iowa State Constitution because the Iowa Constitution took the language of the provision at issue directly from the United States Constitution).

exercise of eminent domain for the benefit of a foreign entity. Eminent domain is the power exercised by the Executive Branch and the "benefit" language is obviously intended as a curb upon the powers of that branch. Surely the government would only invoke the power of eminent domain after concluding that exercise of the power would be beneficial to the people of Palau. The government's position is, in essence, that the eminent domain clause prevents the government from exercising such powers to provide land for a foreign entity, except when the 1265 government has decided that it would be good to do so. That is not what Article XIII, Section 7 says.

The clause unambiguously prohibits the use of the power of eminent domain for a foreign entity. At the very least, this means that if the land in question is to be used by a foreign nation the government of the Republic of Palau has an extremely heavy burden o' showing extraordinary circumstances which establish that the particular use is for the sole benefit of Palauan persons or entities.

Gibbons, 1 ROP Intrm. at 354-55.

Plaintiff in this case observes that the United States would have had the right to select the sites to be condemned in *Gibbons*, while the site here has already been determined. Airai also notes that *Gibbons* involved a foreign nation, while the beneficiary here would be a foreign corporation, that if RTI decides not to pursue the golf course project, the state will search for another developer; and that the land will be returned to its rightful owners when the lease expires in 25 years. But the State fails to explain why any of these minor distinctions should change the analysis or the outcome. The fact remains that, as in *Gibbons*, a foreign entity will benefit from the condemnation, leaving Airai State with "an extremely heavy burden of showing extraordinary circumstances which establish that the particular use is for the sole benefit of Palauan persons or entities." If the millions of dollars and national defense benefits that would have gone to the people of Palau from the Compact did not qualify as "extraordinary circumstances," then the generation of revenue for Plaintiff--the stated purpose of the proposed condemnation--cannot qualify, either.

Defendant has also filed motion seeking attorney's fees. Although Plaintiff's argument is not a winning one, it is not groundless, frivolous, or brought in bad faith as required for sanctions under ROP R. Civ. P. 11 or 14 PNC § 702. Accordingly, Defendant's motion for an award of attorney's fees is denied.

CONCLUSION

For the foregoing reasons, Defendant's motion for summary judgment is granted. Article X, Section 2 of the Airai State Constitution on its face clearly prohibits the use of eminent domain for the benefit of a foreign entity. The *Gibbons* Court reading of the identical provision in the National Constitution is consistent with the plain meaning of the Airai State Constitution. Hence, this condemnation proceeding is hereby declared unconstitutional.

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(c) In the event assessors are appointed by the court, they shall take and subscribe an oath before the judge or justice that they will faithfully perform their duties as assessors.

Source
(Code 1966, § 1306) 39 TTC § 54, modified

Notes
Wally v. Republic of Palau, 17 ROP 109, 110 (2010)
Wally v. ROP, 16 ROP 19, 23 (2008)
In re Yamaguchi, 3 TTR 303 (1967)

§ 316. Determination of ownership in event of dispute.

In the event there is a dispute over the ownership of the property which is the subject of an eminent domain proceeding, the court shall adjudicate and determine the ownership of the property as part of the proceedings.

Source
(Code 1966, § 1307) 39 TTC § 55

Notes
Wally v. Republic of Palau, 17 ROP 109, 110 (2010)
Wally v. ROP, 16 ROP 19, 23 (2008)

§ 317. Final judgment; certificate of title.

(a) The record of the final judgment in the proceedings shall state the particular land or interest in land which the national government has acquired and the compensation to be paid to the defendants.

(b) The Clerk of Courts shall issue a certificate of title in accordance with the judgment.

Source
(Code 1966, § 1308) 39 TTC § 56, modified

Notes
Wally v. Republic of Palau, 17 ROP 109, 110 (2010)
Wally v. ROP, 16 ROP 19, 23 (2008)

§ 318. Immediate possession; procedure generally.

(a) In the event the national government desires to enter into immediate possession of the property, it shall file a declaration of taking and pay a sum of money which is considered to be the fair value of the property to the Clerk of Courts.

(b) In addition to the requirements set out in section 313 of this title, the summons shall state the following:

(1) that the plaintiff requires immediate possession of the property;

(2) that a sum of money which is considered to be the fair value of the property has been paid to the Clerk of Courts, which sum shall draw interest at the rate of three percent per annum from the date of the summons until claimed by the defendant or ordered paid to the defendant by the court;

(3) that the defendant may at any time claim and receive the money which has been deposited with the Clerk of Courts upon the execution of a quitclaim deed in favor of the plaintiff.

(c) Payment to the Clerk of Courts in accordance with this section shall entitle the national government to take immediate possession of the land.

Source
(Code 1966, § 1309) 39 TTC § 57, modified

Notes
Wally v. Republic of Palau, 17 ROP 109, 110, 111, 112, 113, 114 (2010)
Wally v. ROP, 16 ROP 19, 21, 23, 24, 25 (2008)
In re Kabua, 4 App. Div. (June 1978)

§ 319. Same; possession after proceedings commenced.

(a) In the event the national government determines that it requires immediate possession of the property after eminent domain proceedings have been commenced, but before the rights of the parties and the amount of compensation are determined, a declaration of taking shall be filed in the court and a sum of money which is considered to be the fair value of the land shall be paid to the Clerk of Courts.

(b) A summons shall be issued and served in the same manner as the summons in

(c) a description of each parcel of land to be acquired and a statement of what interest in the land is desired by the plaintiff.

(d) a general statement of the purpose of the taking.

Source
(Code 1966, § 1304; Code 1970 title 10, § 31) 39 TTC § 51, modified

Notes
Wally v. Republic of Palau, 17 ROP 109, 110 (2010)
Wally v. ROP, 16 ROP 19, 23 (2008)
In re Kabua, (App. Div. June 1978)

§ 312. Failure of parties to appear at proceedings.

In the event of the failure of any of the parties specified in section 311 of this title to appear in the proceedings, the court shall, nevertheless, proceed to fix the amount of compensation and order that the amount be paid by the national government, without interest, to the rightful claimants on demand at any time within seven years from the date of the final judgment.

Source
(Code 1966, § 1311; Code 1970 title 10, § 52) 39 TTC § 52, modified

Notes
Wally v. Republic of Palau, 17 ROP 109, 110 (2010)
Wally v. ROP, 16 ROP 19, 23 (2008)

§ 313. Issuance of summons; contents.

The Clerk of Courts shall issue a summons which shall contain:

(a) the names of the parties;

(b) a general description of the whole property, or a reference to the complaint for the description of the land; and

(c) a notice to the defendants to appear in the proceedings.

Source
(Code 1966, § 1305) 39 TTC § 53(1) (first sentence, modified

Notes
Wally v. Republic of Palau, 17 ROP 109, 110 (2010)
Wally v. ROP, 16 ROP 19, 23 (2008)

§ 314. Service of summons and complaint; posting.

(a) When the defendants are known the summons shall be served by delivering to them a copy thereof along with a copy of the complaint.

(b) If the defendants, whether known or unknown, cannot be found, then a copy of the summons and complaint shall be posted as follows:

(1) on the property;

(2) at the courthouse;

(3) at a public place in a village located near the property; and

(4) by delivering one copy of the summons and complaint to the chief executive officer of the state in which the property is situated.

(c) The service of the summons and the complaint or the posting thereof as provided herein shall be sufficient to give the Trial Division of the Supreme Court jurisdiction to proceed with and finally determine the case.

Source
(Code 1966, § 1305) 39 TTC § 53(1) (except first sentence) and (2), modified

Notes
Wally v. Republic of Palau, 17 ROP 109, 110 (2010)
Wally v. ROP, 16 ROP 19, 23 (2008)

§ 315. Establishment of value of land; assessors.

(a) Upon a prima facie showing by the Attorney General that the property desired to be purchased by the national government is for public use, the court must hear the parties, and establish a fair value for the land.

(b) The court may appoint three assessors to assist in the proceedings and perform such functions as the court may direct.

Chapter 4
Land Acquisition

§ 401. Application of chapter.

This chapter shall be applicable to the acquisition of real property under the laws of the Republic for use in any project or program of the national government, a state government, or any agency of such government.

Source
P.L. No. 6-71 § 11 to 17 TTC § 451, modified

§ 402. "Government" defined.

In this chapter, "government" means the national government, a state government, or any agency of such government.

Source
35 PNC § 402

§ 403. Procedure generally; government conduct encouraged or required.

(a) In acquiring real property the government will, to the greatest extent practicable,

(1) make every reasonable effort to acquire real property expeditiously through negotiation.

(2) before the initiation of negotiations, have the real property appraised and give the owner or his representative an opportunity to accompany the appraiser during the inspection of the property.

(3) before the initiation of negotiations, establish an amount which is believed to be just compensation for the real property, and make a prompt written offer to acquire the property for that amount.

(A) In no event will the just compensation offered be less than the government's approved appraisal of the fair market value of such property.

(B) At the time the government makes an offer to purchase real property, the owner of that property will be provided with a written statement of the basis for the amount estimated to be just compensation.

(C) In determining just compensation for the property, any increase or decrease of the fair market value caused by the public improvement for which the property is acquired prior to the date of valuation will be disregarded (other than that caused by physical deterioration).

(4) if interest in the real property is to be acquired by exercise of the power of eminent domain, institute formal condemnation proceedings and not intentionally make it necessary for the owner to institute legal proceedings to prove the fact of the taking of the real property.

(5) if the acquisition of only part of the property will leave its owner with an uneconomic remnant, offer to acquire that remnant.

(b) Before requiring any owner to surrender possession of any real property, the government will,

(1) pay the agreed purchase price; or

(2) deposit with the court, for the benefit of the owner, an amount not less than the government's approved appraisal of the fair market value of the property; or

(3) pay the amount of the award of compensation in condemnation proceedings for the property.

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sections 313 and 314 of this title. The summons shall refer to the original summons already served on the defendants, and shall otherwise conform to the requirements set out in section 318 of this title.

Source
(Code 1966, § 1310.) 10 TTC § 58, modified.

Notes
Wally v. Republic of Palau, 17 ROP 109, 110 (2010).
Wally v. ROP, 16 ROP 19, 23 (2008).
In re Kubuo, (App. Div. June 1975).

§ 320. Costs of proceedings.

The costs in all cases brought under this chapter shall be paid by the plaintiff.

Source
(Code 1966, § 1312.) 10 TTC § 59

Notes
Wally v. ROP, 16 ROP 19, 23 (2008).

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improvements; or

(3) the payment is not duplicated by any payment otherwise authorized by law or regulation.

Source
(P.L. No. 6-71, § 1.) 67 TTC § 454, modified.

§ 409. Expenses incidental to transfer of title.

As soon as possible after real property has been acquired, the government shall reimburse the owner for:

(a) recording fees, taxes and similar expenses incidental to conveying the real property to the agency; and

(b) the penalty cost for prepayment of any pre-existing recorded mortgage entered into in good faith and encumbering the real property.

Source
(P.L. No. 6-71, § 1.) 67 TTC § 455.

§ 410. Authority of President to promulgate regulations.

The President shal. have authority to issue regulations to implement this chapter.

Source
(P.L. No. 6-71, § 1.) 67 TTC § 456, modified.

IN THE
SUPREME COURT OF THE REPUBLIC OF PALAU

IN RE AMENDMENT NO. 1 TO RULES AND REGULATIONS OF THE LAND COURT) ORDER

Pursuant to the rule-making power vested in the Supreme Court, in consultation with the Land Court, by 35 PNC § 1316, Article X, § 14 of the Constitution, and 4 PNC § 101,

Rule 24 of the RULES AND REGULATIONS OF THE LAND COURT, promulgated on October 15, 1996 to take effect on October 18, 1996, is amended as follows:

"(A) Transfers of Land Owned by Persons or Estates other than Clans or Lineages. When transfer of title or interest in registered land occurs, the Senior Land Court Judge shall cancel the certificate and issue a new certificate of title to the transferee. If only a part of the land is transferred, the Land Court shall require the certificate holder to have the area to be transferred surveyed at his own expense, and a map thereof submitted to the Senior Land Court Judge. If satisfactory to the Senior Judge, a new certificate of title shall then be issued for each part of the land covered by the former certificate.

Upon receiving a request for or notice of transfer, the Senior Land Court Judge must determine that the document of transfer is properly executed and properly describes the land before canceling the existing certificate and issuing a new certificate of title. In doing so, the Senior Judge may order such notice and hearing as deemed appropriate.

The owner's duplicate certificate must be submitted for proper cancellation upon a request for or notice of transfer. If the owner's duplicate certificate has been lost, destroyed or is otherwise unavailable, the new owner may request the Land Court to issue a replacement duplicate certificate. Such request shall be by petition under oath. The replacement certificate shall include a statement that it is issued in place of a lost or destroyed certificate.

(B) Transfers of Land Owned by a Clan or Lineage. The procedures for transferring land owned by a clan or lineage shall be governed by section (A) except that no certificate of title based on a transfer of such land shall issue unless notice has been given that any strong senior member of the lineage or clan may object to the transfer by filing an objection with the Land Court by a specified date which is 30 days after notice is posted as required by section (B)(1). The notice shall describe the land to be transferred and shall indicate the identity of the transferee and the persons acting for the clan or lineage in the transfer. Notice shall be given as follows:

Source
67 TTC § 452(1), modified.

§ 404. Same; government conduct discouraged.

In acquiring real property, to the greatest extent practicable the government will not:

(a) schedule construction or development of a public improvement that will require any person lawfully occupying real property to move from a dwelling, or move his business or farm operation, without giving that person at least 90 days' written notice of the date he is required to move.

(b) if acquired property is rented to the former owner or tenant for a short term or subject to termination by the government on short notice, charge a rent that is more than the fair rental value of the property to a short term occupant.

(c) advance the time of condemnation.

(d) defer negotiations, condemnation or deposit of funds in court for use of the owner.

(e) take any course of action to compel an owner to agree to a price for his property.

Source
67 TTC § 452(2), modified.

§ 405. Unauthorized or inverse condemnation; litigation expenses to owner.

Should a court determine condemnation was unauthorized or should the property owner obtain a judgment in the nature of inverse condemnation, then the owner shall be reimbursed for reasonable expenses of litigation, in line with section 304 of the United States' Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970.

Source
67 TTC § 452(3), modified.

Commission Comment

Section 304 of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Public Law 91-646) is found at 42 U.S.C. § 4654.

§ 406. Donation by owner allowed.

Nothing in sections 403 through 405 should be construed to preclude a donation by an owner after his property has been appraised and the full amount of the estimated just compensation has been tendered to him.

Source
67 TTC § 452(4), modified.

§ 407. Interest in improvements.

In acquiring any interest in real property the government will acquire at least an equal interest in all building structures or other improvements located on that real property which will be removed or which will be adversely affected by the completed project.

Source
(P.L. No. 6-71, § 1.) 67 TTC § 453.

§ 408. Payments for improvements by tenants.

(a) In the case of a building structure or other improvements owned by the tenant on real property acquired for a project to which this chapter applies, the government will, subject to subsection (c) of this section, pay the tenant the larger of:

(1) the fair market value of the improvement (as established by the government's appraiser), assuming its removal from the property; or

(2) the enhancement to the fair market value of the real property.

(b) Payments will also be made for improvements that are damaged as well as those which must be removed.

(c) A payment may not be made to a tenant under subsection (a) of this section unless:

(1) the tenant, in consideration for the payment, assigns, transfers and releases to the government all his rights, title and interest in the improvements;

(2) the owner of the land involved disclaims any interest in the

and Appellant Robat Demei, acting as the Clan's chief, began entering into new leases with individuals who were up until that point KSPLA's tenants, some of whom are not Clan members. The parties dispute whether Demei had the authority to enter into these leases. The trial court concluded that although a clan's chief has authority to manage land within the clan, in order to alienate property (including by lease) in favor of non-clan members, the consent of all senior strong members is required. The trial court further concluded that because such consent was not obtained in the present case, none of the litigants had the authority to unilaterally enter into the leases. Finally, the trial court held that Demei holds the Clan's male chief title but that none of the parties demonstrated that she holds the female chief title. Because we discern no error in the trial court's factual findings or application of the law, we **AFFIRM.**

BACKGROUND

[¶ 2] We here sketch the basic factual background and provide some additional details as necessary in the analysis below. Ngeribkal Clan has three lineages started by three sisters, Ewalech, Saulwai, and Kiklang. The highest male title is *Ngiribkal* and the highest female title is *Dirribkal*. It is undisputed that Rengulbai Ngirdimau was *Ngiribkal* at the time the Clan filed its return of public lands claim. The last uncontested *Dirribkal* was a woman named Tolilang, who passed away in 2013. It is also undisputed that individuals on both sides of this dispute are *ochell* members of Ngeribkal Clan. In addition, the trial court specifically found, and the parties do not challenge, that there are senior strong members on both sides: Appellants Demei and Ngedikes Gibbons, and Appellees Mary Hiroko Sugiyama and Ines Santos.

[¶ 3] Appellees sought a declaratory judgment that, among other things, (1) Demei and Gibbons have no authority to negotiate or execute the leases; (2) Appellee Bonicacio Eberdong is *Ngiribkal*; and (3) Sugiyama is *Dirribkal*. Appellants counterclaimed seeking a mirror image declaration that (1) Demei is *Ngiribkal*; (2) Gibbons is *Dirribkal*; and (3) Eberdong and Sugiyama have no authority to enter into the leases. In their closing argument at trial, Appellees urged the court to refrain from deciding the title disputes and instead to base its judgment as to Sugiyama's authority to administer the land on the fact that she was chosen by the then-*Ngiribkal* to represent the Clan in court during its return of public lands claim. According to Appellees, this appointment is binding on the other Clan members, and the authority to

administer the successfully reclaimed land was inherent in her appointment, especially in light of the fact that she spent considerable time and personal resources in the reclamation process.

[¶ 4] On August 9, 2019, the trial court concluded, in its Findings of Fact and Conclusions of Law, that Demei is the male titleholder. However, the court also concluded that, as a matter of customary law, Demei cannot grant leases or use rights to non-clan members without the consent of the senior strong members of the Clan. Because the trial court found that Appellees include such members, it held that leases entered into by Demei are invalid. Next, the trial court held that there was insufficient evidence to conclude that either Gibbons or Sugiyama is the Clan's female titleholder, and therefore the court declined to enter judgment in favor of either party on this issue. Finally, the court rejected Sugiyama's argument that she had the authority to enter into the leases on the basis of her prior representation of the Clan in the return of public lands process.

[¶ 5] Both sides timely appealed. Appellants object to the finding that there is insufficient evidence that Gibbons is the female titleholder, whereas Appellees challenge the finding that Demei is the male titleholder, the finding of insufficient evidence to establish that Sugiyama is the female titleholder, and the trial court's conclusion that Sugiyama's representation of the Clan in the return of public lands process did not vest her with the authority to administer the land following its return.

STANDARD OF REVIEW

[¶ 6] We review a trial court's legal conclusions, including its application of customary law, de novo, and its findings of fact for clear error. *Espinon v. Ngerulmobel Hamlet*, 2020 Palau 10 ¶ 16; *Beouch v. Sasao*, 20 ROP 41, 50 (2013).

DISCUSSION

[¶ 7] Appellants/Cross-Appellees argue that Demei's testimony that "when Tolilang passed away . . . Ngerair was one of those who appointed Ngedikes to be Dirribkal." Trial Tr. at 135:11-13, and Demei's identification of Ngerair as a child of Lucy Orrukem combined with evidence that Orrukem previously held the *Dirribkal* title, undermines the trial court's conclusion that "there was

(1) by posting notice for at least 30 days in both English and the principal local language of the state in which the land is located at the Post Office, the Office of the Clerk of the Supreme Court in Koror, the Land Court, and in the state office and the principal meeting place in the village in which or nearest to which the land is located; and

(2) by placing an advertisement to appear within the 30 days specified in section (B)(1) and in the languages specified in section (B)(1) on a local Koror radio station and in a local newspaper.

(C) <u>Transfers of Land by Will or Inheritance.</u> Transfers of interests in land by will or by inheritance shall be determined by the Trial Division of the Supreme Court. Upon determination by the Trial Division of the proper devisee or heir, the Trial Division shall order the Land Court to cancel the decedent's duplicate certificate and the original certificate bound in the permanent register and to issue a new original certificate and duplicate certificate in favor of the devisee or heir.

The Land Court may establish a fee schedule and charge for issuance of new or replacement certificates."

SO ORDERED THIS 9th DAY OF October, 2001

ARTHUR NGIRAKLSONG
Chief Justice

LARRY W. MILLER
Associate Justice

R. BARRIE MICHELSEN
Associate Justice

KATHLEEN M. SALII
Associate Justice

IN THE SUPREME COURT OF THE REPUBLIC OF PALAU APPELLATE DIVISION

ROBAT DEMEI and NGEDIKES GIBBONS,
Appellants/Cross-Appellees,

v.

MARY HIROKO SUGIYAMA, BONICACIO EBERDONG, UODELCHAD INES SANTOS, DIRCHOLSUCHEI. MARY THING, and KEKEREI EL TECHEDIB TIMOTHY NGIRDIMAU,[1]
Appellees/Cross-Appellants.

Cite as: 2021 Palau 2
Civil Appeal No. 19-019
Appeal from Civil Action No. 18-077

Argued: November 2, 2020
Decided: January 14, 2021

Counsel for Appellants .... J. Uduch Sengebau Senior
Counsel for Appellees .... Johnson Toribiong

BEFORE: GREGORY DOLIN, Associate Justice
KATHERINE A. MARAMAN, Associate Justice
DENNIS K. YAMASE, Associate Justice

Appeal from the Trial Division, the Honorable Oldiais Ngiraikelau, Presiding Justice, presiding.

OPINION

MARAMAN, Associate Justice:

[¶ 1] This matter arose after Ngeribkal Clan prevailed in its return of public lands claim against Koror State Public Lands Authority ("KSPLA")[2]

[1] Because certain clan titles, and therefore the ability to bring suit on behalf of the clan, are disputed in this case, we have altered the caption to remove Ngeribkal Clan and all disputed clan titles. *See Espinon v. Obichang*, 2020 Palau 8 n.1.

[2] The land returned to the Clan is referred to as *Blalatall* and is located in Ngerbeched.

(1992) ("The removal of the title [] from appellee amounts to a deprivation of a vested right."). Accordingly, we discern no error by the trial court.

[¶ 10] Appellees also contend that the trial court should have found that Eberdong was the titleholder "because the majority of the *ourrot* representing the consensus of the lineages . . . support him." Appellees' Opening Br. at 23. However, the only individuals who claim to have appointed Eberdong are Sugiyama, Kohama, and Santos, as well as Agatha Eberdong, Demei's sister. As already discussed, there was no evidence that Kohama was an *ourrot* member of the Clan, nor do Appellees point to any such evidence regarding Agatha Eberdong. Perhaps most fundamentally, according to Appellees' own argument, Eberdong was appointed in 2015, *i.e.*, eleven years after Demei was appointed to hold the title. As there is no evidence that Demei's title was revoked, it follows that Eberdong's appointment was a legal nullity. *See Filibert*, 8 ROP Intrm. at 275-77; *Espangel*, 3 ROP Intrm. at 246. Even assuming that Eberdong's alleged appointment could, in theory, be viewed as an act that somehow removed Demei from his position, on appeal, we "may not reweigh the evidence, test the credibility of witnesses, or draw inferences from the evidence." *Seventh Day Adventist Mission of Palau, Inc. v. Elsau Clan*, 11 ROP 191, 195 (2004) (internal quotation marks omitted). Therefore, where, as here, "there are two permissible views of the evidence, the fact finder's choice between them cannot be clearly erroneous." *Id.* In sum, we discern no clear error in the trial court's factual findings regarding the *Ngiribkal* title.

[¶ 11] Lastly, Appellees contend that as a result of Sugiyama's appointment to represent the Clan in its return of public lands claim against KSPLA, she was conferred authority to administer the Clan's returned land. We agree with the trial court that this argument finds no support in Palauan customary law, our precedent, or the nature of Sugiyama's appointment by the then-chief of the Clan. It is well settled that "clan or lineage land is administered by the strongest male member, normally the title bearer." *Ngirudelsang v. Etibek*, 6 TTR 235, 239 (Palau Tr. Div. 1973). Although a clan can, by consensus among the senior strong members, choose to forgo traditional arrangements and select who will serve as a trustee of its land, *see, e.g.*, *Elbelau v. Beouch*, 3 ROP Intrm. 328, 331 (1993), the record is devoid of evidence that Ngeribkal Clan's custom differs from the traditional method of administering clan land, or that

it chose to deviate from its custom. We also discern no error, let alone clear error, in the trial court's factual finding that, despite Sugiyama's selection to be the Clan's "voice[,] and eyes[,] and ears," during the return of public lands process, *see* Trial Tr. at 56:19, and the undisputed fact that Sugiyama largely financed the return of lands proceeding out of her own pocket, "[s]he was only appointed to represent the clan in court and she did." Findings of Fact and Conclusions of Law at 17. Appellees have not pointed to any basis in the record or in customary law for interpreting Sugiyama's appointment more broadly. Nor do Appellees' remaining (and underdeveloped) arguments about equitable estoppel, waiver, and ratification undermine the trial court's conclusion regarding the specific and limited scope of Sugiyama's appointment.

CONCLUSION

[¶ 12] In summary, the trial court's findings that none of the litigants proved they were properly appointed *Dirribkal*, and that Demei is *Ngiribkal* but lacks authority to unilaterally lease the Clan's lands to non-clan members, are **AFFIRMED** in their entirety.[8]

[8] As we have recently noted, the parties had the right to seek declaratory relief in the Land Division regarding their dispute over clan titles. *See Lalabong v. Blesam*, 2020 Palau 28 ¶ 7 n.3; *see also* 14 PNC § 1001 ("In a case of actual controversy within its jurisdiction, any appropriate court of the Republic, upon the filing of an appropriate pleading, may declare the rights and other legal relations of any interested party seeking such declaration, whether or not further relief is or could be sought."); *Kruheed v. Ebilat Clan*, 2017 Palau 14 ¶¶ 10-15. However, once the trial court determined that neither Demei nor Sugiyama had the authority to execute the leases on the land, the title disputes became untethered from any discrete, real-world dispute over the exercise of legal authority. Furthermore, according to the parties at oral argument, the resolution of the title disputes by the trial court or this Court will do little to quell the internecine conflicts that are roiling the Clan and its surrounding community. As we stated in *Lalabong*, the time may be ripe for this Court to reassert, as a prudential matter, its ability to decline to determine those internal clan title disputes that are not connected to specific disputes over land or an exercise of legal authority, and which cannot be satisfactorily resolved through litigation. *See* 2020 Palau 28 ¶ 7 n.3; *Matlab v. Melamarang*, 9 ROP 93, 97 (2002) (suggesting that "the issuance of declaratory relief concerning the seating of a title holder is at odds with this Court's repeated insistence that the selection of a title bearer is not the court's responsibility"), *overruled on other grounds by Kruheed*, 2017 Palau 14 ¶ 6.

a complete lack of evidence on the identity of the people who [allegedly] appointed" Gibbons to be *Dirribkal*. Findings of Fact and Conclusions of Law (Aug. 9, 2019) at 12. Although we agree with Appellants that the evidence of Gibbons' appointment as *Dirribkal* is more substantial than the trial court's decision would lead one to believe, we conclude that the trial court's statement about a lack of evidence does nothing to undermine its ultimate conclusion. It is well established "that the ourrot of all lineages of a clan must reach a consensus" regarding the appointment of the female titleholder in order for it to be valid. *Ngirmang v. Orrukem*, 3 ROP Intrm. 91, 95 (1992). In contrast, the testimony Appellants proffered at trial and point to on appeal merely establishes that one individual, who may or may not have been an *ourrot* member of the Clan at the time, participated in the appointment. Thus, although there may have been an attempt by some individuals to install Gibbons as *Dirribkal*, the evidence is insufficient to establish, by a preponderance of the evidence, that Gibbons was appointed by consensus of the *ourrot* of all three lineages of the Clan. *See Sungino v. Benhart*, 20 ROP 215, 217 (2013) ("The burden of proof . . . belongs to the individual or group seeking to establish their status within the clan."). Therefore, the trial court's misdescription of the state of the evidence was harmless. Because the "mistake did not affect the outcome, it would be senseless to vacate and remand for reconsideration." *See "B" Mining Co. v. Addison*, 831 F.3d 244, 253 (4th Cir. 2016); *see also Ngiraiwet v. Telungalek ra Emadaob*, 16 ROP 163, 165 (2009) ("Harmless errors are those that do not prejudice a particular party's case."). This Court "will not reverse a lower court decision due to an error where that error is harmless." *Ngiraiwet*, 16 ROP at 165.

[¶ 8] Appellees/Cross-Appellants raise three issues on appeal. First, they argue that Sugiyama must be the female titleholder because she was appointed by women from all three lineages of the Clan.[5] The trial court agreed with the basic legal proposition that appointment of a female titleholder must involve *ourrot* from all lineages of a clan. Applying the law to the facts before it, however, the court concluded that there was insufficient evidence that Sugiyama was properly appointed. Although one woman from each lineage

[5] Before the trial court, Appellees contended that a resolution of the disputed titles was unnecessary, but, as previously described, the court rejected this argument and made a ruling regarding the disputed female title.

may have participated in the appointment, there was, in the court's view, insufficient evidence that two of them, Appellee Mary Thing and Karen Kohama, were *ourrot*.[6] Neither Thing nor Kohama testified, and Appellees' briefs do not point to anything in the record that demonstrates their services to and status in the Clan. "It is not the Court's duty to . . . scour the record for any facts to which [an] argument might apply." *Idid Clan v. Demei*, 17 ROP 221, 229 n.4 (2010). Because Appellees fail to point this Court to any evidence that Thing and Kohama were *ourrot*, we cannot hold that the trial court's finding regarding the lack of evidence on this point was clearly erroneous. *See Rudimch v. Rebluud*, 21 ROP 44, 46 (2014) ("[T]he burden of demonstrating error on the part of a lower court is on the Appellant.").

[¶ 9] Second, Appellees challenge the trial court's finding that Demei, rather than Eberdong, is *Ngiribkal*. The trial court found that Demei was properly appointed to hold the title in 2004 because the women who appointed him included the contemporaneous holder of the female title, his mother, Dirramekai. *See Kebliil ra Uchelkeyukl v. Ngiraungas*, 2018 Palau 15 ¶ 11 ("This court has previously recognized that it is the female chief title holder who ultimately chooses the male chief title holder."). Appellees' argument that Demei does not hold the title rests almost entirely on their contention that Demei improperly leased the Clan's land.[7] However, Appellees do not cite (and our own research has failed to reveal) any customary law or other basis to support the proposition that one's mishandling of clan lands has any direct effect on that individual's status as the clan's titleholder. To the contrary, once a titleholder is properly installed, customary law requirements must be met in order to remove him, even where the titleholder acts beyond his authority. *See Filibert v. Ngirmang*, 8 ROP Intrm. 273, 275-77 (2001) (discussing the procedure for removing a titleholder); *Espangel v. Diaz*, 3 ROP Intrm. 240, 246

[6] The trial court declined to rule that Thing and Kohama are not *ourrot*. The court also noted that Gibbons was clearly a senior strong member of the Clan and did not participate in the appointment.

[7] In the fact section of their brief, Appellees cite Sugiyama's testimony that Clan members never gathered to appoint Demei, but the trial court was free to credit this testimony or the conflicting testimony in favor of Appellants' position, and we will not overturn credibility determinations on appeal absent extraordinary circumstances. *See, e.g.*, *Ngermengiau Lineage v. Estate of Itand*, 20 ROP 68, 71 (2013).

Section 13.2. Roads and Drainage. The KSPLA reserves the right and easement to construct and maintain on the Property boundaries, roads and related drainage. The KSPLA shall have reasonable discretion to decide the matter of where such boundaries, roads and related drainage shall be situated, but the roads and drainage shall take into account the existence of improvements situated on the property.

Section 13.3. Right to Remove. This reservation of Rights of Way and Easements shall include the right to remove trees, vegetation, signage and other obstructions which may, in the KSPLA's sole discretion, need to be removed in order to carry out the purposes of this section; said removal shall be without compensation to the Lessee.

SECTION 14. LIENS, TAXES & ASSESSMENTS.

Section 14.1. Tax Liens. Lessee shall keep the Property and all improvements thereon free and clear of liens, taxes, encumbrances and other charges. Lessee shall immediately pay any such lien, tax, encumbrance or charge that is reduced to judgment.

Section 14.2. Taxes. Lessee shall promptly pay all taxes, licenses, fees, assessments and other charges levied upon the Property (or any interest in the Property) as they become due, and upon request shall provide KSPLA with proof of such payment.

Section 14.3. Indemnification. Lessee shall protect, indemnify and hold harmless the KSPLA, the Lease and the Property (and all KSPLA interest therein and improvements thereupon) from all claims, tax assessments and other charges, and from all costs, including attorneys, court and expert witness fees, in connection therewith.

SECTION 15. EMINENT DOMAIN.

Section 15.1. Complete Taking. If during this Lease the entire Property is taken by eminent domain, then Lessee' entire leasehold interest and all other Lessee' rights hereunder shall terminate on the actual date of such taking and the KSPLA shall refund any excess rent paid by Lessee. In any condemnation proceeding that may be brought pertaining to the Property, Lessee shall be entitled to file and to prosecute a claim against the condemnor for the value of its leasehold interest in the Property and for the value of its interest in the improvements and the KSPLA shall be entitled to pursue a claim against the condemnor for the full value of its interest in the Property and the Property improvements.

Section 15.2. Partial Taking. In the event of a partial taking by eminent domain, this Lease shall remain in effect covering the property not taken, except that the annual Base Rent shall be reduced by an amount equivalent to the square meter area taken multiplied by the per-square-meter Base Rent rate in effect at the time of the taking.

Section 15.3. Award Apportionment. All compensation awarded by reason of such taking shall be divided between Lessee and the KSPLA according to their respective interests in the Lease, the Property, the Property's improvements, and in the remainder at the time of such taking.

Initials: W. C. KW

ATTACHMENT 2

DETAILED LIST OF IMPACTED TREES

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DOLIN, Associate Justice, concurring *dubitante*:

[¶ 13] I join the Court's judgment insofar as it affirms the trial court's conclusion that neither Demei nor Sugiyama has the authority to unilaterally lease the Clan land to non-clan members. I am also constrained to say that, under the current governing caselaw, and applying the clear error standard of review, the Court's resolution of the issues regarding Clan titles is correct. However, I hesitate to fully endorse that part of the opinion because I have grown increasingly skeptical of the wisdom of this Court adjudicating intra-clan title disputes that are untethered to any dispute over land or other legal right.

[¶ 14] On the one hand, we have held not only that the courts have jurisdiction over customary law disputes, *see, e.g., Espangel v. Diaz*, 3 ROP Intrm. 240, 245 (1992), but that to the extent we have "jurisdiction over a dispute[, we] should usually exercise it." *Koror State Legislature v. KSPLA*, 2017 Palau 28 ¶ 16. On the other hand, we have repeatedly and consistently said that "[t]he selection of a title bearer is the Clan's responsibility, not the Court's." *Lukubong v. Blesam*, 2020 Palau 28 ¶ 7 (quoting *Sato v. Ngerechelong State Assembly*, 7 ROP Intrm. 79, 81 (1998)); *see also Matlab v. Melimarang*, 9 ROP 93, 97 (2002), *overruled on other grounds by Kinhud v. Ellui Clan*, 2017 Palau 14 ¶ 6; *Filibert v. Ngirmang*, 8 ROP Intrm. 273, 276 (2001). Although these directions may seem inconsistent, upon a careful reading of our precedent, it becomes apparent that they are not. Thus, *Kinhud* did not *require* courts to exercise jurisdiction over title disputes governed by customary law; rather, it reaffirmed that "the decision whether to entertain claims for declaratory relief is 'committed to the sound discretion of the trial court.'" 2017 Palau 14 ¶ 5 (quoting *Filibert*, 8 ROP Intrm. at 276); *see also id.* ¶ 7 ("noting that nothing in the language of [ROP] Rule [of Civil Procedure] 57 purports to create an absolute right in any party to [] a declaration[,]" but that "under its plain language, it places discretion in the trial court, creating an opportunity—not a duty—to grant relief to qualifying litigants"). Similarly, although the *Koror State Legislature* Court reversed the Trial Division's *constitutional* holding, which concluded that the Palauan Constitution, like the U.S. one, imposes a standing requirement for the court to exercise jurisdiction, 2017 Palau 28 ¶ 22, it endorsed the notion that, as a *prudential* matter, cases

over which this Court has jurisdiction may nevertheless be non-justiciable, *id.* ¶¶ 23-24. In my view, over the past several years our courts have adjudicated intra-clan disputes without sufficiently considering whether, as a prudential matter, these contests "may be inappropriate for consideration for other [than constitutional] reasons." *Id.* ¶ 23 (quoting *PCSPP v. Ueki*, 22 ROP 11, 14-15 (2014)).

[¶ 15] Because "the decision whether to entertain claims for declaratory relief is 'committed to the sound discretion of the trial court.'" *Kinhud*, 2017 Palau 14 ¶ 5 (quoting *Filibert*, 8 ROP Intrm. at 276), I cannot be sure (certainly not without the benefit of briefing and argument on the issue) that the decision to adjudicate the title disputes in the present case was erroneous. Because I cannot be certain of the error, I concur in the Court's judgment on these issues. However because discretion merely "denotes the absence of a hard and fast rule," and must be "exercised not arbitrarily or willfully, but with regard to what is right and equitable under the circumstances and the law," *Espuwen v. Obichang*, 2020 Palau 8 ¶ 40 (Dolin, J., concurring) (quoting *Langnes v. Green*, 282 U.S. 531, 541 (1931)), we should take the earliest possible opportunity to authoritatively set forth the factors that would militate for or against the exercise of jurisdiction in such disputes.

[¶ 16] At the end of the day, disputes over clan titles that are untethered to disputes over land or other legal rights are mostly disputes about the status and respect accorded to the claimant within a clan. Such respect is not conferred by judicial decree but is earned over years, if not decades, of providing services to a clan and building strong bonds within it. For this reason, though the Constitution and the Declaratory Judgment Act grant us the power to resolve such intra-clan disputes, in my view this power should be exercised rarely and gingerly. *Cf. Aitaro v. Koror State Gov't*, 15 ROP 175, 179 (Tr. Div. 2008) ("When title or customary disputes are resolved through traditional means, such resolutions can only strengthen traditions and customs."). I look forward to the day when the Court clarifies this area of the law and reinvigorates the prudential justiciability doctrine as it applies to "naked" title disputes.

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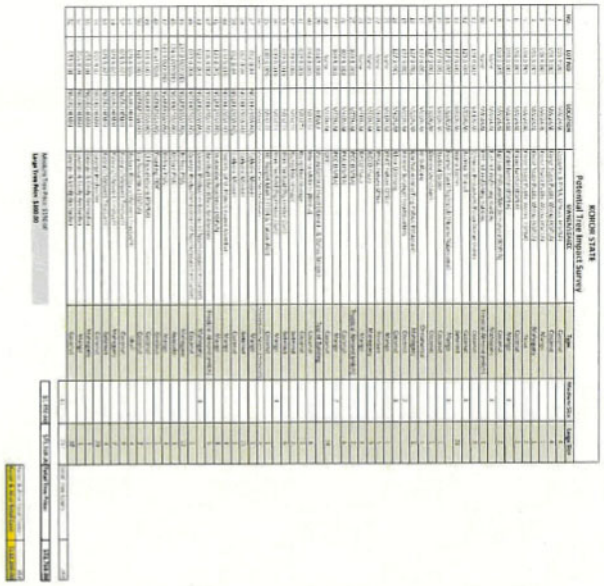
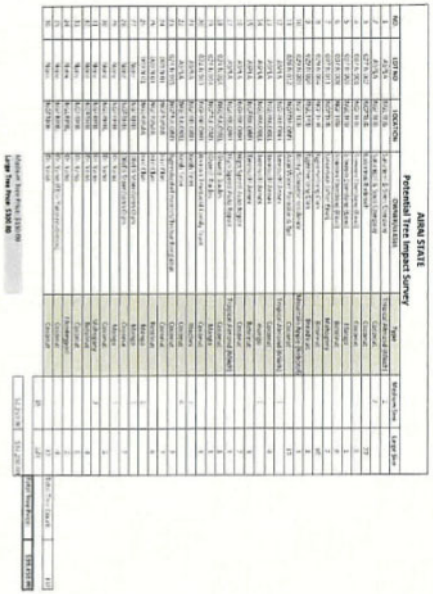




Annex 10 Environmental Monitoring Form

MONITORING FORM (Construction Stage)

-If environmental reviews indicate the need of monitoring by JICA, JICA undertakes monitoring for necessary items that are decided by environmental reviews. JICA undertakes monitoring based on regular reports including measured data submitted by the project proponent. When necessary, the project proponent should refer to the following monitoring form for submitting reports.

-When monitoring plans including monitoring items, frequencies and methods are decided, project phase or project life cycle (such as construction phase and operation phase) should be considered.

1. The situation of compensation

Monitoring Item	Monitoring Results during Report Period
The situation of compensation	

2. Mitigation Measures

- Air pollution

Monitoring Item	Monitoring Results during Report Period
The condition of the sprinkle The use condition of low emission gas construction vehicles	

– Water quality

Free of visible floating materials, oils, greases, scum, and other floating matter attributable to human activities

Name of Substation	Item	Conditions	Remarks
Malakal	Visual Check		1 time per week before and after discharge into ocean
Airai			
Kokusai			

- Noise and vibration

Monitoring Item	Monitoring Results during Report Period
The use condition of soundproof walls and low noise and vibration construction vehicles	

- Protected areas, ecosystem and historical areas

Monitoring Item	Monitoring Results during Report Period
Existence of endangered species Impacts to protected areas, KBA, and historical areas	

3. Social Environment

－Impact to existing road

Monitoring item	Monitoring results during report periods
Conditions of construction vehicles operation and traffic jams	Visual check Picture Monthly report

－Accident

Monitoring item	Monitoring results during report periods
Safety Meeting	Visual check Picture Monthly report

MONITORING FORM (Operation Stage)

-If environmental reviews indicate the need of monitoring by JICA, JICA undertakes monitoring for necessary items that are decided by environmental reviews. JICA undertakes monitoring based on regular reports including measured data submitted by the project proponent. When necessary, the project proponent should refer to the following monitoring form for submitting reports.

-When monitoring plans including monitoring items, frequencies and methods are decided, project phase or project life cycle (such as construction phase and operation phase) should be considered.

1. Mitigation measures

- Soil pollution

Monitoring Item	**Monitoring Results during Report Period**
The situation of soil pollution	

2. Social Environment

－Accident

Monitoring items	Monitoring results during report periods
Safety Meeting	Visual check Picture Monthly report

5. Field Report

PREPARATORY SURVEY FOR THE PROJECT FOR UPGRADING POWER GRID IN THE REPUBLIC OF PALAU

FIELD REPORT

SEPTEMBER 24th 2021

Prepared and Submitted by:	Confirmed and Agreed by:
Mr. Makoto ABE Chief Consultant JICA Preparatory Survey Team	Mr. Frank Kyota Chief Executive Officer Palau Public Utilities Corporation (PPUC) Executing Agency for the Project

JICA PREPARATORY SURVEY TEAM

Yachiyo Engineering Co., Ltd.

Contents

[Attachment]

Attachment – 1	Member List of the Study Team
Attachment – 2	Simulation model of KB grid for power system analysis
Attachment – 3	Summary of stakeholders meeting
Attachment – 4	Major Undertakings to be covered by Japan and Palau
Attachment – 5	Tentative implementation schedule

[Annex]

Detailed transmission line route drawings

A5-2

1. Outline of the Project

1.1 Background of the Project

Based on the several preliminary discussions between the Government of the Republic of Palau (hereinafter referred to as "Palau") and JICA Palau Office, Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched the Preparatory Survey Team for the Outline Design (hereinafter referred to as "the Team") of the Project for Upgrading Power Grid (hereinafter referred to as "the Project") to Palau.

Throughout the first field survey in the from 29th August to 27th September, 2021, PPUC and the Team had series of technical discussions to form mutual understandings about the contents, scope, preconditions for the Outline Design, basic specifications, general layouts, and so on of the Project throughout the first field survey. PPUC and the Team agreed to record the following issues described on this Field Report as a conclusion of the discussions.

Components of the Project will be further examined and may be modified through the consultation with the Japanese Ministry of Foreign Affairs and JICA headquarters. It is important for the Palau side to understand that the Preparatory Survey is not a commitment for the future implementation of the Project.

Particularly, in consideration of the schedule and procedures of Japan's Grant Aid projects, the Team explained, and PPUC agreed with the Team to proceed to the further study, the outline design, planning of the implementation schedule, the cost estimation and so on of the Project in accordance with the mutual understandings made on this field report immediately after the first field survey.

1.2 Framework for the Project

The framework for the Project are shown as follows;

- Responsible Ministry:

  Ministry of Public Infrastructure and Industries (MPII)

- Executing Agency:

  Palau Public Utilities Corporation (PPUC)

- Operation and Maintenance Agency:

  Palau Public Utilities Corporation (PPUC)

1.3 The Scope of the Japanese side

The Scope of the Japanese side and the Outline of the proposed project components are shown in Table 1.3-1 and Figure 1.3-1.

Table 1.3-1 Outline of the Proposed Project Components

Components	Quantities
Procurement and Installation Work	
1. 34.5kV transmission line (Malakal - Kokusai line)	
(a) 34.5kV overhead line	Approx. 32.0km
(b) 34.5kV underground cable	Approx. 2.7km
(c) 34.5kV transmission line at KB Bridge	1 lot
(d) 34.5kV underground cables from each substation (Malakal, Koror, Airai, Kokusai) to existing power poles	1 lot
2. 13.8kV distribution line (Connection point)	
(a) 13.8kV overhead line and underground cables from each substation (Malakal, Koror) to existing power poles	1 lot
3. Expansion of Malakal substation	
(a) 10MVA 34.5/13.8kV transformer (Option-A)	1 bank
(b) 34.5kV switchgear (indoor)	4 bay
4. Construction of Koror substation	
(a) 10MVA 34.5/13.8kV transformer	1 bank
(b) 34.5kV switchgear (indoor)	6 bay
(c) 13.8kV switchgear (indoor)	4 bay
5. Improvement of Airai substation (Option-B)	
(a) 10MVA 34.5/13.8kV transformer	1 bank
(b) 34.5kV switchgear (indoor)	3 bay
6. Construction of Ngchesar substation (Option-C)	
(a) 5MVA 34.5/13.8kV transformer	1 bank
7. Expansion of Kokusai substation	
(a) 34.5kV switchgear (indoor)	5 bay
Procurement Work	
8. Maintenance Tools for the Equipment of the Project	1 lot
9. Spare Parts and Consumables for the Equipment of the Project	1 lot
10. Digger Derrick Truck (Option-D)	1 lot
Construction Work	
11. Construction of buildings for substation	4 buildings
12. Civil works	1 lot

[Remark] Note that contents and quantities are subject to change.

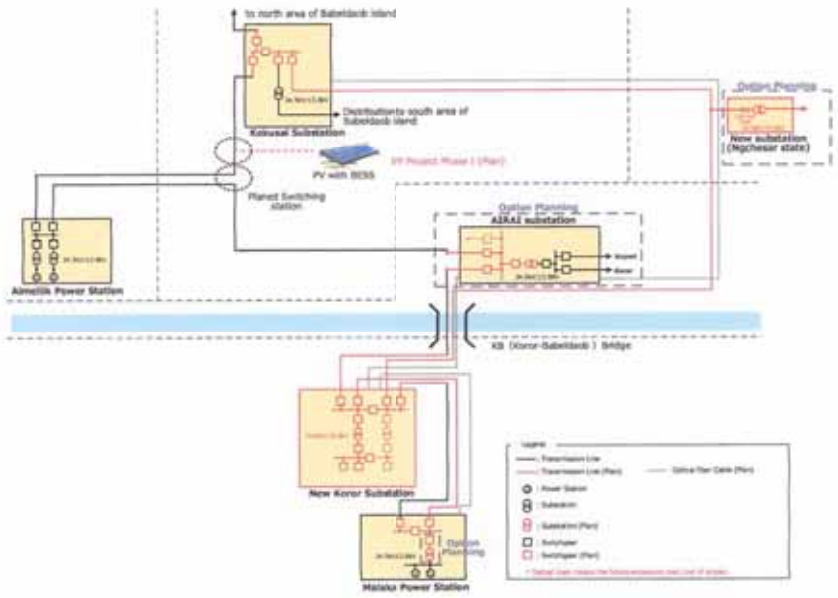


Figure 1.3-1 Outline of the Project components

2. Technical requirements confirmed in the first field survey

2.1 Technical requirements for the Substation of the Project

2.1.1 General requirement

Table 2.1.1-1 Basic Conditions for the Facility Design of the Project

Items		Values
Altitude		1,000m
Ambient Temperature	Maximum	40 Degrees Centigrade
Maximum Wind Velocity		40m/s
Seismic Force		Horizontal 0.10G
Soil Bearing Capacity		Depends on the soil survey result
Salt Density		0.5mg/cm^2
Seismic force		0.1 G horizontal direction

2.1.2 Electrical System

Table 2.1.2-1 Voltage and Wiring System

Item	Substation & Distribution System		Station Service Power	
Nominal Voltage	34.5kV	13.8kV	208-120V AC	110V DC
Maximum Voltage	36kV	17.5kV	-	-
Frequency	60Hz			-
Maximum Short Circuit Capacity	12.5kA (1sec.)	12.5kA (1sec.)	N/A	
Lightning Impulse Withstand Voltage (LIWV)	200kV(outdoor) 170kV (indoor)	110kV(outdoor) 95kV(indoor)	N/A	
Power Frequency Withstand Voltage	AC70kV	AC34kV	N/A	
Earthing System	Effective Earthing System		N/A	
Minimum Creepage Distance of Insulator	31mm/kV (outdoor) 20mm/kV (indoor)		N/A	
Contamination Level	IEC standards (very heavy pollution <salt-contamination> area)			
Insulator	Ceramic, White or Brown			
Protection Class (IP)	Outdoor: IP43 or more Indoor: IP21 or more			

2.1.3 Applicable Standards

- IEC : International Electrical Commission
- ISO : International Organization for Standardization
- JIS : Japanese Industrial Standards
- JEC : Japanese Electrotechnical Committee
- JEM : Standards for Japan Electrical Manufacturer's Association
- JEAC : Japan Electric Association Code
- JCS : Japan Cable Makers Association Standards
- JASS : Japan Architectural Standards Specification
- AIJ : Architectural Institute of Japan
- ANSI : American National Standards Institute

2.1.4 Technical requirements for the Equipment of Malakal substation

Reference drawings;-

SS-01: Single Line Diagram for Malakal substation
SS-02: Layout Drawing for Malakal substation

Table 2.1.4-1 Equipment to be provided for Malakal substation

No.	Item / Equipment	Quantity	Specifications
1	34.5kV Switchgear cubicle	1 lot	(1) Type: - Indoor type metal-enclosed switchgear - Construction shall be air-insulated and have enough space to enable easy maintenance, contained in the substation building - Space for the maintenance shall be secured in accordance with the relevant layout drawings. - To have the construction extendable to the future Transformer Bank extension (2) Type of circuit breaker: - VCB or GCB (3)Rated Voltage: - 36kV (4) Rated current: - 600A (5) Rated short-time withstand current: - 12.5kA (1 sec) (6) Number of Panels: [34.5kV panels] - Incoming panel: 1 set (with EVT, etc.) - Outgoing feeder panel: 2 sets (with EVT, etc.) - Outgoing feeder panel: 2 sets (with circuit breaker) - Bus Section panel: 1 set (with circuit breaker) - Control and Protection Device [Auxiliary panels] - AC distribution board: 1 set - Battery and charger: 1 set (with mold case circuit breaker) (7) Network arrangement: - In cases of the feeders in which bidirectional power flows exist, synchronizing interlock shall be provided properly. (8) Equipment, devices, Metering and protection relays: - Quantity to be provided in each feeder unit is as per the attached single-line diagram. - Detail ratings such as CT/VT ratio & burden, etc. shall be calculated and proposed by the Tenderer/Contractor. (9) Linkage with the existing facilities: - Necessary feeder control shall be carried out through the mimic board provided on the front surface of each cubicle. - Auxiliary AC power shall be supplied from the existing substation facilities. - Relevant connection material and work shall be included in the Project scope (10) Interface with the existing SCADA system: - All interface signals for the SCADA system shall be provided on the collective terminal boards properly located in the cubicle
2	34.5kV cable termination & Steel structure unit	1 lot	To be used for the connection between the existing 34.5kV outgoing feeder and new 34.5kV incoming one

No.	Item / Equipment	Quantity	Specifications
			(1) Type: - The steel structure shall be lattice truss construction made of hot-dip galvanized shaped steel and assembled by bolts and nuts. - Cable termination shall be heat-shrinkable type, or equivalent. (2) Materials: This unit shall consist from, - Steel structure - Cable termination kit - Necessary terminals and supports - Others
3	34.5kV Power Cables	1 set	(1) Type: - Placed in the conduit pipe (2) Conductor and insulation: - Copper conductor and XLPE insulation, 35kV-CVT250mm^2 (3) Accessories: - Termination kits
4	13.8kV Power Cables	1 set	(1) Type: - Placed in the conduit pipe (2) Conductor and insulation: - Copper conductor and XLPE insulation, 15kV-CVT250mm^2 (3) Accessories: - Termination kits
5	Control & LV cable	1 set	(1) Type - 600V, multi-core, jacket type, polyvinyl chloride insulated and sheathed cable with/without copper tap shielding (CVVS/CVV)
6	Grounding System	1 set	(1) Type: - Mesh type grounding with the annealed copper stranded conductors, grounding rods, and connectors. Connection with the existing grounding is acceptable. (2) Criteria: - Less than 1 ohm
7	Building for the switchgear	1 lot	- Sealed construction to protect the Equipment located inside. - No-ventilation provided. - No-window provided. - To keep inside environment proper, an air-conditioner shall be provided. - The building shall have enough size of door or hatch to install the cubicle. Size shall be proposed by the Tenderer/ Contractor. The door shall have appropriate sealing function.
8	34.5kV Lightning Arrester	6 pcs	(1) Type: - Outdoor, single phase, metal oxide gapless (2) Rated voltage: - 30kV (3) Nominal Discharge Current: - 10kA
9	13.8kV Lightning Arrester	6 pcs	(1) Type: - Outdoor, single phase, metal oxide gapless (2) Rated voltage:

No.	Item / Equipment	Quantity	Specifications
			- 12kV (3) Nominal Discharge Current: - 10kA

2.1.5 Technical requirements for the Equipment of Kokusai substation

Reference drawings;-

SS-03: Single Line Diagram for Kokusai substation

SS-04: Layout Drawing for Kokusai substation

Table 2.1.5-1 Equipment to be provided for Kokusai substation

No.	Item / Equipment	Quantity	Specifications
1	34.5kV Switchgear cubicle	1 lot	(1)Type: - Indoor type metal-enclosed switchgear - Construction shall be air-insulated and have enough space to enable easy maintenance, contained in the substation building - Space for the maintenance shall be secured in accordance with the relevant layout drawings. - To have the construction extendable to the future Transformer Bank extension (2) Type of circuit breaker: - VCB or GCB (3)Rated Voltage: - 36kV (4) Rated current: - 600A (5) Rated short-time withstand current: - 12.5kA (1 sec) (6) Number of Panels: [34.5kV panels] - Outgoing feeder panel: 3 sets (with EVT, etc.) - Outgoing feeder panel: 3 sets (with circuit breaker) - Bus Section panel: 1 set (with circuit breaker) - Transformer Primary panel: 1 set(with circuit breaker) - Station transformer (50kVA): 1unit (with fuse) - Control and Protection Device [Auxiliary panels] - AC distribution board: 1 set - Battery and charger: 1 unit (with mold case circuit breaker) (7) Network arrangement: - In cases of the feeders in which bidirectional power flows exist, synchronizing interlock shall be provided properly. (8) Equipment, devices, Metering and protection relays: - Quantity to be provided in each feeder unit is as per the attached single-line diagram.

No.	Item / Equipment	Quantity	Specifications
			- Detail ratings such as CT/VT ratio & burden, etc. shall be calculated and proposed by the Tenderer/Contractor. (9) Linkage with the existing facilities: - Necessary feeder control shall be carried out through the mimic board provided on the front surface of each cubicle. (10) Interface with the existing SCADA system: - All interface signals for the SCADA system shall be provided on the collective terminal boards properly located in the cubicle
2	34.5kV Power Cables	1 set	(1) Type: - Placed in the conduit pipe (2) Conductor and insulation: - Copper conductor and XLPE insulation, 35kV-CVT250mm^2 (3) Accessories: - Termination kits
3	Control & LV cable	1 set	(1) Type - 600V, multi-core, jacket type, polyvinyl chloride insulated and sheathed cable with/without copper tap shielding (CVVS/CVV)
4	Grounding System	1 set	(1) Type: - Mesh type grounding with the annealed copper stranded conductors, grounding rods, and connectors. Connection with the existing grounding is acceptable. (2) Criteria: - Less than 1 ohm
5	Building for the switchgear	1 lot	- Sealed construction to protect the Equipment located inside. - No-ventilation provided. - No-window provided. - To keep inside environment proper, an air-conditioner shall be provided. - The building shall have enough size of door or hatch to install the cubicle. Size shall be proposed by the Tenderer/ Contractor. The door shall have appropriate sealing function.
6	34.5kV Lightning Arrester	9 pcs	(1) Type: - Outdoor, single phase, metal oxide gapless (2) Rated voltage: - 30kV (3) Nominal Discharge Current: - 10kA

2.1.6 Technical requirements for the Equipment of Koror substation

Reference drawings;

SS-05: Single Line Diagram for Koror substation

SS-06: Layout Drawing for Koror substation (1)

SS-07: Layout Drawing for Koror substation (2)

Table 2.1.6-1 Equipment to be provided for Koror substation

No.	Item / Equipment	Quantity	Specifications
1	33/11kV Transformer	1 lot	(1) Type: Outdoor, oil immersed, with on-load tap changer (2) Rated primary voltage: - 34.5kV (3) Rated secondary voltage: - 13.8kV (4) Rated Capacity: - 10MVA (5) Cooling type: - ONAN (6) Number of phases: - 3 (7) Frequency: - 60Hz (8) Tap voltage: - 34.5kV -10% to -10% (9) Number of taps: - 17 taps (10) Step voltage: - 1.25% (11) Winding connection: - Primary : Star (neutral lead out) - Secondary : Star (neutral lead out) - Tertiary : Delta (12) Impedance: - About 6% (13) Others - Bushing Current Transformers (BCTs) - Lightning Arresters (LAs) on Primary & Secondary sides
2	34.5kV Switchgear cubicle	1 lot	(1) Type: - Indoor type metal-enclosed switchgear - Construction shall be air-insulated and have enough space to enable easy maintenance, contained in the substation building - Space for the maintenance shall be secured in accordance with the relevant layout drawings. - To have the construction extendable to the future Transformer Bank extension (2) Type of circuit breaker: - VCB or GCB (3)Rated Voltage: - 36kV (4) Rated current: - 600A

No.	Item / Equipment	Quantity	Specifications
			(5) Rated short-time withstand current: - 12.5kA (1 sec) (6) Number of Panels: [34.5kV panels] - Outgoing feeder panel: 4 sets (with EVT, etc.) - Outgoing feeder panel: 4 sets (with circuit breaker) - Bus Section panel: 1 set (with circuit breaker) - Transformer Primary panel: 1 set(with circuit breaker) - Control and Protection Device (7) Network arrangement: - In cases of the feeders in which bidirectional power flows exist, synchronizing interlock shall be provided properly. (8) Equipment, devices, Metering and protection relays: - Quantity to be provided in each feeder unit is as per the attached single-line diagram. - Detail ratings such as CT/VT ratio & burden, etc. shall be calculated and proposed by the Tenderer/Contractor. (9) Linkage with the existing facilities: - Necessary feeder control shall be carried out through the mimic board provided on the front surface of each cubicle. (10) Interface with the existing SCADA system: - All interface signals for the SCADA system shall be provided on the collective terminal boards properly located in the cubicle
3	13.8kV Switchgear cubicle		(1) Type: - Indoor type metal-enclosed switchgear - Construction shall be air-insulated and have enough space to enable easy maintenance, contained in the substation building - Space for the maintenance shall be secured in accordance with the relevant layout drawings. - To have the construction extendable to the future Transformer Bank extension (2) Type of circuit breaker: - VCB or GCB (3)Rated Voltage: - 24kV (4) Rated current: - 600A (5) Rated short-time withstand current: - 12.5kA (1 sec) (6) Number of Panels: [13.8kV panels] - Bus Section panel: 1 set (with circuit breaker) - Incoming feeder panel: 1 set (with circuit breaker) - Outgoing feeder panel: 1 set (with circuit breaker) - Transformer Secondary panel: 1 set(with circuit breaker) - Station transformer (50kVA): 1unit (with fuse) - Control and Protection Device

No.	Item / Equipment	Quantity	Specifications
			[Auxiliary panels] - AC distibution board: 1 set - Battery and charger: 1 unit (with mold case circuit breaker) (7) Network arrangement: - In cases of the feeders in which bidirectional power flows exist, synchronizing interlock shall be provided properly. (8) Equipment, devices, Metering and protection relays: - Quantity to be provided in each feeder unit is as per the attached single-line diagram. - Detail ratings such as CT/VT ratio & burden, etc. shall be calculated and proposed by the Tenderer/Contractor. (9) Linkage with the existing facilities: - Necessary feeder control shall be carried out through the mimic board provided on the front surface of each cubicle. (10) Interface with the existing SCADA system: All interface signals for the SCADA system shall be provided on the collective terminal boards properly located in the cubicle
4	34.5kV Power Cables		(1) Type: - Placed in the conduit pipe (2) Conductor and insulation: - Copper conductor and XLPE insulation, 35kV-CVT250mm^2 (3) Accessories: - Termination kits
5	13.8kV Power Cables	1 set	(1) Type: - Placed in the conduit pipe (2) Conductor and insulation: - Copper conductor and XLPE insulation, 15kV-CVT250mm^2 (3) Accessories: - Termination kits
6	Control & LV cable	1 set	(1) Type - 600V, multi-core, jacket type, polyvinyl chloride insulated and sheathed cable with/without copper tap shielding (CVVS/CVV)
7	Grounding System	1 set	(1) Type: - Mesh type grounding with the annealed copper stranded conductors, grounding rods, and connectors. Connection with the existing grounding is acceptable. (2) Criteria: - Less than 1 ohm
8	Building for the switchgear	1 lot	- Sealed construction to protect the Equipment located inside. - No-ventilation provided. - No-window provided. - To keep inside environment proper, an air-conditioner shall be provided. - The building shall have enough size of door or hatch to install the cubicle. Size shall be proposed by the Tenderer/ Contractor. The door shall have appropriate sealing function.
9	34.5kV Lightning Arrester	15 pcs	(1) Type: - Outdoor, single phase, metal oxide gapless

No.	Item / Equipment	Quantity	Specifications
			(2) Rated voltage: - 30kV (3) Nominal Discharge Current: - 10kA
10	13.8kV Lightning Arrester	6 pcs	(1) Type: - Outdoor, single phase, metal oxide gapless (2) Rated voltage: - 12kV (3) Nominal Discharge Current: - 10kA
11	Outdoor lighting equipment	1 set	(1) Type: - LED lamp, 100W, AC120V, 60Hz, or equivalent

2.1.7 Technical requirements for the Equipment of Airai substation [Option]

Reference drawings;

SS-08: Single Line Diagram for Airai substation

SS-09 Layout Drawing for Airai substation

Table 2.1.7-1 Equipment to be provided for Airai substation

No.	Item / Equipment	Quantity	Specifications
1	33/11kV Transformer	1 lot	(1) Type: Outdoor, oil immersed, with on-load tap changer (2) Rated primary voltage: - 34.5kV (3) Rated secondary voltage: - 13.8kV (4) Rated Capacity: - 10MVA (5) Cooling type: - ONAN (6) Number of phases: - 3 (7) Frequency: - 60Hz (8) Tap voltage: - 34.5kV +10% to -10% (9) Number of taps: - 17 taps (10) Step voltage: - 1.25%

No.	Item / Equipment	Quantity	Specifications
			(11) Winding connection: - Primary : Star (neutral lead out) - Secondary : Star (neutral lead out) - Tertiary : Delta (12) Impedance: - About 6% (13) Others: - Bushing Current Transformers (BCTs) - Lightning Arresters (LAs) on Primary & Secondary sides
2	34.5kV Switchgear cubicle	1 lot	(1) Type: - Indoor type metal-enclosed switchgear - Construction shall be air-insulated and have enough space to enable easy maintenance, contained in the substation building - Space for the maintenance shall be secured in accordance with the relevant layout drawings. - To have the construction extendable to the future Transformer Bank extension (2) Type of circuit breaker: - VCB or GCB (3)Rated Voltage: - 36kV (4) Rated current: - 600A (5) Rated short-time withstand current: - 12.5kA (1 sec) (6) Number of Panels: [34.5kV panels] - Outgoing feeder panel: 2 sets (with EVT, etc.) - Outgoing feeder panel: 2 sets (with circuit breaker) - Transformer Primary: 1 set(with circuit breaker) - Station transformer (50kVA): 1unit (with fuse) [Auxiliary panels] - AC distribution board: 1 set - Battery and charger: 1 unit (with mold case circuit breaker) (7) Network arrangement: - In cases of the feeders in which bidirectional power flows exist, synchronizing interlock shall be provided properly. (8) Equipment, devices, Metering and protection relays: - Quantity to be provided in each feeder unit is as per the attached single-line diagram. - Detail ratings such as CT/VT ratio & burden, etc. shall be calculated and proposed by the Tenderer/Contractor. (9) Linkage with the existing facilities: - Necessary feeder control shall be carried out through the mimic board provided on the front surface of each cubicle. (10) Interface with the existing SCADA system:

No.	Item / Equipment	Quantity	Specifications
			- All interface signals for the SCADA system shall be provided on the collective terminal boards properly located in the cubicle
3	13.8kV Switchgear	1 lot	- The existing facilities shall be used, and they shall be integrated into the newly supplied 34.kV switchgears and transformer. Necessary material such as cable and support shall be supplied.
4	34.5kV Power Cables	1 set	(1) Type: - Placed in the conduit pipe (2) Conductor and insulation: - Copper conductor and XLPE insulation,35kV-250mm^2 (3) Accessories: - Termination kits
5	13.8kV Power Cables	1 set	(1) Type: - Placed in the conduit pipe (2) Conductor and insulation: - Copper conductor and XLPE insulation, 15kV-250mm^2 (3) Accessories: - Termination kits
6	Control & LV cable	1 set	(1) Type - 600V, multi-core, jacket type, polyvinyl chloride insulated and sheathed cable with/without copper tap shielding (CVVS/CVV)
7	Grounding System	1 set	(1) Type: - Mesh type grounding with the annealed copper stranded conductors, grounding rods, and connectors. Connection with the existing grounding is acceptable. (2) Criteria: - Less than 1 ohm
8	Building for the switchgear	1 lot	- Sealed construction to protect the Equipment located inside. - No-ventilation provided. - No-window provided. - To keep inside environment proper, an air-conditioner shall be provided. - The building shall have enough size of door or hatch to install the cubicle. Size shall be proposed by the Tenderer/ Contractor. The door shall have appropriate sealing function.
9	34.5kV Lightning Arrester	9 pcs	(1) Type: - Outdoor, single phase, metal oxide gapless (2) Rated voltage: - 30kV (3) Nominal Discharge Current: - 10kA
10	13.8kV Lightning Arrester	3 pcs	(1) Type: - Outdoor, single phase, metal oxide gapless (2) Rated voltage: - 12kV (3) Nominal Discharge Current: - 10kA

2.1.8 Technical requirements for the Equipment of new substation (Ngchesar state) [Option]

Table 2.1.8-1 Equipment to be provided for new substation (Ngchesar state)

No.	Item / Equipment	Quantity	Specifications
1	33/11kV Transformer	1 lot	(1) Type: Outdoor, oil immersed, with on-load tap changer (2) Rated primary voltage: - 34.5kV (3) Rated secondary voltage: - 13.8kV (4) Rated Capacity: - 5MVA (5) Cooling type: - ONAN (6) Number of phases: - 3 (7) Frequency: - 60Hz (8) Tap voltage: - 34.5kV +10% to -10% (9) Number of taps: - 17 taps (10) Step voltage: - 1.25% (11) Winding connection: - Primary : Star (neutral lead out) - Secondary : Star (neutral lead out) - Tertiary : Delta (12) Impedance - About 6% (13) Others: - Bushing Current Transformers (BCTs) - Lightning Arresters (LAs) on Primary & Secondary sides
2	34.5kV Disconnector Switch	1 set	(1)Type: Outdoor, manual operation, Air insulated type
3	34.5kV Cut out fuse	1 set	(1)Type: Outdoor, 34.5kV

2.1.9 Technical requirements for the Equipment of Malakal substation (Transformer update) [Option]

Table 2.1.9-1 Equipment to be provided for Malakal substation (Transformer update)

No.	Item / Equipment	Quantity	Specifications
1	33/11kV Transformer	1lot	(1) Type: Outdoor, oil immersed, with on-load tap changer (2) Rated primary voltage: - 34.5kV (3) Rated secondary voltage: - 13.8kV (4) Rated Capacity: - 10MVA (5) Cooling type: - ONAN (6) Number of phases: - 3 (7) Frequency: - 60Hz (8) Tap voltage: - 34.5kV +10% to -10% (9) Number of taps: - 17 taps (10) Step voltage: - 1.25% (11) Winding connection: - Primary : Star (neutral lead out) - Secondary : Star (neutral lead out) - Tertiary : Delta (12) Impedance: - About 6% (13) Others - Bushing Current Transformers - (BCTs) - Lightning Arresters (LAs) on Primary & Secondary sides
2	34.5kV Switchgear cubicle	1 lot	(1) Type: - Indoor type metal-enclosed switchgear (2) Type of circuit breaker: - VCB or GCB (3)Rated Voltage: - 36kV (4) Rated current: - 600A

No.	Item / Equipment	Quantity	Specifications
			(5) Rated short-time withstand current: - 12.5kA (1 sec) (6) Number of Panels: [34.5kV panels] - Transformer Primary: 1 set(with circuit breaker)
3	13.8kV Switchgear	1 lot	- The existing facilities shall be used, and they shall be integrated into the newly supplied 34.kV switchgears and transformer. Necessary material such as cable and support shall be supplied.
4	34.5kV Power Cables	1 set	(1) Type: - Placed in the conduit pipe (2) Conductor and insulation: - Copper conductor and XLPE insulation,35kV-250mm^2 (3) Accessories: - Termination kits
5	13.8kV Power Cables	1 set	(1) Type: - Placed in the conduit pipe (2) Conductor and insulation: - Copper conductor and XLPE insulation, 15kV-250mm^2 (3) Accessories: - Termination kits
6	Control & LV cable	1 set	(1) Type - 600V, multi-core, jacket type, polyvinyl chloride insulated and sheathed cable with/without copper tap shielding (CVVS/CVV)
7	Grounding System	1 set	(1) Type: - Mesh type grounding with the annealed copper stranded conductors, grounding rods, and connectors. Connection with the existng grounding is acceptable. (2) Criteria: - Less than 1 ohm
8	34.5kV Lightning Arrester	3 pcs	(1) Type: - Outdoor, single phase, metal oxide gapless (2) Rated voltage: - 30kV (3) Nominal Discharge Current: - 10kA

A5-10

2.2 Technical requirement for Transmission and distribution lines

(1) Scope of Work

Scope of the work for transmission and distribution lines is shown in TL-01 Site Location Map in the Drawings.

a) 34.5kV transmission line between Malakal substation and Kokusai substation

Current capacity of existing 34.5kV line between Malakal substation and Aimeliik substation will be upgraded by constructing new 34.5kV transmission line using conductor ACSR-150mm^2; overhead line/or CVT-250mm^2; underground cable, refer to the attached detailed transmission line route drawings (Annex). The overhead line length is approx. 32.0km. The underground cable length is approx. 2.7km. Support structure of the 34.5kV overhead transmission line shall be concrete pole types, refer to the drawing TL-02.

Table 2.2-1 Quantity of Power Poles (Draft)

Pole	Quantity
New pole	498
Replacement of pole	86
Rearrangement of pole	39

Communication line shall be constructed between Malakal substation and Kokusai substation using Optical Fiber Cable.

b) 34.5kV transmission line and 13.8kV distribution line at Malakal substation

Two routes of 34.5kV and 13.8kV underground cables shall be constructed from Malakal substation to the power poles (Malakal-1, Koror-1).

c) 34.5kV transmission line and 13.8kV distribution line at Koror substation

One route of 34.5kV underground cable shall be constructed from Koror substation to the power pole (Malakal-128). Three routes of 34.5kV overhead line shall be constructed from Koror substation to the power poles (Koror-128, Koror-129, Malakal-130).

Two routes of 13.8kV overhead line shall be constructed from Koror substation to the power poles (Koror-127, Malakal-130).

d) 34.5kV transmission line at Airai substation

Two routes of 34.5kV underground cables shall be constructed from Airai substation to the power poles (Airai-19, Airai-20).

e) 34.5kV transmission line at Kokusai substation

One route of 34.5kV underground cable shall be constructed from Kokusai substation to the power pole (Kokusai-1).

f) KB Bridge

Concerning the 34.5kV transmission line route at the KB Bridge, the following 3 ideas have been proposed.

Option1: Cable in the bridge
Option2: Overhead line
Option3: Submarine cable

In this field report, the best option has not been proposed yet. At the moment, the Option2 in different way with the existing line seems a better option to secure power supply security and risk hedge for transmission line at the KB Bridge. The Team will conduct further study and propose the best option.

Table 2.2-2 Transmission line at the KB Bridge

Option	Comments
Cable in the bridge	There is no extra conduits and route for installation of the cable inside to the bridge. New route into the bridge has to be constructed. It is difficult to estimate the bridge strength with new cable.
Overhead Line	New towers or poles at both Koror and Airai sides to support overhead lines shall be erected. Environmental and social consideration shall be needed for overhead lines and tower / pole types.
Submarine cable	There is a submarine cable which PPUC used to utilize before. PPUC is measuring an insulation resistance of the submarine cable regularly. It is difficult to utilize the submarine cable for long time.

(2) Requirements for 34.5kV Transmission and 13.8kV distribution lines

Specifications for 34.5kV Transmission and 13.8kV distribution lines are shown as follows.

Table 2.2-3 Specifications for 34.5kV transmission line (Draft)

No.	Items	Specifications	
1)	Power Pole	Type: Type of pole: Safety factor:	Reinforced Concrete Pole 14m-7kN, 16m-7kN Suspension pole Tension pole 1.0 for main body 1.2 for arms
2)	Overhead Line (Conductor)	Type: Size:	XLPE Aluminum Conductor Steel Reinforced (ACSR) 150mm^2
3)	Power Cable	Type: Standards: Size:	CVT-35kV, XLPE IEC-60502 or equivalent 250mm^2
4)	Insulator	Standards: Type: Material: Color: Creepage distance:	IEC60383-1 or equivalent 480mm line post insulator Suspension insulator (4 pcs/phase) Porcelain White or Brown 31mm / kV
5)	Ground Wire	Type: Size:	Aluminum Clad Steel Wire (AC) 50mm^2

No.	Items	Specifications	
		Shield Angle:	60 degrees
6)	Section Switch	Type:	Pole mount, Water proof
7)	Optical Fiber Cable	Type: Number of Optic Fiber Core:	SM48 x 1 48 cores

Table 2.2-4 Specifications for 13.8kV distribution line (Draft)

No.	Items	Specifications	
1)	Overhead Line (Conductor)	Type: Size:	XLPE Aluminum Conductor Steel Reinforced (ACSR) 150mm^2
2)	Power Cable	Type: Standards: Size:	CVT-15kV, XLPE IEC-60502 or equivalent 250mm^2
3)	Insulator	Standards: Type: Material: Color: Creepage distance:	IEC60383-1 or equivalent Line post insulator Suspension insulator (2 pcs/phase) Porcelain White or Brown 31mm / kV

2.3 Procurement Plan of Spare Parts and Maintenance Tools

Capability of sustainable operation and maintenance for the Equipment of the Project by the Recipient is one of conditions for the Japan's Grant Aid. The Palau side shall keep operation and maintenance for the Equipment of the Project properly by himself, including procurement of Spare Parts. On the other hand, the warranty period for the Project is 1 year after the completion certificate in case of the Japan's Grant Aid. To secure operation and maintenance for the Equipment of the Project for the warranty period, the Spare Parts required for the period shall be provided as the scope of the Japanese.

Spare Parts, Consumables and Maintenance Tools are recommended to be procured. More detailed and the quantity will be explained in the Draft Final Report.

2.4 On-the-Job Training (OJT)

On-the-job training (OJT) shall be carried out during the construction period. Through the OJT, maintenance and operation staff of the Palau side will be able to experience practical and advanced skill from Manufacturer's engineers. Contents of OJT are suggested as follows;

- Operation and maintenance on 34.5/13.8kV substation equipment
- Protection relay setting
- Fault analysis and operation record management

2.5 Power flow analysis

(1) Power demand forecast

Power demand forecast was developed following the result of the First Field survey with the Palau Public Utilities Corporation (PPUC) and a master plan study titled "The Project for Upgrading and Maintenance of National Power Grid in the Republic of Palau" (May 2019 by JICA, hereinafter referred to "JICA MP 2019").

Figure 2.5-1 shows the comparison of the updated peak demand forecast of the Project with the actual peak demand, the estimate of the "JICA MP 2019" and the estimate of the "Palau Energy Roadmap 2017" by IRENA.

As illustrated in Figure 2.5-1, the actual peak demand in 2020 and 2021 were somewhat lower than the forecasted peak demand of JICA MP 2019, a decline which might be attributed to the Covid-19 crisis. Hence, the updated demand forecast is reviewed based on the result of the comparison of the peak demand of JICA MP 2019 and the actual peak demand in 2019. As the result, it is found that the energy gap between the peak demand of JICA MP 2019 and the actual peak demand in 2019 is 1.5%.

Also, the additional demand (1.5MW) in Airai is due to the large-scale moving of people from Koror to Airai (0.5MW) and the opening of a big supermarket (1MW) which is expected by the end of 2021.

Given these conditions, the updated peak demand forecast of the Project is shown in Figure 2.5-1 (Refer to line in purple) and Table 2.5-1, respectively.

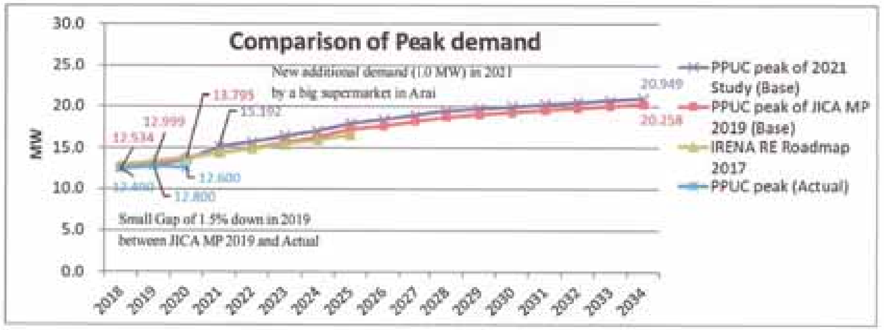


Figure 2.5-1 Comparison to actual data and existing power demand forecast

Table 2.5-1 Power demand forecast per state in KB grid

Unit: MW

State	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Aimeliik	0.474 4%	0.484 4%	0.497 3%	0.506 3%	0.516 3%	0.525 3%	0.531 3%	0.541 3%	0.550 3%	0.559 3%	0.561 3%	0.564 3%	0.567 3%	0.569 3%	0.572 3%	0.575 3%
Airai	2.714 21.4%	2.864 21.1%	4.524 29.8%	4.660 29.6%	4.800 29.2%	4.943 29.0%	5.100 28.4%	5.188 28.2%	5.285 27.9%	5.377 27.7%	5.436 27.6%	5.496 27.5%	5.557 27.5%	5.618 27.4%	5.681 27.4%	5.740 27.4%
Koror	8.641 67.5%	9.232 68.1%	9.137 60.2%	9.320 60.0%	9.891 60.1%	10.254 60.2%	10.721 59.7%	10.972 59.6%	11.229 59.5%	11.492 59.1%	11.638 59.0%	11.786 59.0%	11.935 59.0%	12.086 59.0%	12.240 59.1%	12.399 59.2%
Melekeok	0.465 3.6%	0.480 3.5%	0.495 3.3%	0.507 3.2%	0.658 4.0%	0.701 4.1%	0.780 4.3%	0.828 4.5%	0.913 4.8%	1.013 5.2%	1.038 5.3%	1.062 5.3%	1.075 5.3%	1.086 5.3%	1.098 5.3%	1.111 5.3%
Ngaraard	0.095 0.7%	0.098 0.7%	0.102 0.7%	0.104 0.7%	0.141 0.9%	0.155 0.9%	0.351 2.0%	0.367 2.0%	0.420 2.2%	0.438 2.3%	0.488 2.5%	0.502 2.5%	0.504 2.5%	0.505 2.5%	0.507 2.4%	0.509 2.4%
Ngardmau	0.039 0.3%	0.040 0.3%	0.042 0.3%	0.043 0.3%	0.044 0.3%	0.045 0.3%	0.046 0.3%	0.047 0.3%	0.048 0.3%	0.049 0.3%	0.049 0.2%	0.050 0.3%	0.051 0.3%	0.051 0.2%	0.052 0.3%	0.052 0.2%
Ngaremlengui	0.106 0.8%	0.109 0.8%	0.112 0.7%	0.114 0.7%	0.117 0.7%	0.119 0.7%	0.122 0.7%	0.124 0.7%	0.126 0.7%	0.129 0.7%	0.130 0.7%	0.131 0.7%	0.132 0.7%	0.133 0.6%	0.134 0.6%	0.135 0.6%
Ngatpang	0.064 0.5%	0.066 0.5%	0.068 0.4%	0.069 0.4%	0.071 0.4%	0.072 0.4%	0.073 0.4%	0.075 0.4%	0.076 0.4%	0.077 0.4%	0.078 0.4%	0.079 0.4%	0.079 0.4%	0.080 0.4%	0.080 0.4%	0.081 0.4%
Ngchesar	0.048 0.4%	0.049 0.4%	0.051 0.3%	0.052 0.3%	0.053 0.3%	0.054 0.3%	0.055 0.3%	0.056 0.3%	0.057 0.3%	0.058 0.3%	0.059 0.3%	0.060 0.3%	0.060 0.3%	0.061 0.3%	0.062 0.3%	0.063 0.3%
Ngerchelong	0.083 0.6%	0.086 0.6%	0.088 0.6%	0.090 0.6%	0.102 0.6%	0.115 0.7%	0.129 0.7%	0.143 0.8%	0.157 0.8%	0.170 0.9%	0.183 0.9%	0.195 1.0%	0.208 1.0%	0.221 1.1%	0.221 1.1%	0.222 1.1%
Ngiwal	0.052 0.4%	0.053 0.4%	0.055 0.4%	0.056 0.4%	0.057 0.3%	0.059 0.3%	0.060 0.3%	0.061 0.3%	0.062 0.3%	0.063 0.3%	0.064 0.3%	0.064 0.3%	0.065 0.3%	0.065 0.3%	0.066 0.3%	0.067 0.3%
Koror+Babeldaob	12.800 100%	13.585 100%	15.192 100%	15.722 100%	16.452 100%	17.061 100%	17.971 100%	18.404 100%	18.924 100%	19.429 100%	19.723 100%	19.989 100%	20.220 100%	20.475 100%	20.711 100%	20.949 100%

Based on Table 2.5-1 and the following conditicns, load allocation to each substation is estimated by the Team as shown in Table 2.5-2.

- Koror substation will be constructed in 2024.
- Ngchesar substation will be constructed in 2034.
- Airai substation will continue to be operated.

(2) Power system analysis

The necessity of a Koror substation and the transmission line between Malakal - Koror - Kokusai substations shall be evaluated by power system analysis.

This project aims to enhance reliability and stability of power supply to the KB grid, and accelerate the integration of renewable energy. Therefore, power system analysis shall be performed within the range shown in Attachement-2.

The following analyses will be conducted as the power system analysis in the Project.

- Power flow analysis
  - Commissioning year (2024)
  - Target year for project evaluation: 3 years after commissioning (2027)
  - Target year for facility plan: 10 years after commissioning (2034)
- Fault current calculation
- Stability analysis
  - Three-phase short circuit fault at a transmission line (Aimeliik Power Station - Aimeliik2 substation).

2.6 Environmental and Social Consideration

The procedures of Environmental Impact Assessment (EIA) is described in 2.3.1 Environmental Impact Assessment.

The Team subcontracted a local consultant (the Consultant) for preparation of ARAP and PPUC is requested to work in collaboration with the Consultant.

2.6.1 Environmental Impact Assessment

Flow of Environmental Assessment (EA) and Environmental Impact Statement (EIS) in Chapter 2401-61 EA & EIS Regulations in Environmental Quality Protection Act is shown in Figure 2.6.1-1.

The Team and PPUC discussed with Environmental Quality Protection Board (EQPB), and confirmed that the Project is not needed EA/EIS, as shown in Figure 2.6.1-1.

Table 2.5-2 Power demand forecast per substation in KB grid

Unit MW

Substation	34.5/13.8 kV Transformer (PF 0.90)	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Koror Substation	**10 MVA (9.0 MW)**						**5.128** 57.0%	**5.504** 61.2%	**5.714** 63.5%	**5.920** 65.9%	**6.151** 68.3%	**6.274** 69.7%	**6.398** 71.1%	**6.523** 72.5%	**6.651** 73.9%	**6.780** 75.3%	**6.909** 76.8%
Arasi Substation	10 MVA (9.0 MW)	5.828 64.8%	6.178 68.6%	7.803 86.7%	8.069 89.7%	8.342 92.7%	4.943 54.9%	5.100 56.7%	5.188 57.6%	5.285 58.7%	5.377 59.7%	5.436 60.4%	5.496 61.1%	5.557 61.7%	5.618 62.4%	5.681 63.1%	5.740 63.8%
Koror Substation + Arasi Substation		*5.828 32%*	*6.178 34%*	*7.803 43%*	*8.069 45%*	*8.342 46%*	*10.071 56%*	*10.604 59%*	*10.902 61%*	*11.215 63%*	*11.528 64%*	*11.710 65%*	*11.894 66%*	*12.080 67%*	*12.269 68%*	*12.461 69%*	*12.650 70%*
Kokusai Substation (Koburai)	5 MVA (4.5 MW)	0.627 13.94%	0.646 14.35%	0.667 14.83%	0.682 15.16%	0.837 18.59%	0.884 19.64%	0.966 21.46%	1.018 22.62%	1.103 24.50%	1.212 26.93%	1.256 27.47%	1.262 28.04%	1.275 28.32%	1.289 28.65%	1.303 28.96%	1.078 1.78%
Ngcheras Substation (Melekeok+Nacheras+Ngaraol)	5 MVA (4.5 MW)																1.241 27.6%
Malakal Substation (Meyuns, Malakal)	10 MVA (9.0 MW)	5.071 56%	5.432 60%	5.376 60%	5.589 62%	5.808 65%	4.583 51%	4.630 51%	4.656 52%	4.683 52%	4.711 52%	4.726 53%	4.742 53%	4.758 53%	4.774 53%	4.790 53%	4.806 53%
Aimeliik 2 Substation	0.75×3 MVA (2.0 MW)	0.309 15.4%	0.316 15.8%	0.324 16.2%	0.330 16.5%	0.337 16.8%	0.342 17.1%	0.349 17.4%	0.354 17.7%	0.359 18.0%	0.365 18.2%	0.366 18.3%	0.368 18.4%	0.370 18.5%	0.371 18.6%	0.373 18.7%	0.373 18.8%
Medorm (Aimeliik 1) Substation	1.5 MVA (1.35 MW)	0.126 9.3%	0.128 9.5%	0.132 9.8%	0.134 9.9%	0.137 10.1%	0.139 10.3%	0.142 10.5%	0.144 10.7%	0.146 10.8%	0.148 11.0%	0.149 11.0%	0.150 11.1%	0.150 11.1%	0.151 11.2%	0.152 11.2%	0.153 11.3%
Ngiken Substation	0.75×3 MVA (2.0 MW)	0.039 2.0%	0.040 2.0%	0.041 2.0%	0.042 2.1%	0.043 2.1%	0.043 2.2%	0.044 2.2%	0.045 2.2%	0.045 2.3%	0.046 2.3%	0.046 2.3%	0.047 2.3%	0.047 2.3%	0.047 2.3%	0.047 2.4%	0.047 2.4%
Bedung Substation	0.25×3 MVA (0.675 MW)	0.002 0.02%	0.002 0.02%	0.002 0.03%	0.002 0.03%	0.002 0.03%	0.002 0.03%	0.002 0.03%	0.002 0.03%	0.002 0.03%	0.003 0.03%	0.003 0.03%	0.003 0.03%	0.003 0.03%	0.003 0.03%	0.003 0.03%	0.003 0.03%
Ngermedengei (Asahi) Substation	0.30 MVA (0.27 MW)	0.106 39.4%	0.109 40.3%	0.112 41.6%	0.114 42.3%	0.117 43.4%	0.119 44.1%	0.122 45.2%	0.124 46.0%	0.126 46.7%	0.128 47.4%	0.130 48.1%	0.131 48.5%	0.132 48.8%	0.133 49.2%	0.134 49.6%	0.135 50.0%
Ngardmau Substation	0.75×3 MVA (2.0 MW)	0.039 2.0%	0.040 2.0%	0.042 2.1%	0.043 2.2%	0.044 2.2%	0.045 2.3%	0.046 2.3%	0.047 2.4%	0.048 2.4%	0.049 2.5%	0.049 2.5%	0.050 2.5%	0.051 2.6%	0.051 2.6%	0.052 2.6%	0.052 2.6%
Ngaraard 1 Substation	0.25×3 MVA (0.675 MW)	0.026 3.8%	0.027 4.0%	0.028 4.1%	0.028 4.2%	0.038 5.7%	0.042 6.2%	0.096 14.2%	0.100 14.8%	0.113 17.0%	0.120 17.7%	0.133 19.7%	0.137 20.3%	0.137 20.3%	0.138 20.4%	0.138 20.5%	0.139 20.6%
Ngaraard 2 Substation	2 MVA (1.8 MW)	0.151 8.4%	0.157 8.7%	0.162 9.0%	0.166 9.2%	0.205 11.4%	0.228 12.6%	0.384 21.3%	0.410 22.8%	0.462 25.7%	0.489 27.2%	0.538 29.9%	0.560 31.1%	0.574 31.9%	0.588 32.7%	0.589 32.7%	0.592 32.9%
Hotel (Palasia Hotel)	1 MVA (0.9 MW)	0.118 6.6%	0.127 7.0%	0.125 7.0%	0.130 7.2%	0.136 7.5%	0.141 7.8%	0.147 8.2%	0.150 8.3%	0.154 8.5%	0.157 8.7%	0.159 8.9%	0.161 9.0%	0.163 9.1%	0.166 9.2%	0.168 9.3%	0.170 9.4%
Hotel (Royal Resort)	3 MVA (2.7 MW)	0.353 13.7%	0.380 14.7%	0.376 20.9%	0.391 21.7%	0.407 22.6%	0.422 23.5%	0.441 24.5%	0.451 25.0%	0.461 25.6%	0.472 26.2%	0.478 26.6%	0.484 26.9%	0.490 27.2%	0.497 27.6%	0.503 27.9%	1.509 28.3%
KB grid	52.05 MVA (46.85 MW)	12.800 27%	13.583 29%	15.192 32%	15.722 34%	16.452 35%	17.061 36%	17.971 39%	18.404 39%	18.924 40%	19.429 41%	19.725 42%	19.989 43%	20.230 43%	20.475 44%	20.713 44%	20.948 45%

Note: % means load factor of transformers in each substation

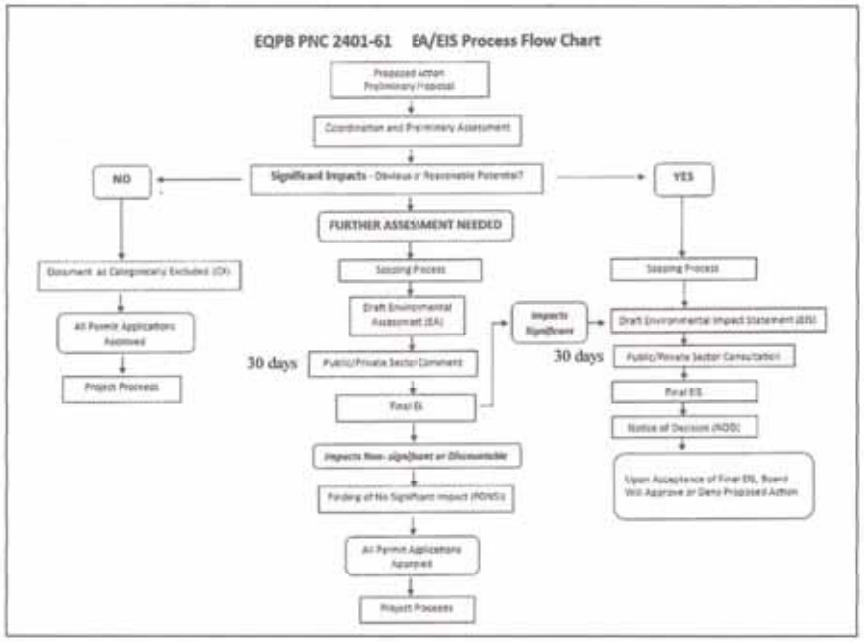


Figure 2.6.1-1 Flow of EA and EIS

A5-14

Republic Of Palau

Environmental Quality Protection Board

September 02, 2021 Doc# 21-1556

Anthony Rudimch
PMU Project Manager
Palau Public Utilities Corporation
PO Box 1372
Koror, Palau 96940

Subject: Notice of Course of Review: Palau Grid Upgrade Project

Dear Mr. Rudimch:

EQPB has received and reviewed preliminary project materials for the Palau Grid Upgrade that will involve expansion of the Malakal Power Plant and Koksai Substation, construction of a new substation in Koror (Ngerbechedsau or Shalbam's property or Mason's Rock area), and installation of new transmission lines along the Babeldaob Compact Road.

Based on our review, and in accordance with Section 2401-61-05 of the Environmental Assessment and Environmental Impact Statement Regulations, EQPB has determined that the course of review for this project is Categorical Exclusion (CX).

A CX determination means that EQPB has determined that an Environmental Assessment (EA) or Environmental Impact Statement are not needed to address actual or potential environmental concerns for this project. Please proceed with permit application for this project accordingly.

If you have any questions regarding this letter or wish to discuss these matters further, please call our office at 488-1639/3600.

Regards

Michael Blesam
Acting Chief Executive Officer, EQPB

Figure 2.6.1-2 The letter that EA/EIS is not necessary for the Project by EQPB

2.6.2 Other procedures

There are procedures as follows:

- Earthmoving permit
  The Team and PPUC consulted with EQPB, and concluded that earthmoving permit is required.
- Toilet Facilities and Wastewater Disposal System Permit
  Portable Toilet is utilized for the construction works for the Project, and the wastewater is disposed in wastewater treatment plant in Malakal, so the permit is not required.

2.6.3 Abbreviated Resettlement Action Plan

The Team conducted the site visit with PPUC, and confirmed that the Project would require land acquisition.

There are no laws or regulations on land acquisition, so PPUC should implement land acquisition, with discussing with land owners, through Ministry of Public Infrastructure and Industries MPII.

The land owner of Koror substation is Koror sate, so PPUC should conclude lease agreement with Koror state. Currently, the land is used as quarry site by Surangel, so PPUC should consult the land lease with Surangel.

The land owners of existing Malakal substation and Kokusai substation and Airai substation are Koror state, Ngatpang state and Airai state respectively, so PPUC should conclude the land lease agreement with Koror state, Ngatpang state, and Airai state.

The lands for New Power Poles for 34.5kV transmission are mostly owned by MPII, but private lands are partially included.

PPUC should consult with private land owners through MPII, and conclude the land lease owners with private land owners.

Based on the JICA Guideline (2010), PPUC is required to prepare an abbreviated resettlement action plan (ARAP).

The team subcontracted the preparation of ARAP to KJP Consulting on 14th September, 2021.

The subcontract requires to complete the preparation of ARAP by 15th December, 2021.

Table 2.6.3-1 Land Acquisition

Land acquisition	Method
New Koror substation	Land owner is Koror State, and now Surangel is leasing the land. PPUC should conclude lease agreement with Koror State, also consulting with Surangel.
Existing Malakal substation	Land owner is Koror State. PPUC should conclude lease agreement with Koror State.
Existing Kokusai substation	Land owner is Ngatpang State. PPUC should conclude lease agreement with Ngatpang State.
Existing Airai substation (option)	Land owner is Airai State. PPUC should conclude lease agreement with Airai State.
New Power Poles for 34.5kV transmission lines between Malakal substation to Kokusai substation	New Power Poles are installed along the roads, and the locations are partly included private lands. Therefore, PPUC should conclude lease agreement with each land owner, through Ministry of Public Infrastructure and Industries (MPII).

Malakal site

Power Poles along the roads

Kokusai site

Koror site

Airai site (option)

2.6.4 Stakeholder meeting

On 23rd September 2021, Stakeholders meeting was held. The summary is shown in Attachment-3.

PPUC should hold Stakeholder meeting continuously.

3. Obligations/Undertakings of the Palau side for the Project

3.1 Preconditions

In addition to the "Annex5 Major Undertakings to be taken by the Government of Palau" stipulated in the minutes of discussions signed on 2nd September, 2021 between Palau side (MPII, PPUC) and the Team, the Palau side has agreed to conduct the undertakings in terms of technical aspect as indicated in Attachment-4.

3.2 Necessary Inputs by the Palau side

Work Demarcation for both Japan and Palau sides is as shown in Attachment-4.

4. Tentative Implementation Schedule of the Project

The tentative implementation schedule is shown in Attachment-5. In case that the Project is approved by the Japanese Government, the Project will proceed as below in the earliest scenario. The installation work of the Project will start in July, 2023. It is important for both sides to understand that the Preparatory Survey is not a commitment for the future implementation of the Project.

- The Exchange of Notes between the Palau and Japanese Government shall be signed in June, 2022.
- Bid Opening will be held in December 2022.
- Installation work of the Project will start in July, 2023.
- Commissioning of the Project will be in June, 2024.

5. Drawings

Part 1	General
Part 2	Substation
Part 3	Transmission and distribution lines
Part 4	Architectural

A5-16

Attachment

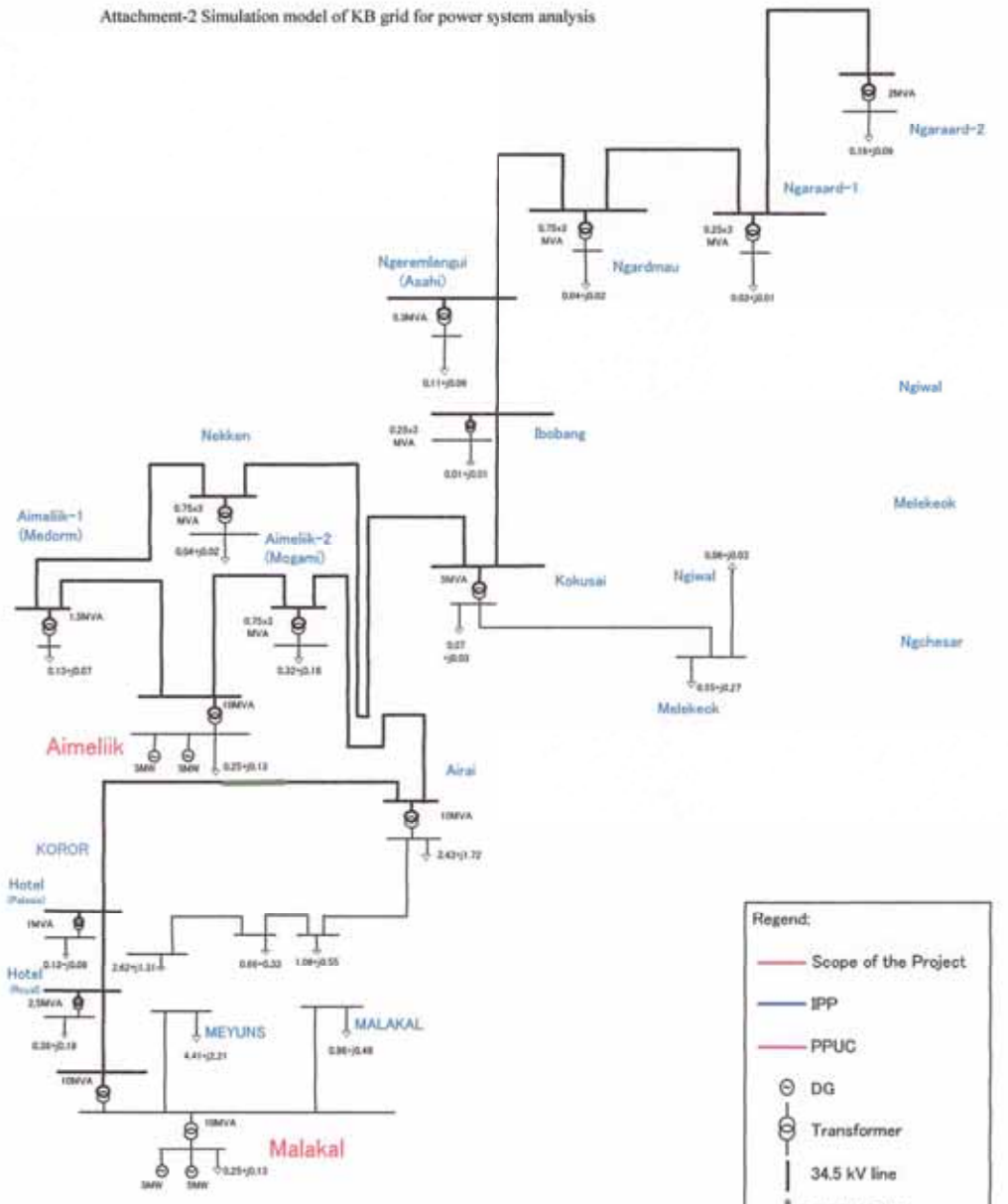
A5-17

Attachment-1 Member List of the Study Team

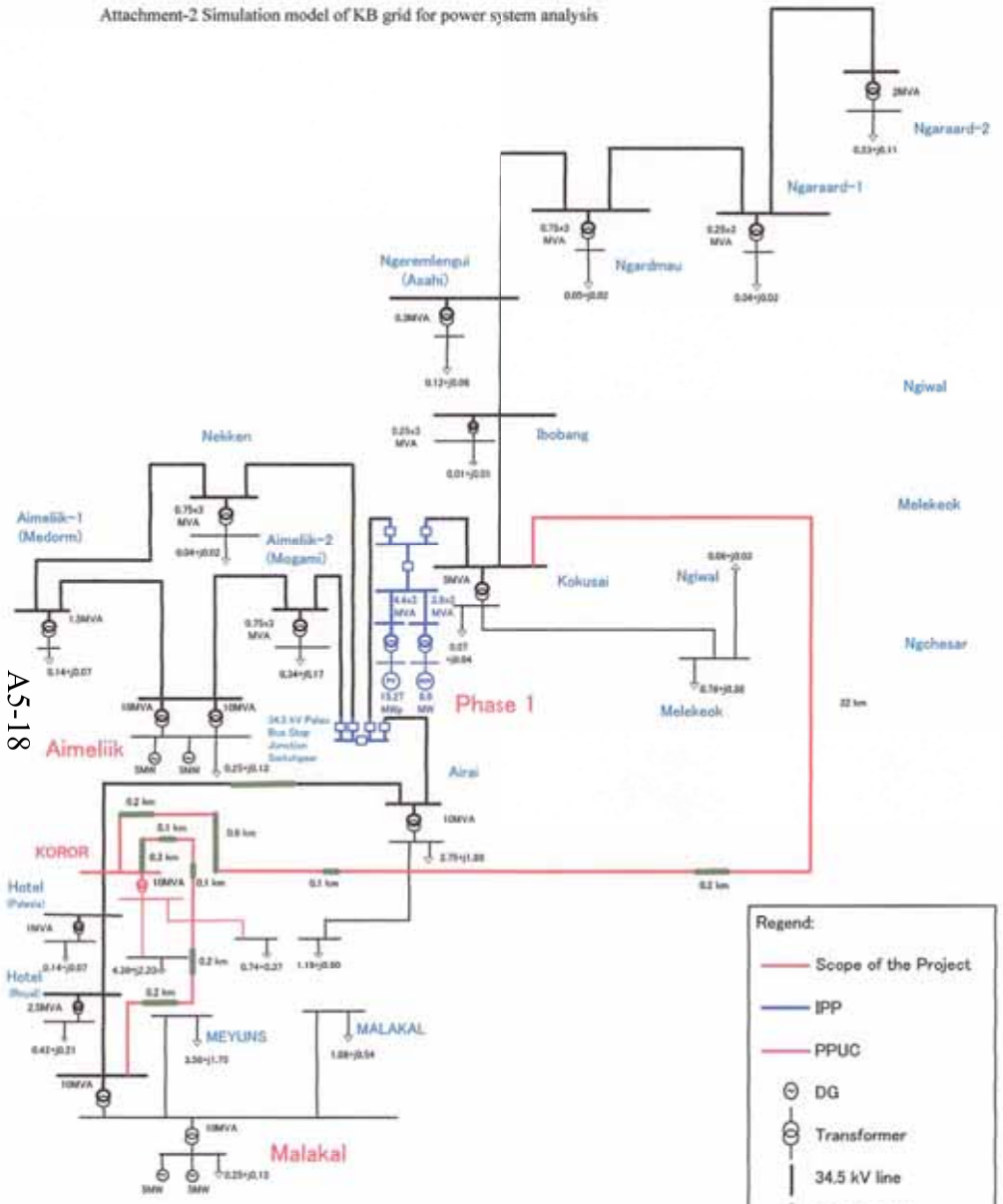
First Field Survey

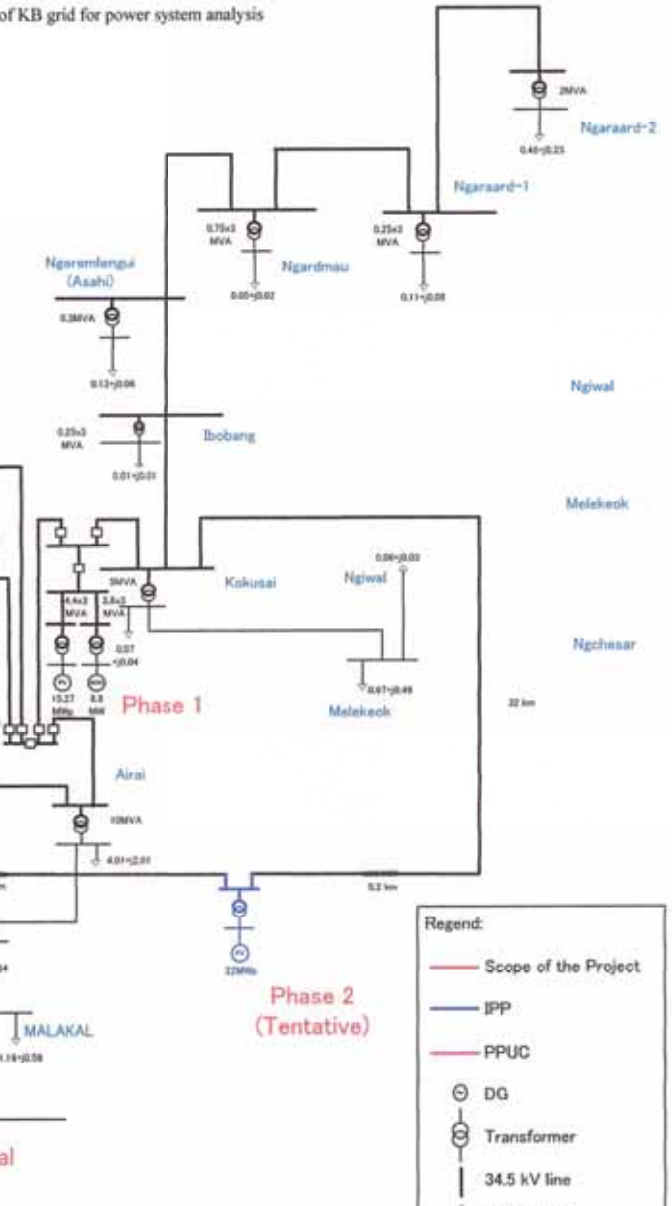
Name	Assignment	Organization
Susumu YUZURUO	Team Leader	Japan International Corporation Agency
Yoshio NAKAGAWA	Deputy Team Leader	Japan International Corporation Agency
Makoto ABE	Chief Consultant/ Transmission and Substation Planning	Yachiyo Engineering Co., Ltd.
Hiroki KAJINO	Substation Facilities	Yachiyo Engineering Co., Ltd.
Kazuhiko KOEDA	Transmission Facilities	Yachiyo Engineering Co., Ltd.
Kyohei KUROHANE	Power System Analysis	Yachiyo Engineering Co., Ltd.
Masataka SATO	Procurement / Cost Estimation	Yachiyo Engineering Co., Ltd.
Hisayuki YAMAMOTO	Facility Planning / Natural Condtion	Yachiyo Engineering Co., Ltd.
Ichiro MASUDA	Construction / Cost Estimation	Yachiyo Engineering Co., Ltd.
Kazuhiro ISHIURA	Environmental and Social Considerations	Yachiyo Engineering Co., Ltd.
Yasuo IIJIMA	Soil Investigation	Yachiyo Engineering Co., Ltd.

Attachment-2 Simulation model of KB grid for power system analysis



KB grid in 2021





Regend:

- Scope of the Project
- IPP
- PPUC
- DG
- Transformer
- 34.5 kV line
- 34.5 kV Cable
- 13.8 kV line
- Load (P+jQ[MW])
- Circuit Breaker (CB)

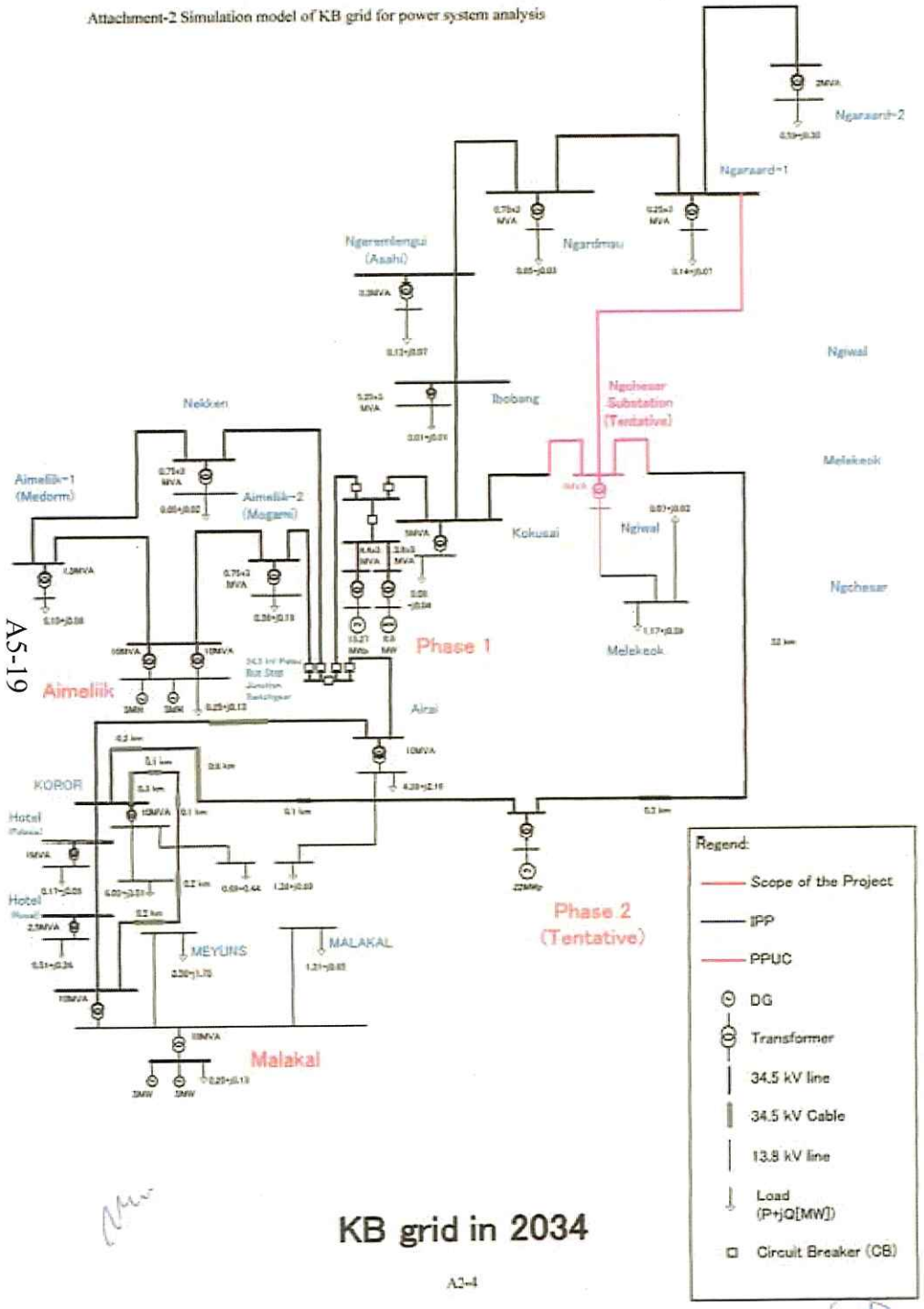
KB grid in 2024

A2-2

KB grid in 2027

A2-3

Attachment-2 Simulation model of KB grid for power system analysis



KB grid in 2034

A2-4

A5-19

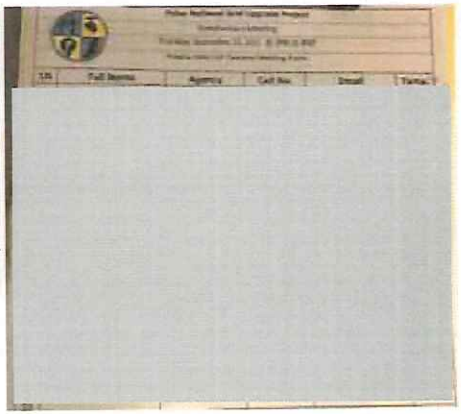
Attachmen-3 Summary of Stakeholder Meeting

Stakeholder meeting was held at 2 pm on 23rd September 2021.
Participants are 19 persons, who consists of:
PPUC, the Team, each state government (Koror, Airai, Ngchesar, and Ngatpang), MPII, EQPB, and PEA.

Summary is as follows:

- PPUC explained the abstract of the Project.
- Each state government and organizations almost agreed and will provide the necessary support to PPUC and the Team.
- PPUC explained 3 options of transmission method at KB Bridge. 1. Cable in the bridge, 2. Overhead line, 3. Submarine cable, as described in 2.2 (1) 0.
  Koror and Airai state government asked for 3. Submarine cable to PPUC and the Team, from the view point of the landscape.
  The Team will consider this opinion, and implement the necessary examination.

Explanation of the Project by PPUC



Participant list

Notes:
ASPLA: Airai State Public Land Authority
KSPLA: Koror State Public Land Authority
NSPLA: Ngatpang State Public Land Authority
PEA: Palau Energy Authority

A3-1

Attachment–4 Major Undertakings to be covered by Japan and Palau

No.	Items	Japan side		Palau side		In charge
		Procurement	Installation	Procurement	Installation	
A. Before the Bid						
1	To sign the banking arrangement (B/A) with a bank in Japan (the Agent Bank) to open bank account for the Grant	-	-	•	•	MOF
2	To issue the authorization to pay (A/P) to the Agent Bank for the payment to the consultant	-	-	•	•	MOF
3	To bear the following commissions to the Agent Bank for the banking services based upon B/A					MOF
	1) Advising commission of A/P	-	-	•	•	
	2) Payment commission for A/P	-	-	•	•	
4	To approve EA/EIS (Conditions of approval should be fulfilled, if any) and secure the necessary budget for implementation for EMP and EMoP (and fulfilling conditions of approval, if any)	-	-	•	•	PPUC
5	To secure the necessary budget and implement land acquisition and resettlement (including preparation of resettlement sites), and compensation with full replacement cost in accordance with RAP	-	-	•	•	MOF
6	To implement social monitoring, and to submit the monitoring results to JICA, by using the monitoring form, on a quarterly basis as a part of Project Monitoring Report	-	-	•	•	PPUC
7	To secure and clear the following lands (Land acquisition and the compensation, cutting trees, and clearance of obstacles) 1) project sites - for Koror substation (approx.15,800m^2) - for Kokusai substation, Malakal substation (if any) - for 34.5kV transmission/ 13.8kV distribution line within the Right Of Way (approx. 30km) 2) temporary storage yard for the Equipment and materials	-	-	•	•	MPII/ PPUC
8	To obtain the planning, zoning, building permit from relevant authority (State Government of Koror, Airai, Ngatpang, Ngchesar and/or Others, etc., if any)	-	-	•	•	PPUC
9	To clear, level and reclaim the following sites 1) leveling and reclaiming the sites - for Koror substation (approx.15,800m^2) - for Kokusai substation, Malakal substation (if necessary)	•	•	-	-	PPUC
10	To submit Project Monitoring Report (with the result of Detailed Design)	-	-	•	•	PPUC
11	To obtain permit for the Project implementation from relevant authority (Right Of Way of road authority, State Government of Koror, Airai, Ngappang and/or Others, etc., if any)	-	-	•	•	PPUC
12	To obtain Earthmoving Permit of EQPB	-	-	•	•	PPUC
13	To explain the Project to the residents living near the facility construction site and hold stakeholder meetings	-	-	•	•	PPUC

No.	Items	Japan side		Palau side		In charge
		Procurement	Installation	Procurement	Installation	
B. During the Project Implementation						
1	To issue A/P to the Agent Bank for the payment to the supplier and the contractor	-	-	•	•	MOF
2	To bear the following commissions to the Agent Bank for the banking services based upon the B/A					MOF
	1) Advising commission of A/P	-	-	•	•	
	2) Payment commission for A/P	-	-	•	•	
3	to ensure prompt unloading and customs clearance at ports of disembarkation in the country of the Recipient and to assist the Supplier(s) with internal transportation therein	-	-	•	•	MPII/ PPUC
4	To accord Japanese physical persons and/or physical persons of third countries whose services may be required in connection with the supply of the products and the services such facilities as may be necessary for their entry into the country of the Recipient and stay therein for the performance of their work	-	-	•	•	MPII/ PPUC
5	To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the country of the Recipient with respect to the purchase of the products and/or the services be exempted and/or be borne by its designated authority without using the Grant	-	-	•	•	MOF/ MPII
6	To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project	-	-	•	•	MPII/ PPUC
7	To notify JICA promptly of any incident or accident, which has, or is likely to have, a significant adverse effect on the environment, the affected communities, the public or workers	-	-	•	•	PPUC
8	To submit Project Monitoring Report after each work under the contract(s) such as shipping, hand over, installation and operational training	-	-	•	•	PPUC
9	To submit Project Monitoring Report (final) (including as-built drawings, equipment list, photographs, etc.)	-	-	•	•	PPUC
10	To submit a report concerning completion of the Project	-	-	•	•	PPUC
11	To construct access roads 1) Outside the project site	-	-	•	•	PPUC
12	To provide facilities for distribution of electricity, water supply and drainage and other incidental facilities necessary for the implementation of the Project outside the site(s)	-	-	•	•	PPUC
13	To provide equipment, furniture, facilities necessary for the implementation of the Project in the site(s)	-	-	•	•	PPUC
14	To ensure the safety of persons engaged in the implementation of the Project	-	-	•	•	PPUC
15	To construct fence and gate around substation	-	-	•	•	PPUC
16	To implement EMP and EMoP	-	-	•	•	PPUC
17	To submit results of environmental monitoring to JICA, by using the monitoring form, on a quarterly basis as a part of Project Monitoring Report	-	-	•	•	PPUC

No.	Items	Japan side		Palau side		
		Procurement	Installation	Procurement	Installation	In charge
18	To implement RAP (livelihood restoration program)	-	-	●	●	MPII/PPUC
19	To implement social monitoring, and to submit the monitoring results to JICA, by using the monitoring form, on a quarterly basis as a part of Project Monitoring Report - Period of the monitoring may be extended if affected persons' livelihoods are not sufficiently restored. Extension of the monitoring will be decided based on agreement between PPUC and JICA.	-	-	●	●	PPUC
20	Construction of building and civil work	●	●	-	-	
21	Procurement, installation, testing and adjustment of the Equipment and materials for the Project	●	●	-	-	
22	Procurement of the Spare parts and consumables	●	●	-	-	
23	Procurement of the Maintenance tools	●	●	-	-	
24	On-the-job training (OJT) for the Equipment	●	●	-	-	
	[Transmission Line]					
25	Survey of underground installations including water pipes, communication lines, unexploded ordnance search and removal	-	-	●	●	PPUC
26	Rearrangement work of the attached equipment of existing poles for installation of 34.5kV transmission line to be done by Japan side : 13.8kV distribution line, distribution transformer, low voltage distribution line, etc.	-	-	●	●	PPUC
27	Temporary power outage plan for 34.5kV transmission line during the work including the notice to the residents	-	-	●	●	PPUC
28	Re-connecting of existing 34.5kV line to new line, and existing 13.8kV line to new line for Koror substation and Malakal substation (With the consensus and the presence of the Personnel of PPUC)	●	●	-	-	
29	Restoration of roads after pole erection and buried cables	●	●	-	-	
	[substation]					
30	Site creation work for Koror substation	●	●	-	-	
31	Application for transportation permit of heavy goods to relevant authority with improving the existing access roads from the port of Palau to the project sites, if necessary	-	-	●	●	PPUC
32	Construction of access road within project site and parking lot for Koror substation and Malakal substation	●	●	-	-	
33	Temporary power outage plan for substation during the work including the notice to the residents	-	-	●	●	PPUC
34	Removal and disposal of existing equipment in Airai substation, Malakal substation, and Other substation, if any	-	-	●	●	PPUC

No.	Items	Japan side		Palau side		
		Procurement	Installation	Procurement	Installation	In charge
C. After the Project						
1	To implement EMP and EMoP	-	-	●	●	PPUC
2	To submit results of environmental monitoring to JICA, by using the monitoring form, semiannually - The period of environmental monitoring may be extended if any significant negative impacts on the environment are found. The extension of environmental monitoring will be decided based on the agreement between PPUC and JICA	-	-	●	●	PPUC
3	To maintain and use properly and effectively the facilities constructed and equipment provided under the Grant Aid 1) Allocation of maintenance cost 2) Operation and maintenance structure 3) Routine check/Periodic inspection	-	-	●	●	PPUC
4	Disposal of removed existing equipment	-	-	●	●	PPUC

Remarks: Alphabetical order

EA	: Environmental Assessment
EIS	: Environmental Impact Statement
EMP	: Environmental Management Plan
EMoP	: Environmental Monitoring Plan
EoJ	: Embassy of Japan
JICA	: Japan International Cooperation Agency
MOF	: Ministry of Finance
MPII	: Ministry of Public Infrastructure and Industries
PPUC	: Palau Public Utilities Corporation

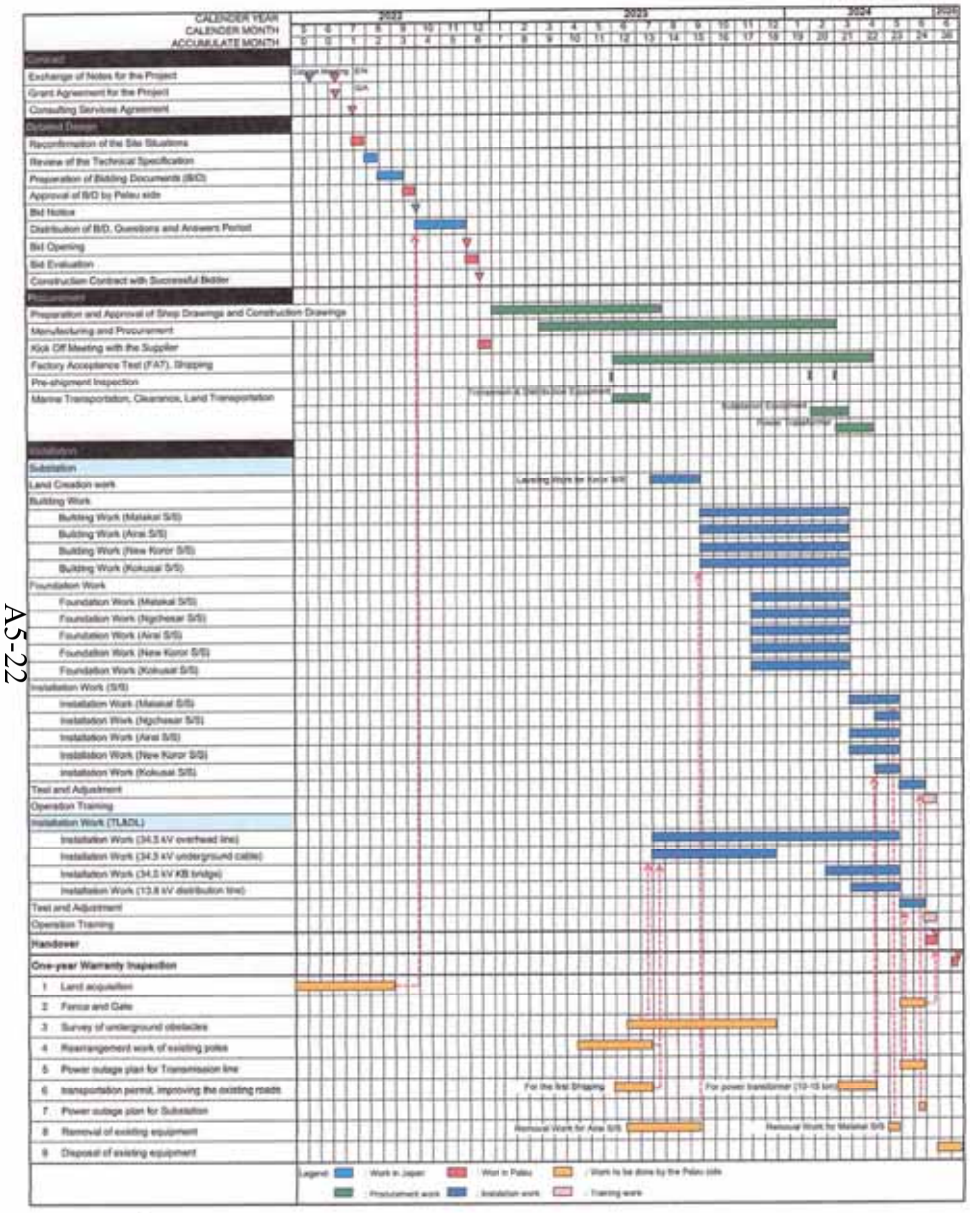
Attachment–5 Tentative implementation schedule

As of 24th September, 2021

Implementation Schedule of the Project (Tentative)

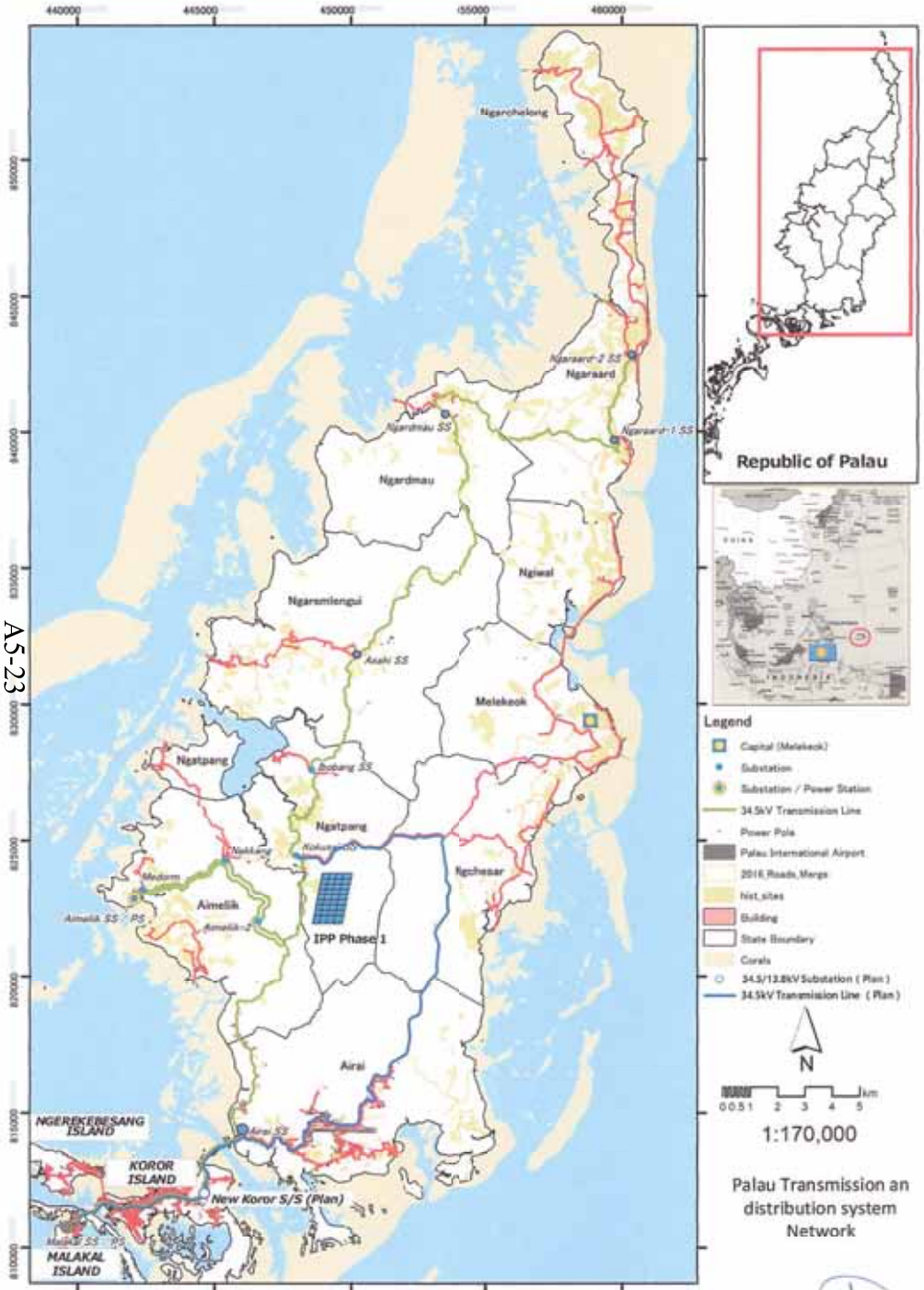
The Project for for Upgrading Power Grid in the Republic of Palau

Yachiyo Engineering Co., Ltd.



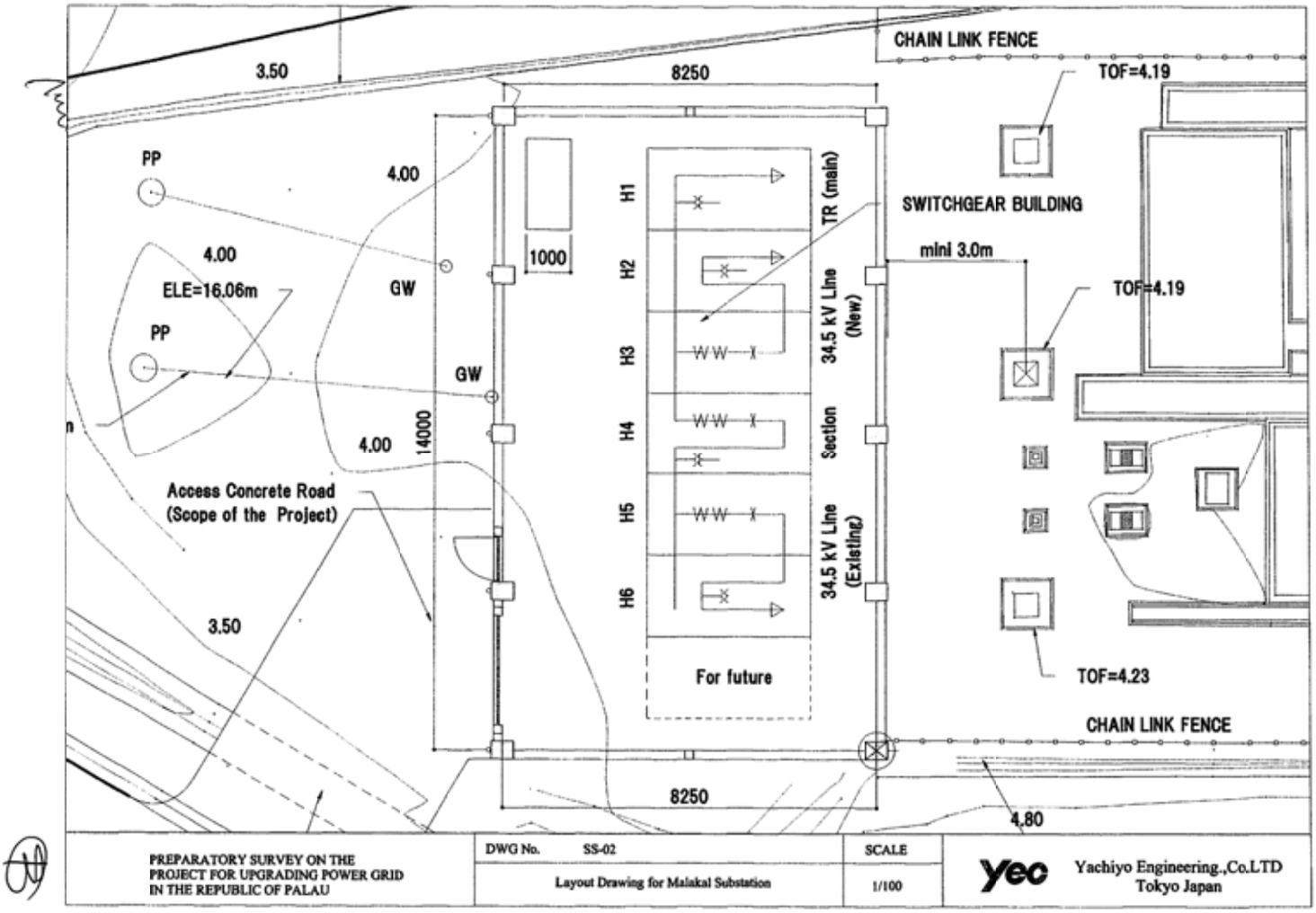
A5-22

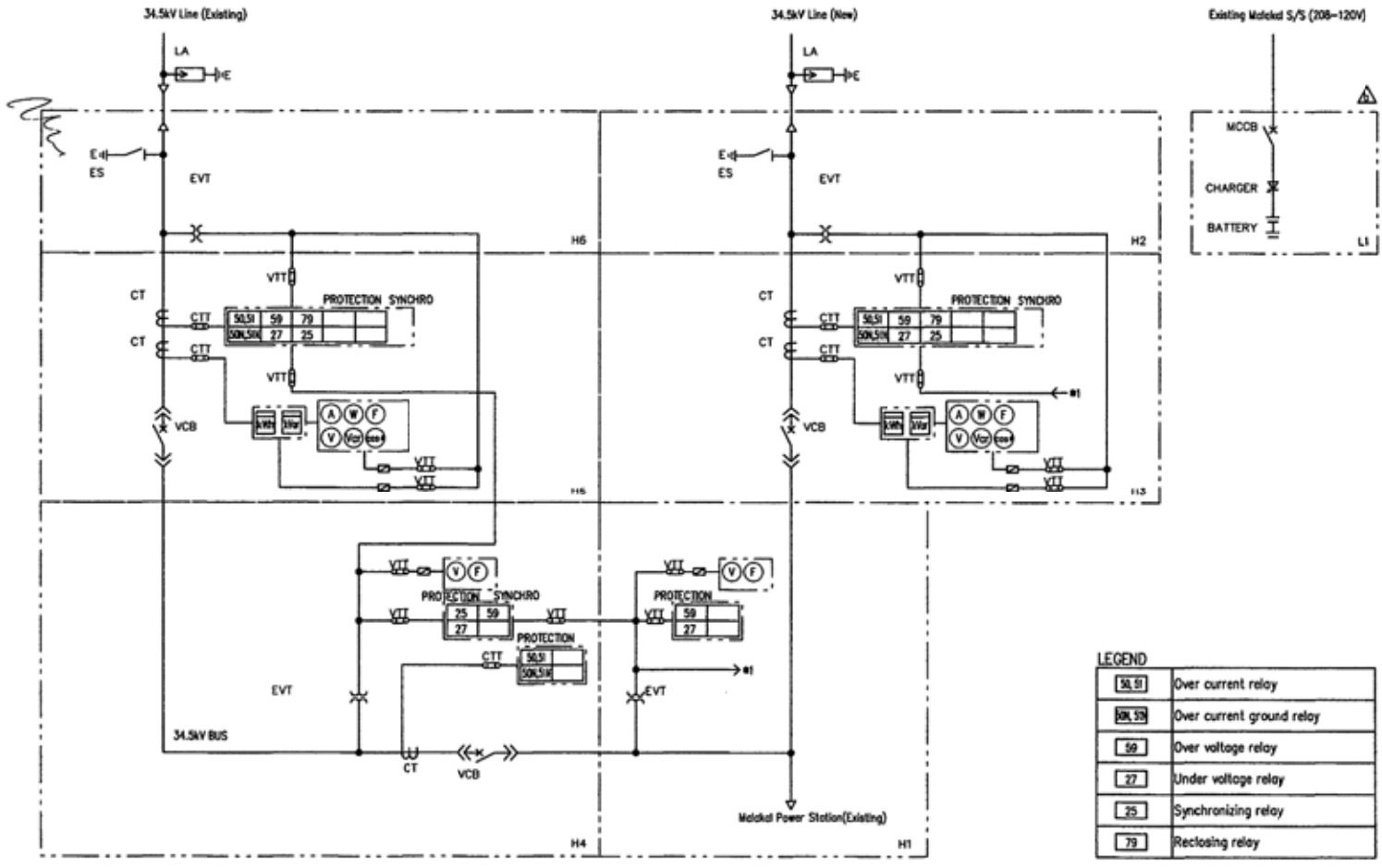
Part 1 General



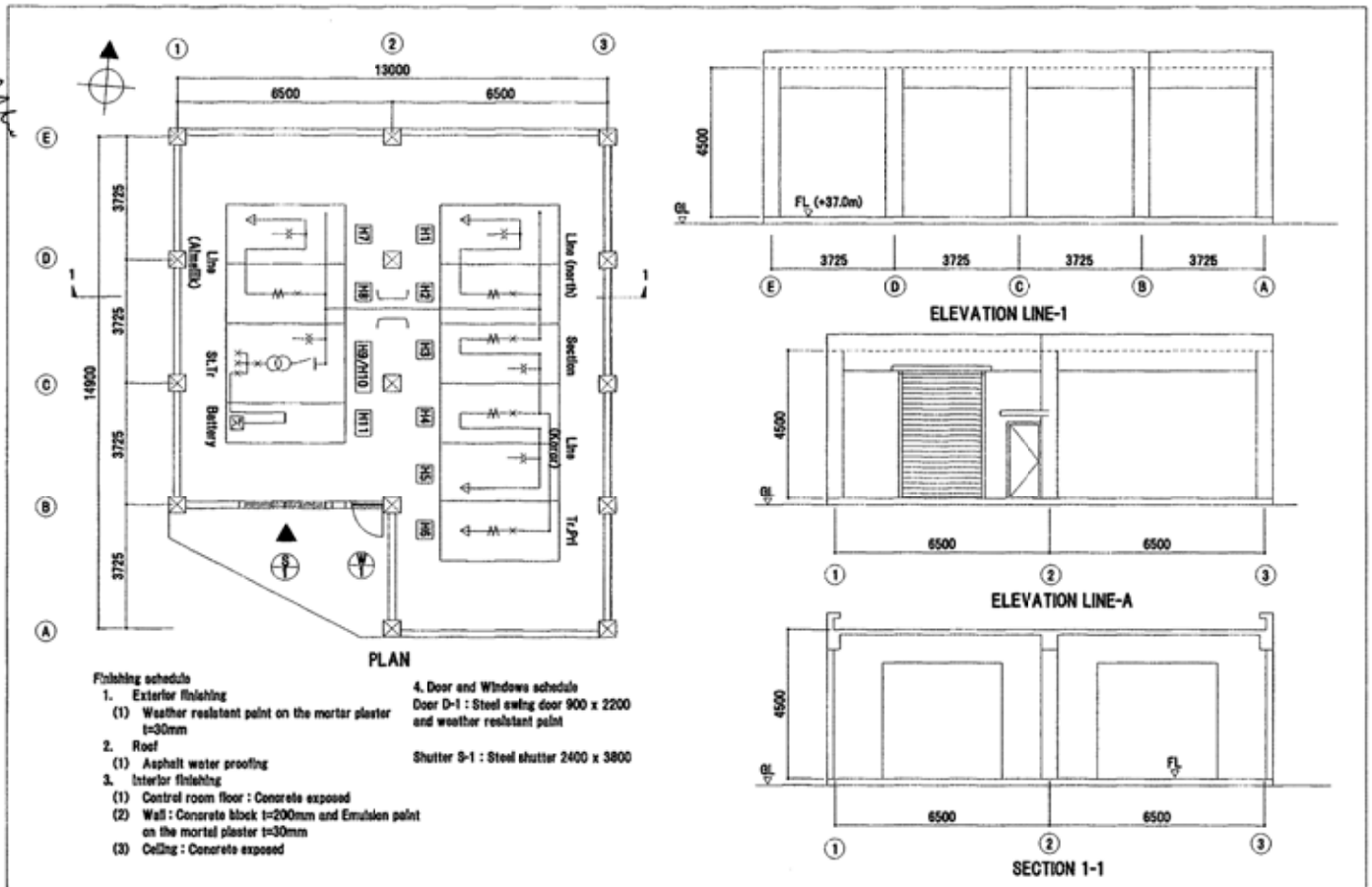
Drawing No. GA-1: Location Map of the Project Site

Part 2 Substation





SS-01 Single line Diagram for Malakal substation



Finishing schedule

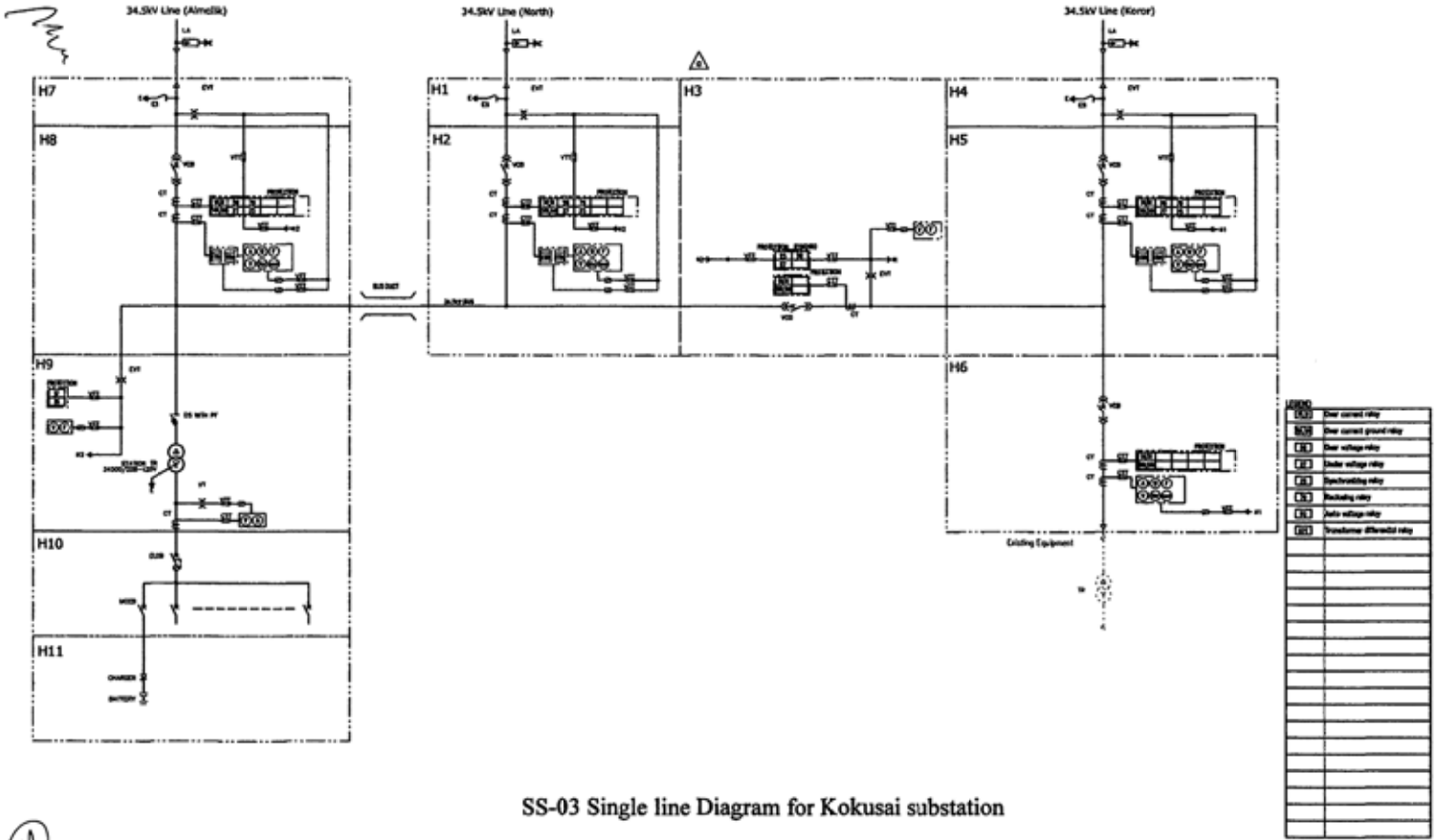
1. Exterior finishing
   (1) Weather resistant paint on the mortar plaster t=30mm
2. Roof
   (1) Asphalt water proofing
3. Interior finishing
   (1) Control room floor : Concrete exposed
   (2) Wall : Concrete block t=200mm and Emulsion paint on the mortal plaster t=30mm
   (3) Ceiling : Concrete exposed

4. Door and Windows schedule

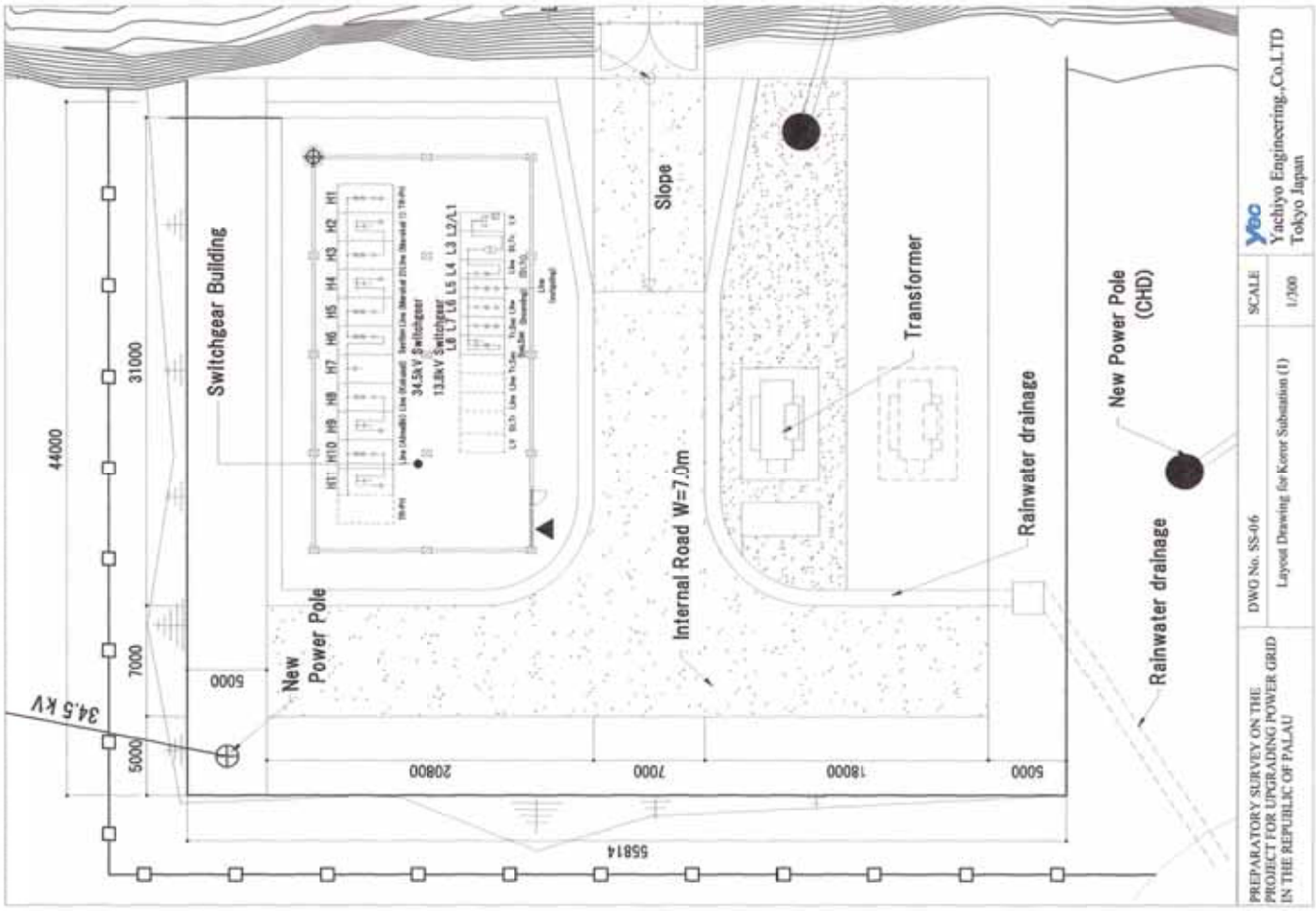
Door D-1 : Steel swing door 900 x 2200 and weather resistant paint

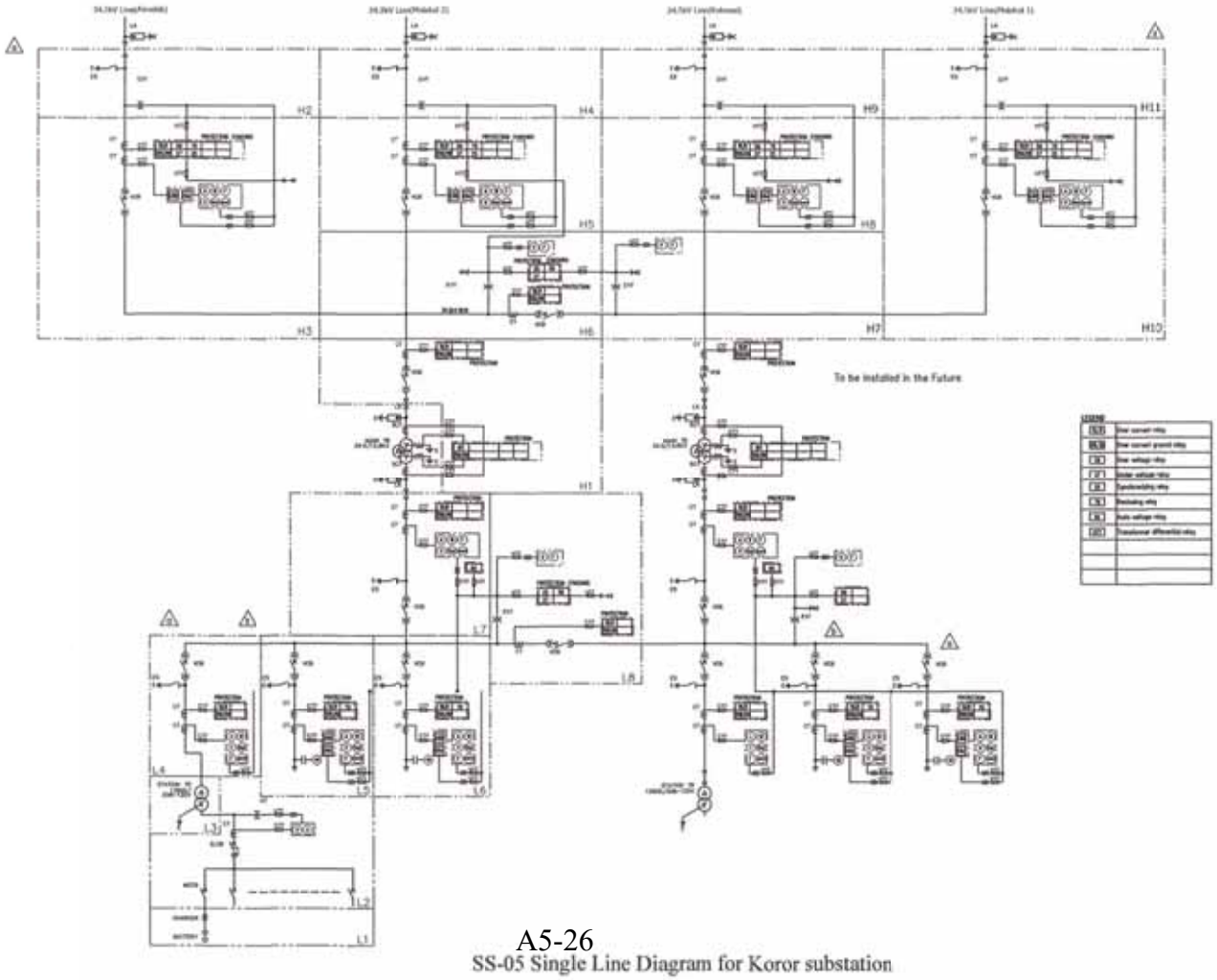
Shutter S-1 : Steel shutter 2400 x 3800

PREPARATORY SURVEY ON THE PROJECT FOR UPGRADING POWER GRID IN THE REPUBLIC OF PALAU	DWG No. SS-04	SCALE	Yachiyo Engineering.,Co.LTD Tokyo Japan
	Layout drawing for Kokusai Substation	1/150	

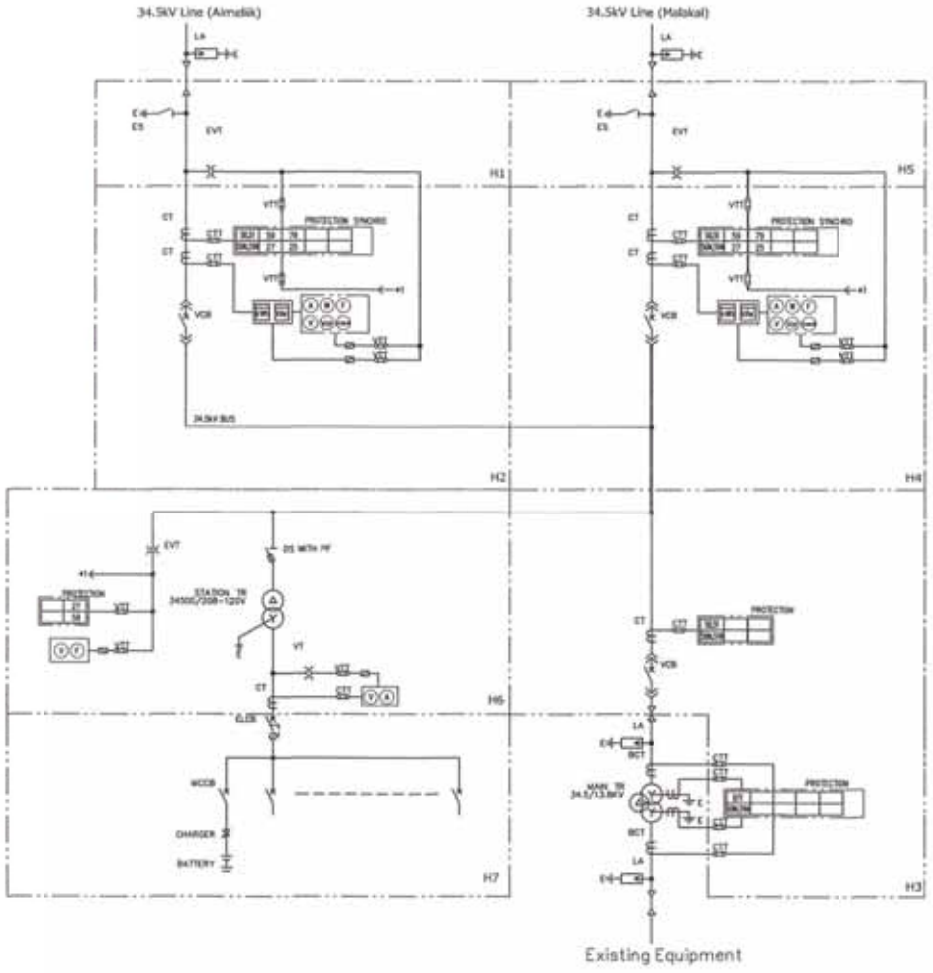


SS-03 Single line Diagram for Kokusai substation

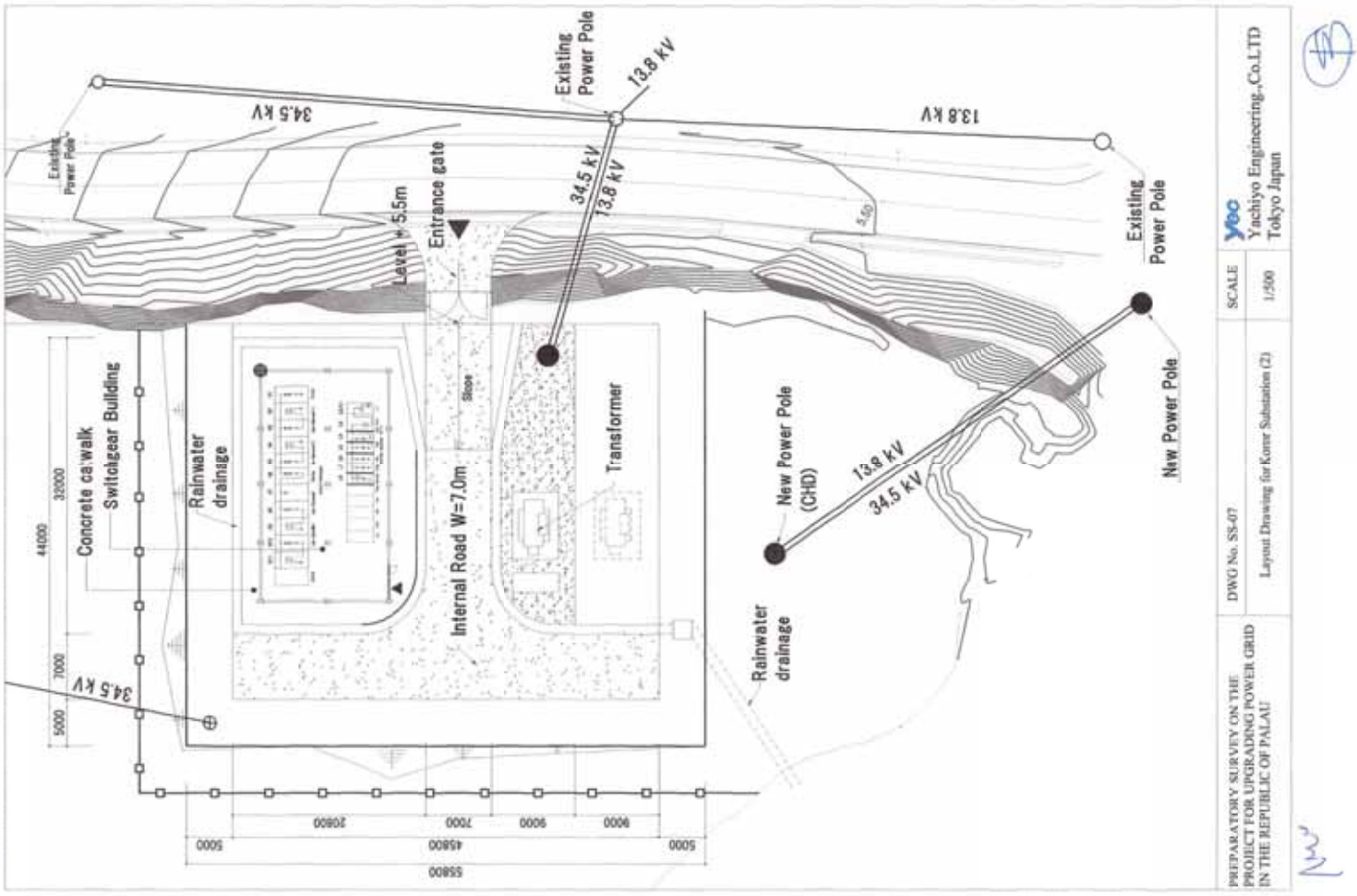




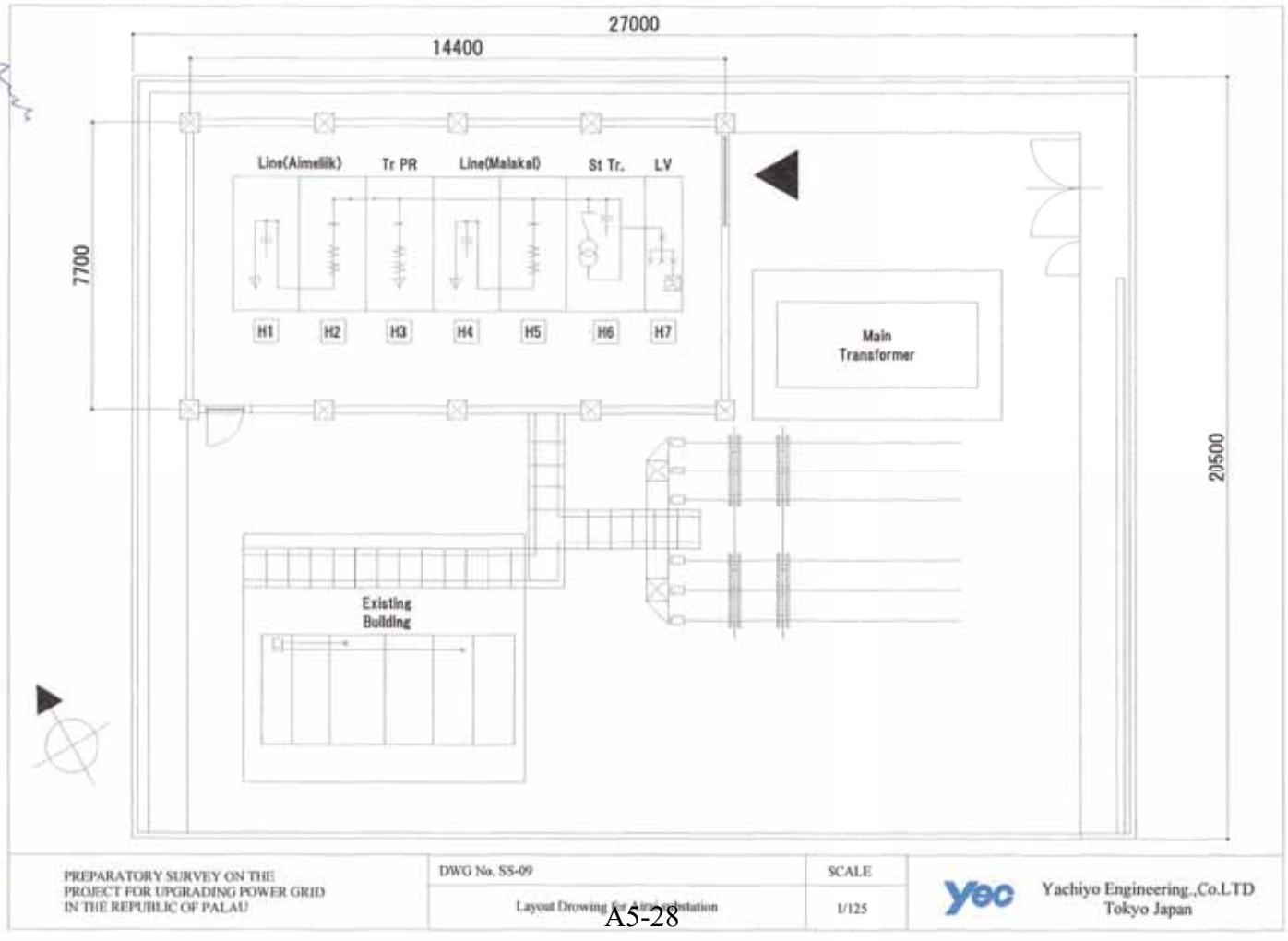
SS-05 Single Line Diagram for Koror substation

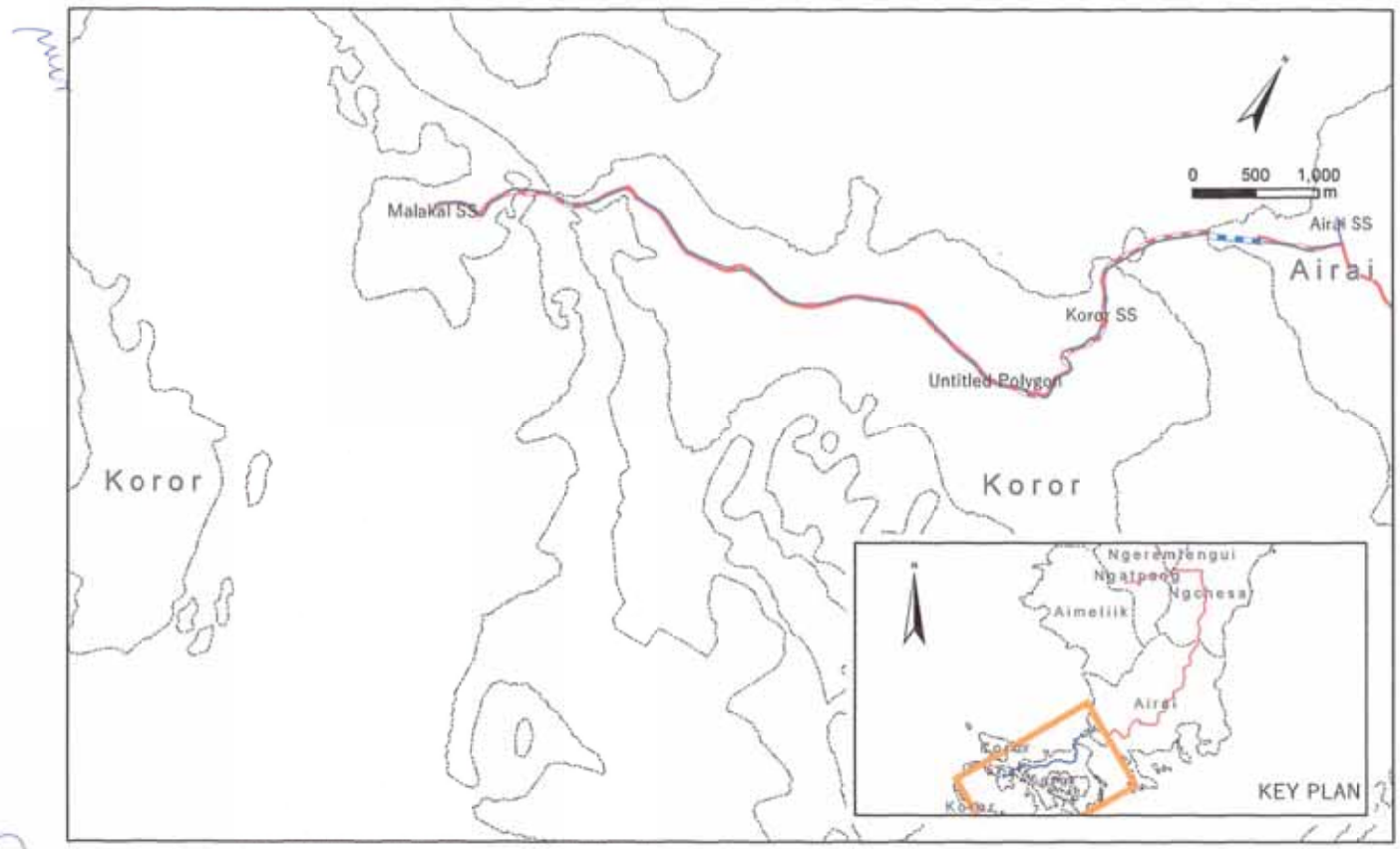


SS-08 Single line Diagram for Airai substation



Part 3 Transmission and Distribution Lines





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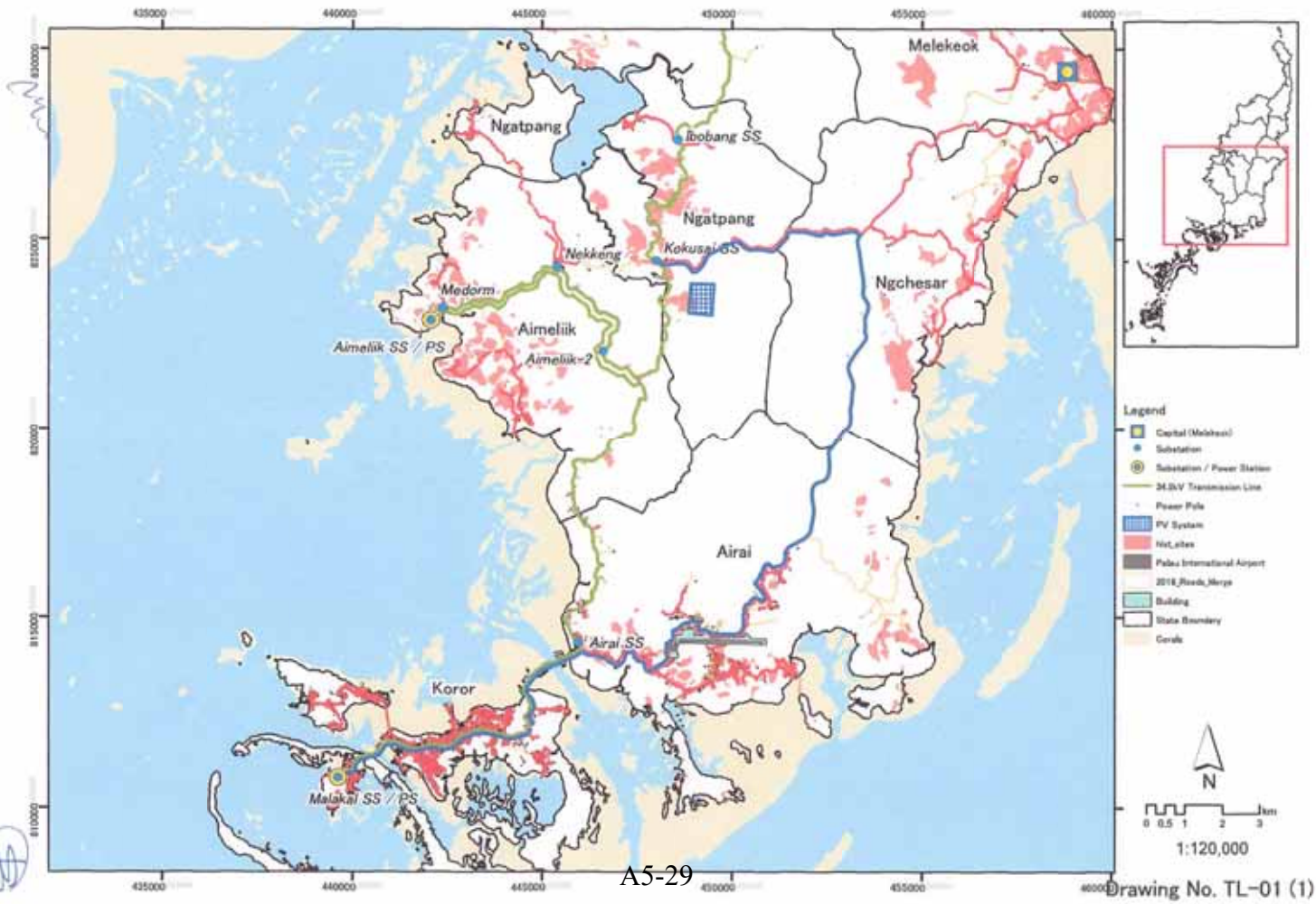

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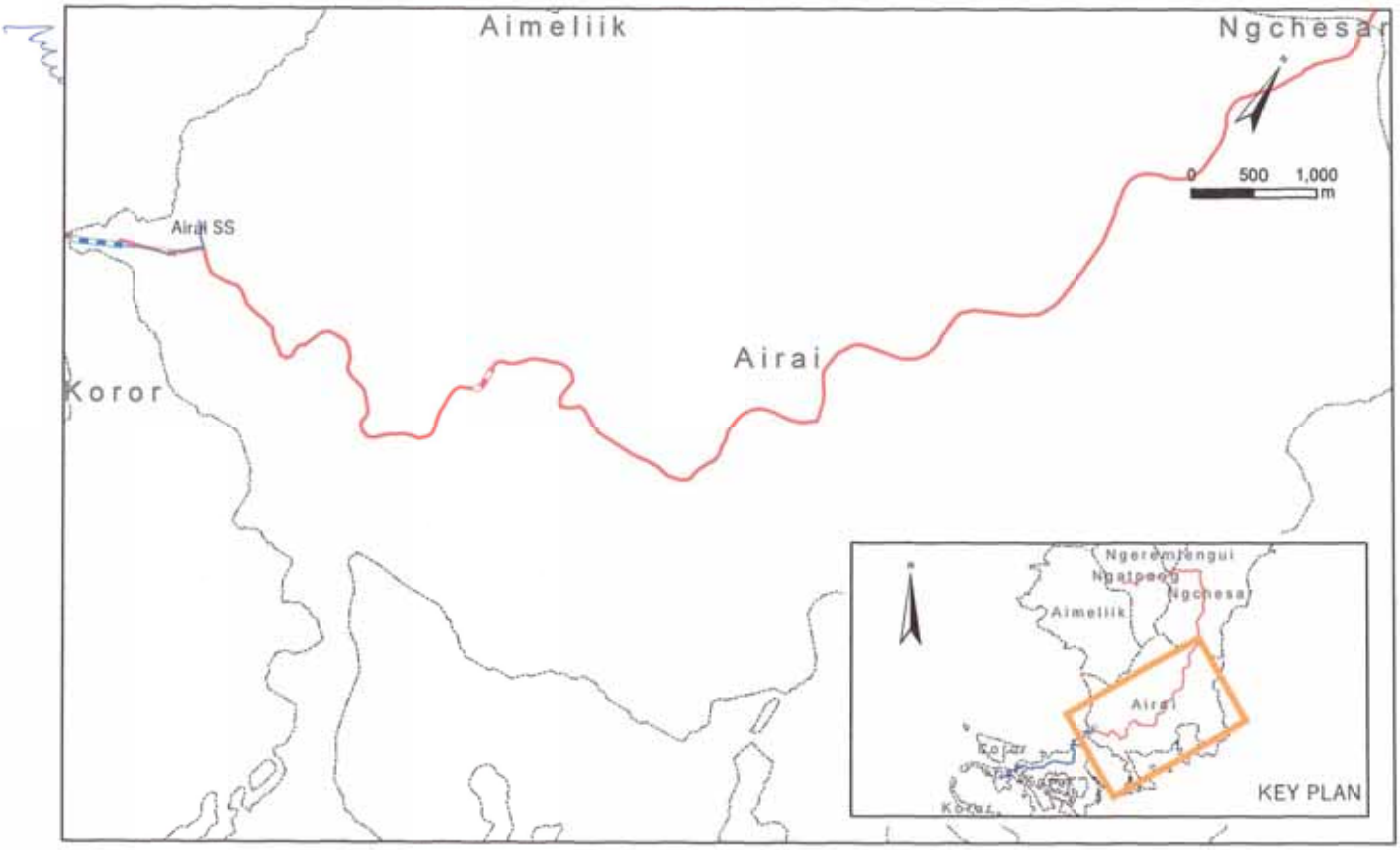

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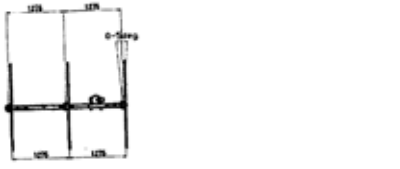
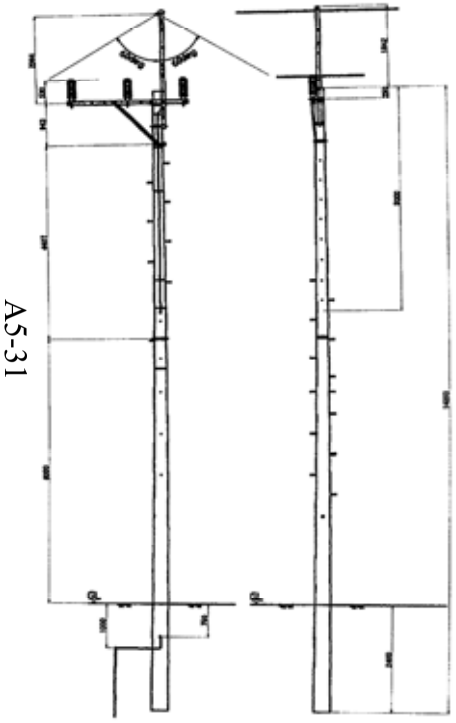


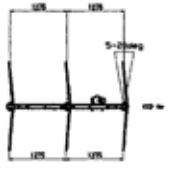


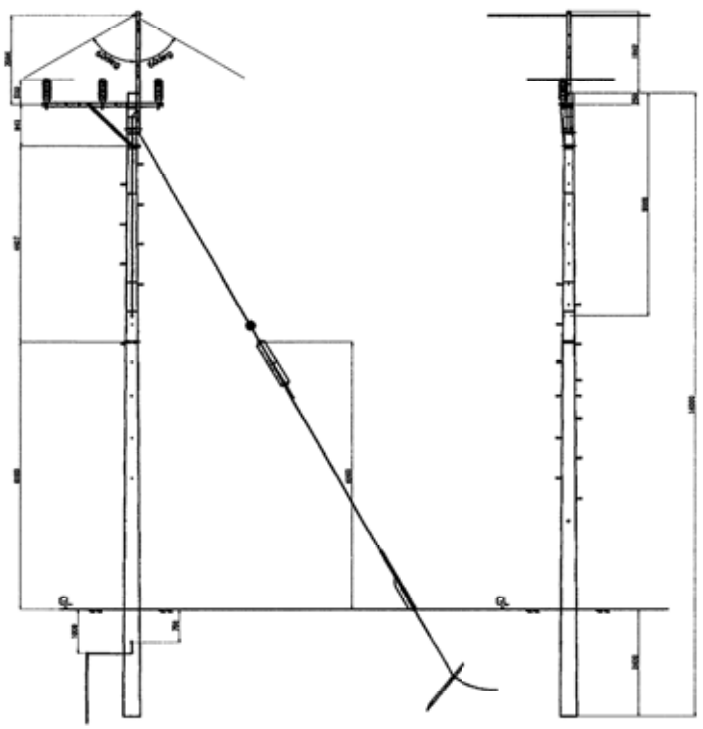
14m Pole Type A

PALAU PUBLIC UTILITY COMPANY(PPUC)		
THE PROJECT FOR		
Title: 34.5kV Transmission Line Concrete Pole assembling Drawing		
Drawing No.: 14m Type A	Sheet No.: 1	Rev.: —
Supplier:		
Item: Drawn / Checked / Approved / Scale	Name	Date / Rem.

Drawing No. TL-02 (1)

A5-31





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THE PROJECT FOR		
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Supplier:		
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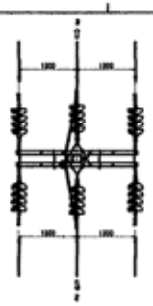

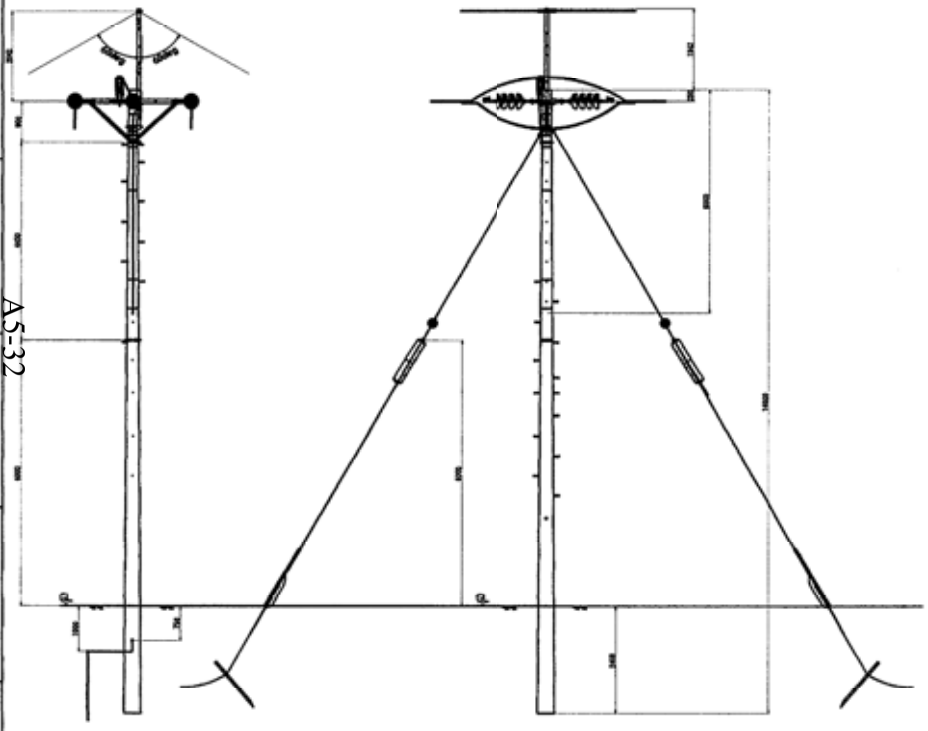

14m Pole Type C

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Supplier		

Item	Name	Date
Drawn		
Checked		
Approved		
Scale	Num	

Rev.	Description	Date	Name

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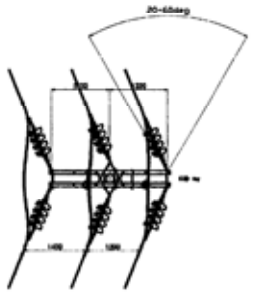

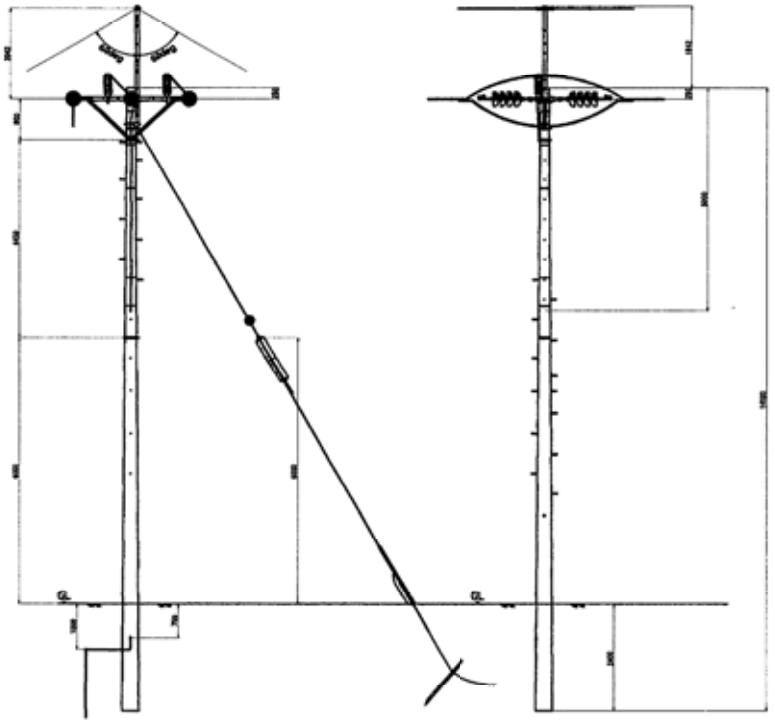

14m Pole Type D

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Drawing No. 14m Type D	Sheet No. 4	Rev. —
Supplier		

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Drawn		
Checked		
Approved		
Scale	Num	

Rev.	Description	Date	Name

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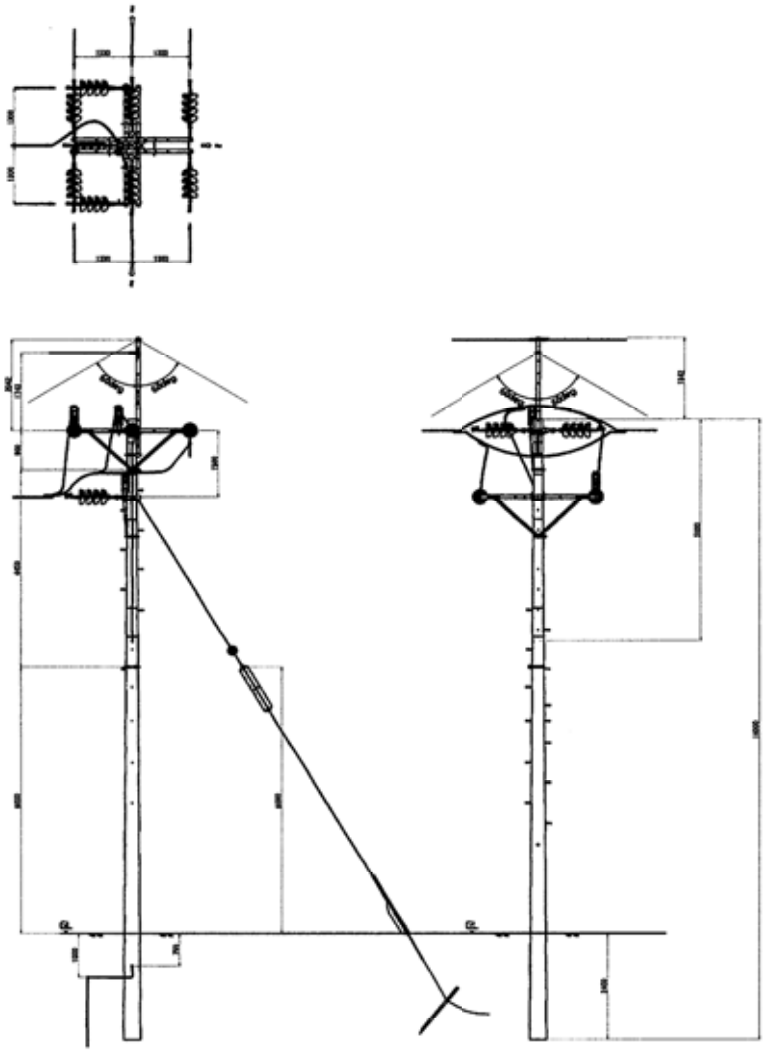
A532



14m Pole Type E

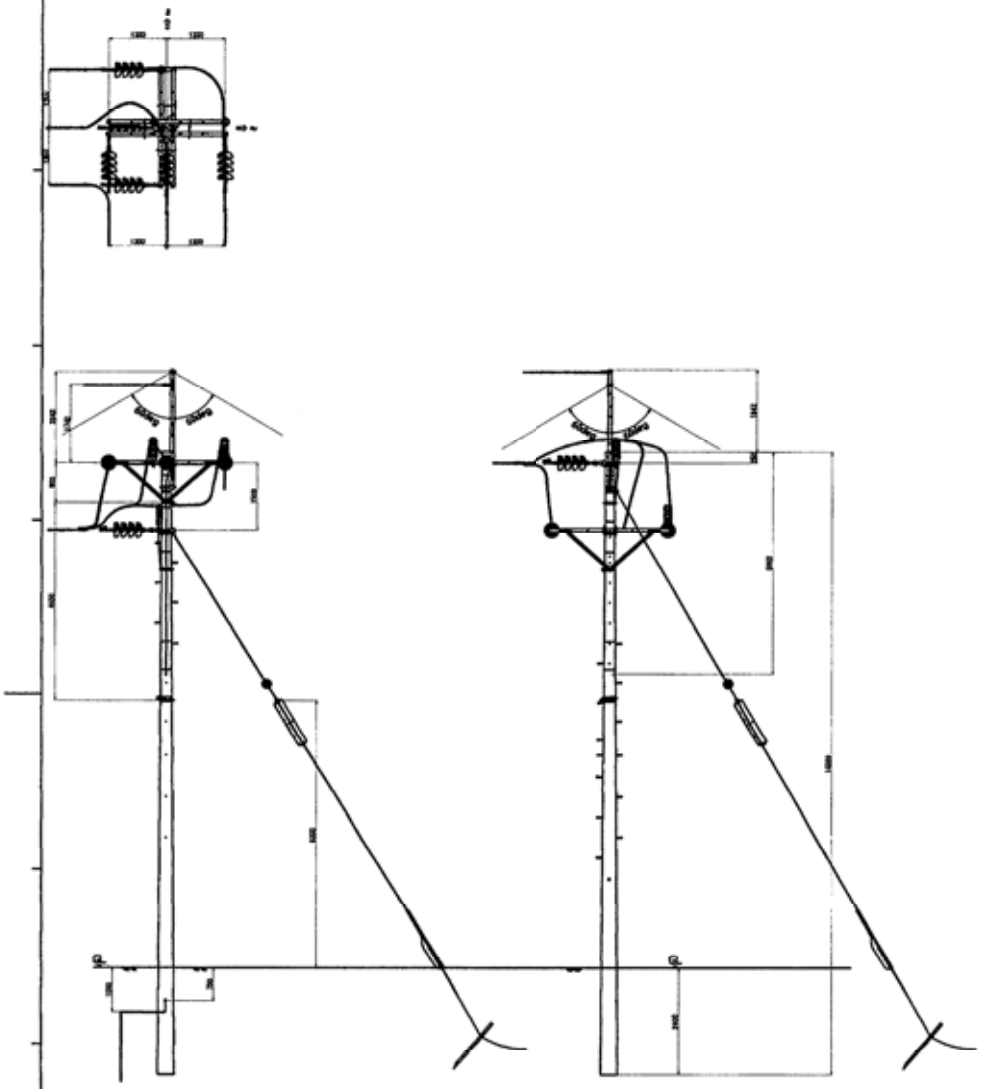
PALAU PUBLIC UTILITY COMPANY(PPUC)

THE PROJECT FOR

34.5kV Transmission Line
Concrete Pole assembling Drawing

14m Type E

Drawing No. TL-02 (5)



14m Pole Type F

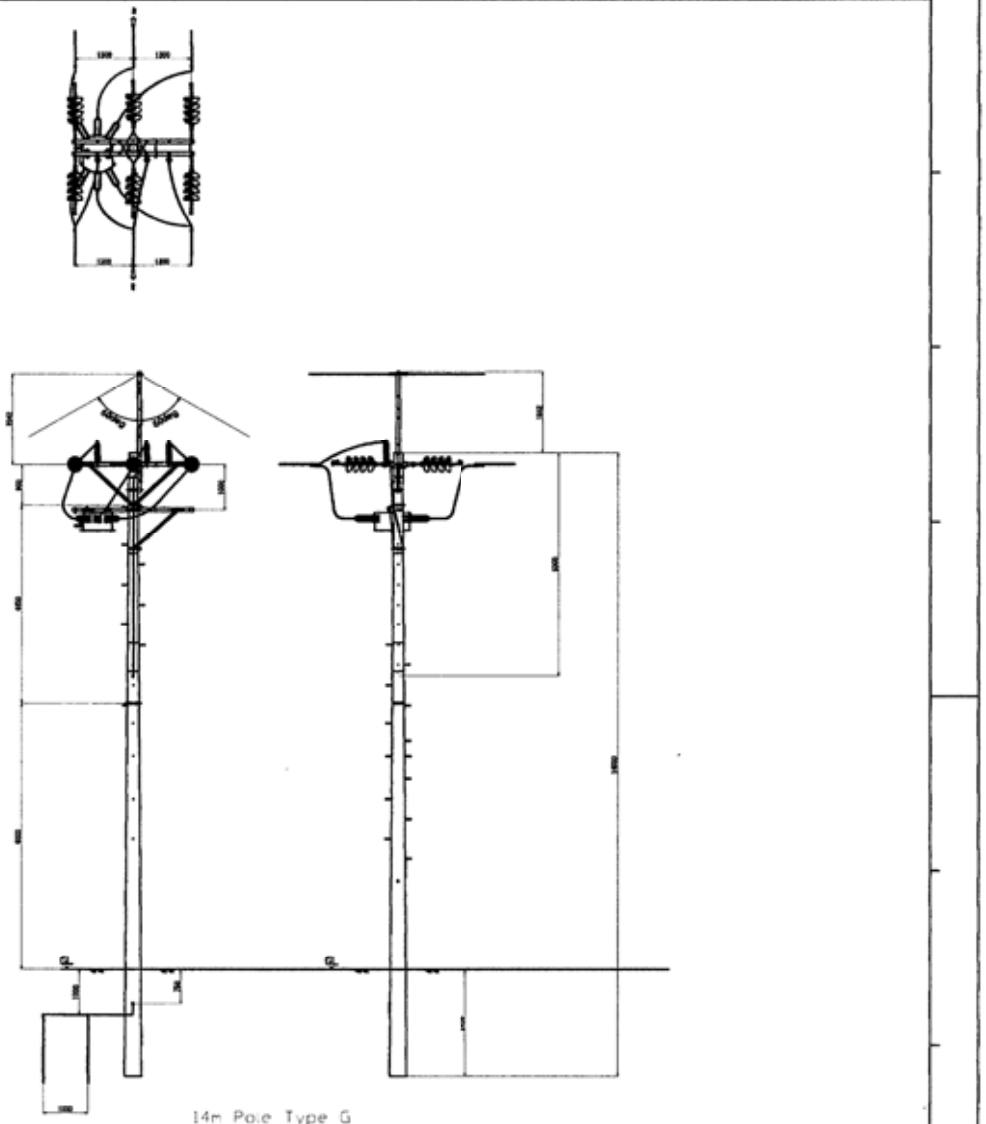
PALAU PUBLIC UTILITY COMPANY(PPUC)

THE PROJECT FOR

34.5kV Transmission Line
Concrete Pole assembling Drawing

14m Type F

Drawing No. TL-02 (6)



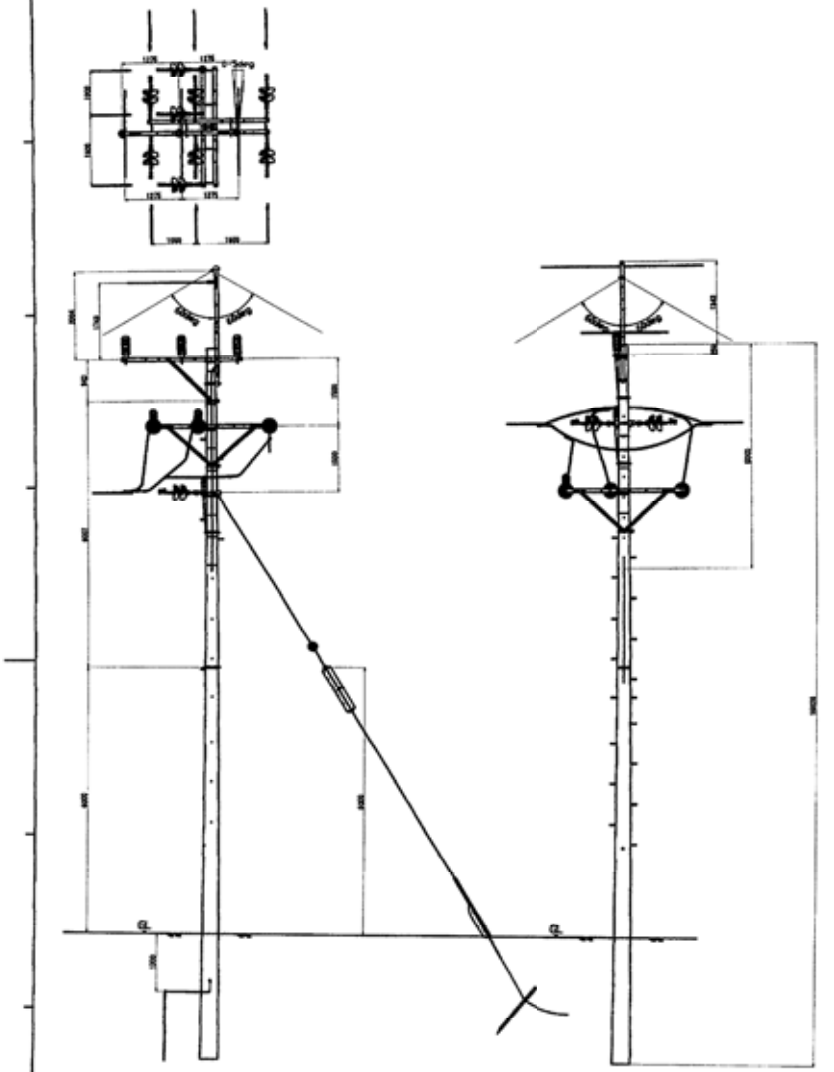
PALAU PUBLIC UTILITY COMPANY(PPUC)

THE PROJECT FOR

34.5kV Transmission Line
Concrete Pole assembling Drawing

14m Type G

Drawing No. TL-02 (7)



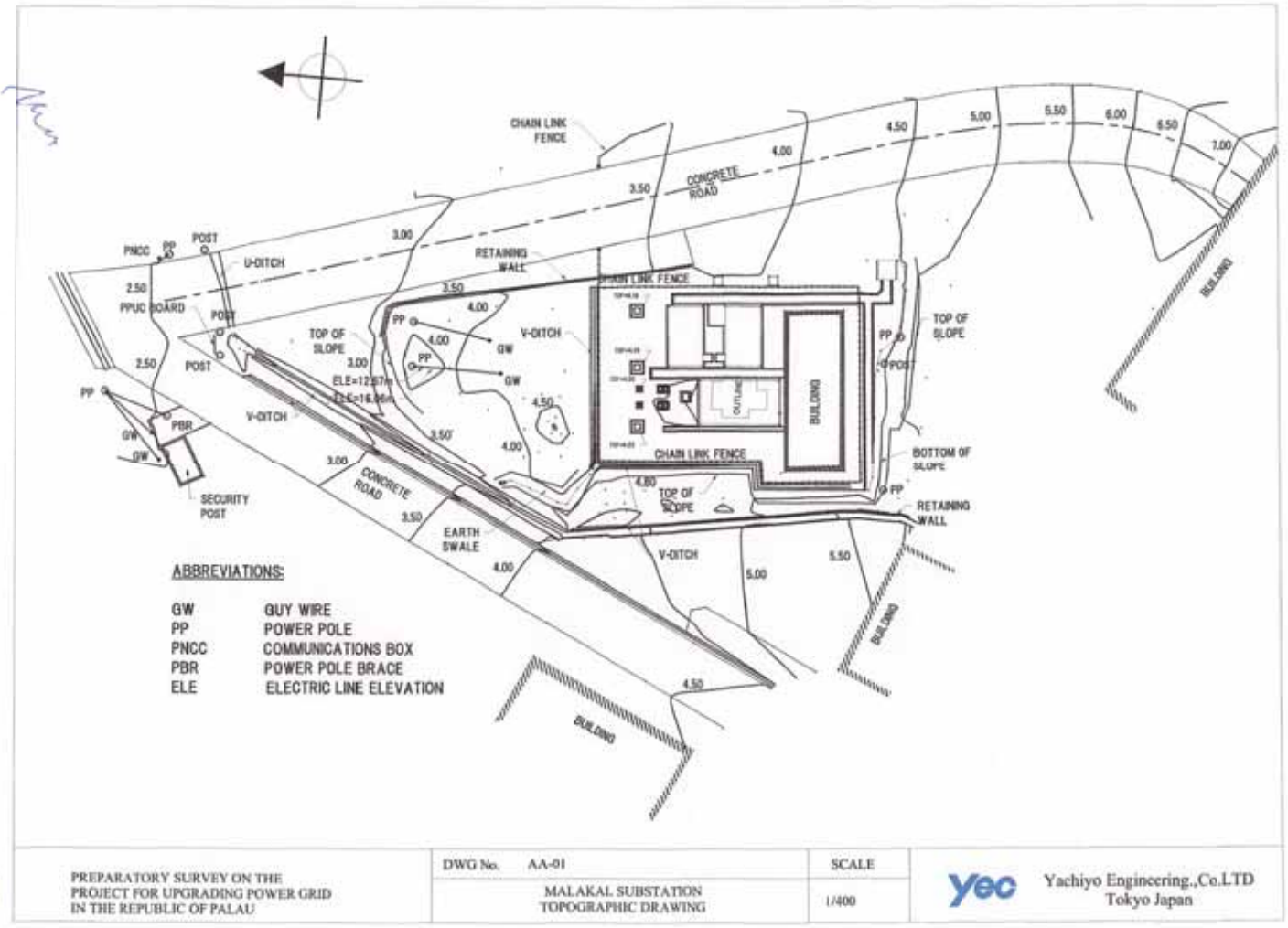
PALAU PUBLIC UTILITY COMPANY(PPUC)

THE PROJECT FOR

34.5kV Transmission Line
Concrete Pole assembling Drawing

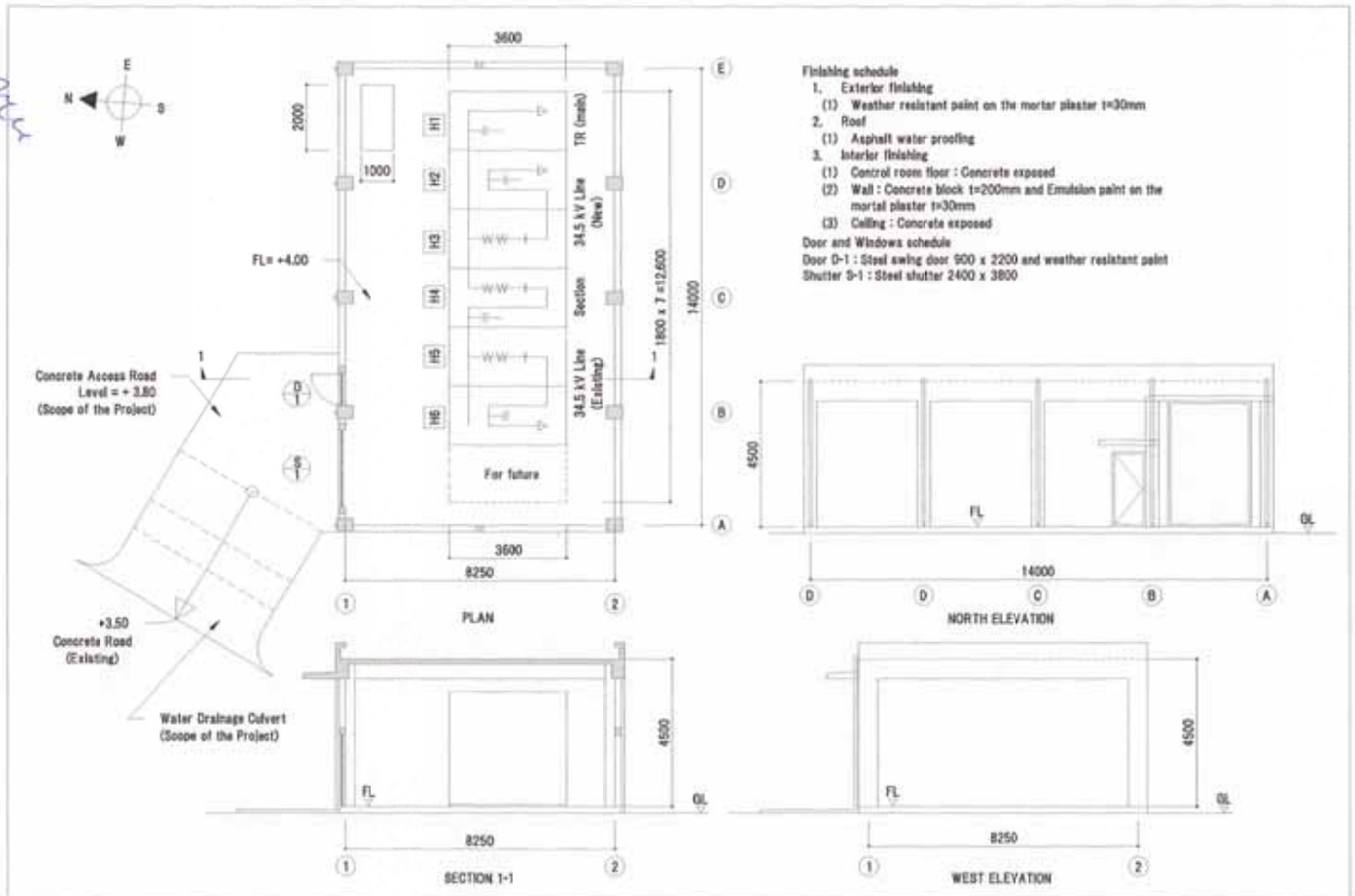
16m Pole

Drawing No. TL-02 (8)

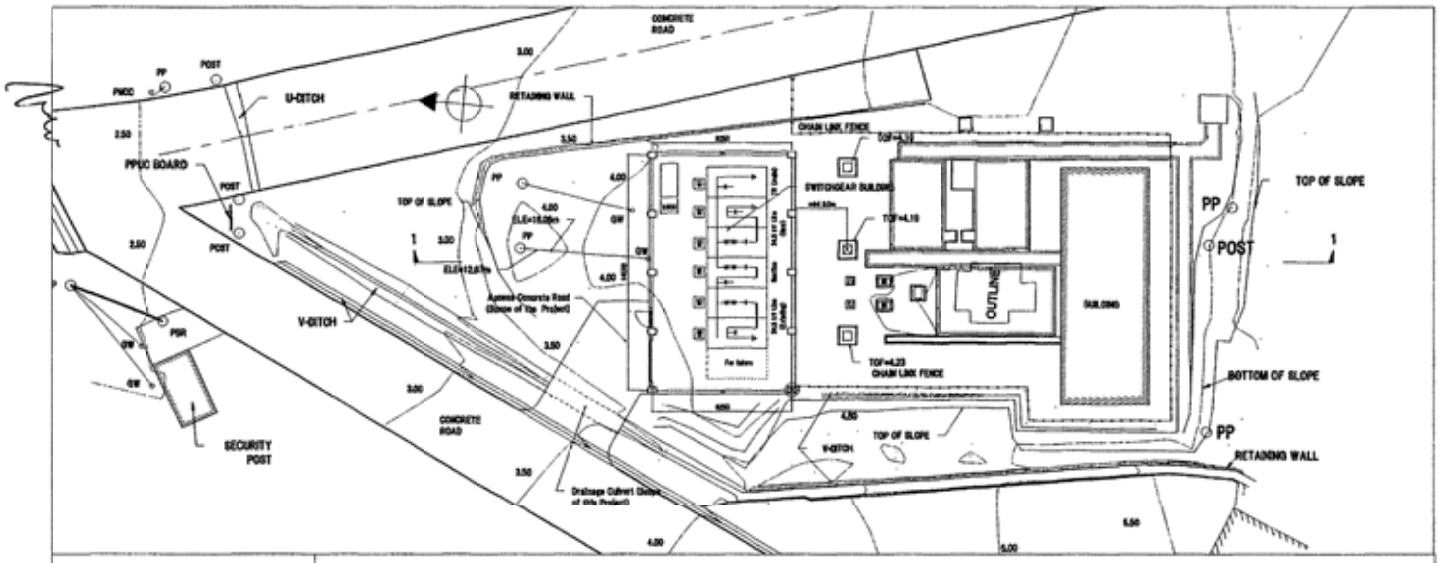


PREPARATORY SURVEY ON THE PROJECT FOR UPGRADING POWER GRID IN THE REPUBLIC OF PALAU	DWG No. AA-01	SCALE
	MALAKAL SUBSTATION TOPOGRAPHIC DRAWING	1/400
	yec Yachiyo Engineering.,Co.LTD Tokyo Japan	

Part 4 Architectural

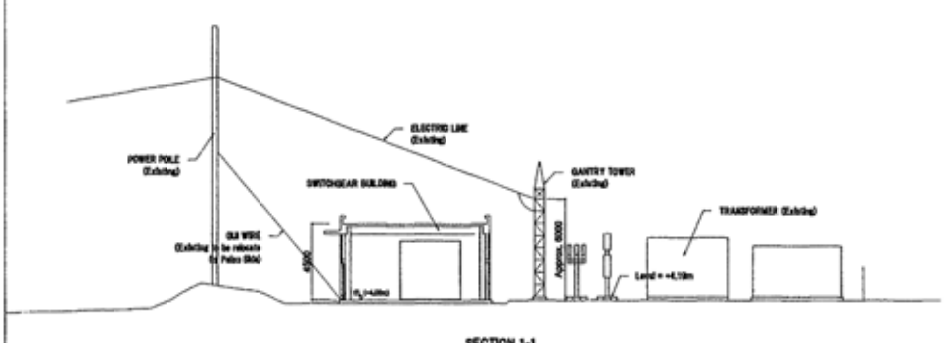


PREPARATORY SURVEY ON THE PROJECT FOR UPGRADING POWER GRID IN THE REPUBLIC OF PALAU	DWG No. AA-03	SCALE	Yachiyo Engineering.,Co.LTD Tokyo Japan
	MALAKAL SUBSTATION SWITCHGEAR BUILDING	1/150	



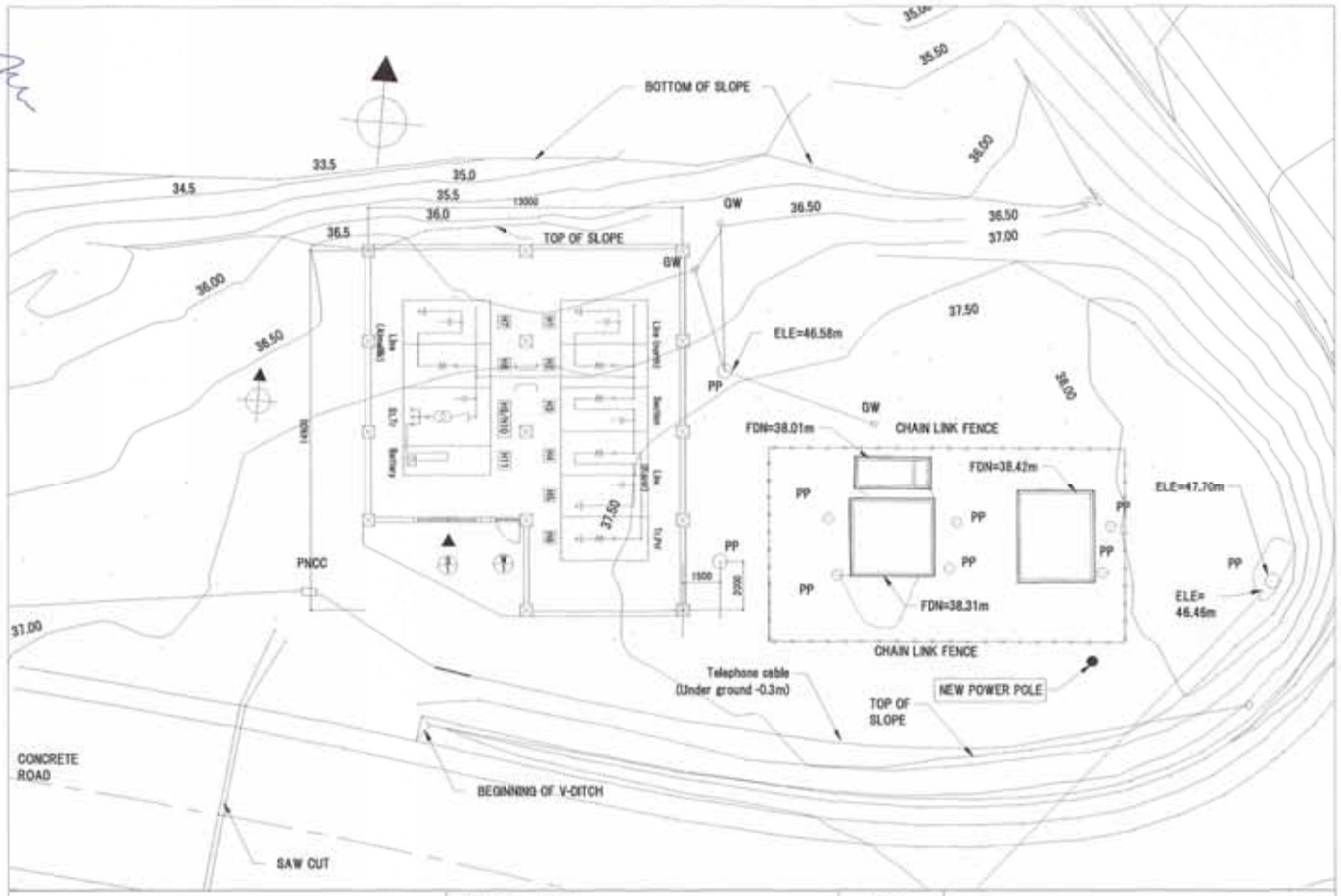
ABBREVIATIONS:

GW	GUY WIRE
PP	POWER POLE
PNCC	COMMUNICATIONS BOX
PBR	POWER POLE BRACE
ELE	ELECTRIC LINE ELEVATION

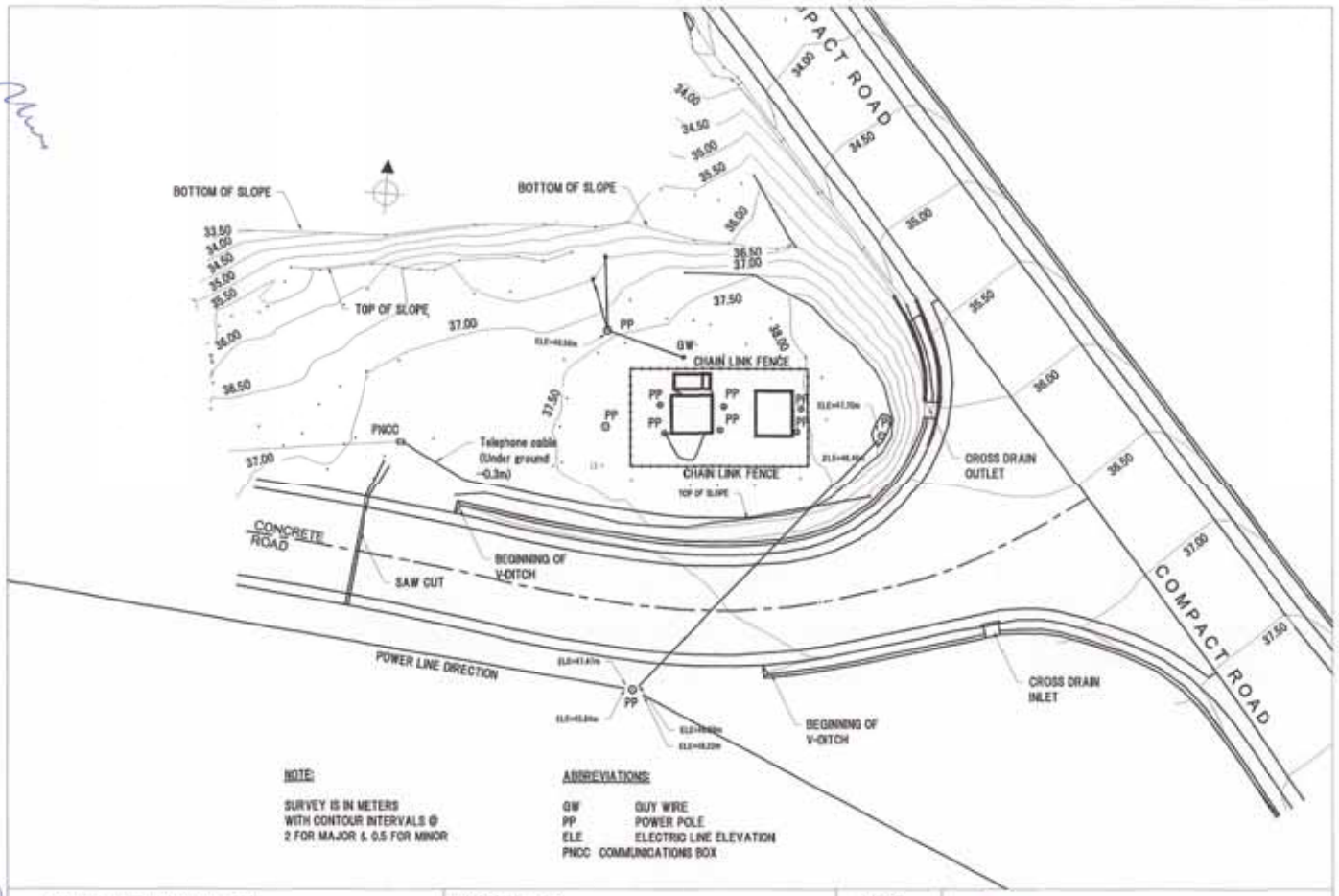


SECTION 1-1

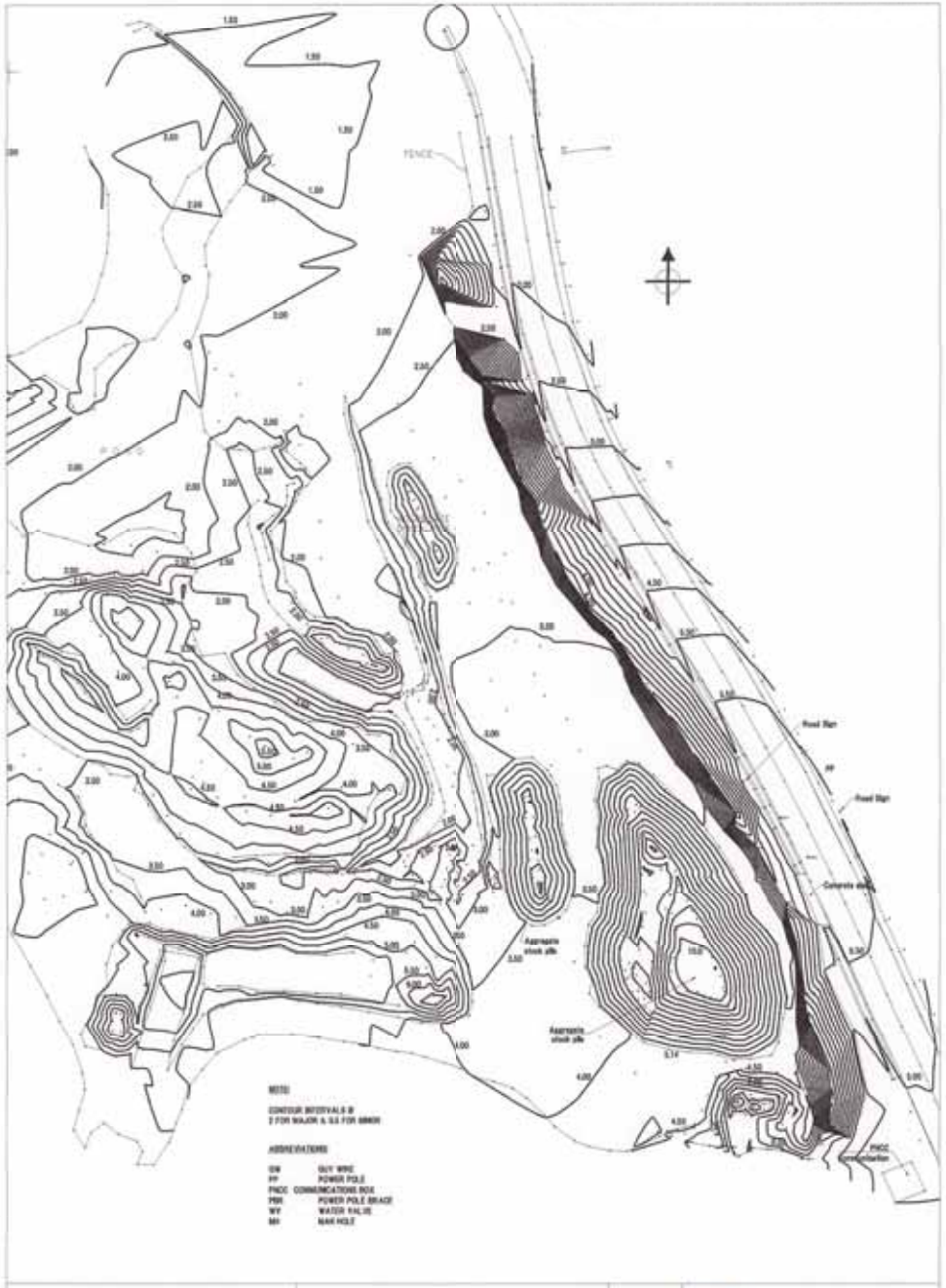
PREPARATORY SURVEY ON THE PROJECT FOR UPGRADING POWER GRID IN THE REPUBLIC OF PALAU	DWG No. AA-02	SCALE	Yachiyo Engineering.,Co.LTD Tokyo Japan
	MALAKAL SUBSTATION SITE PLAN AND SECTION	1/150	



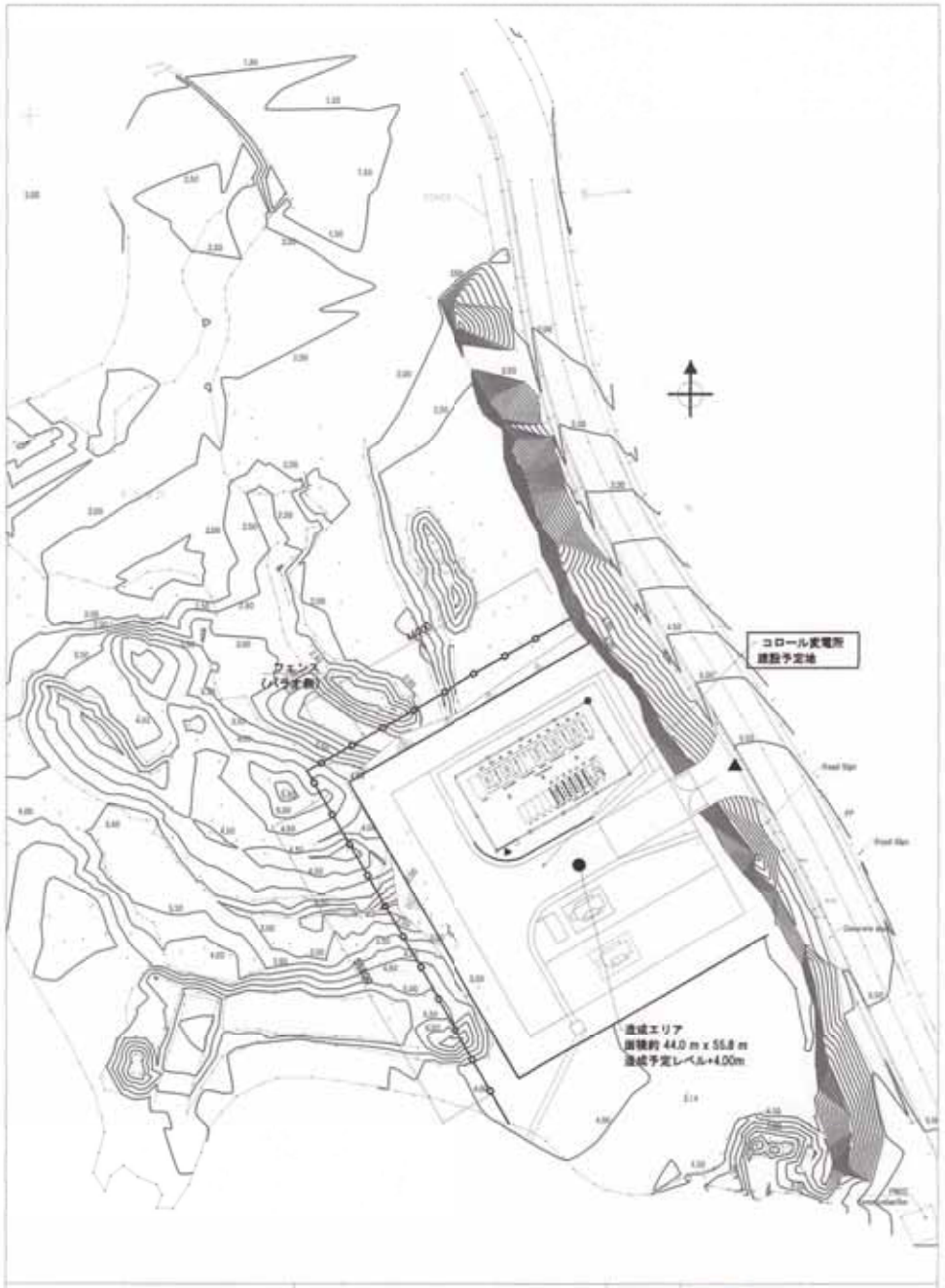
PREPARATORY SURVEY ON THE PROJECT FOR UPGRADING POWER GRID IN THE REPUBLIC OF PALAU	DWG No. AA-05 KOKUSAI SUBSTATION SITE PLAN	SCALE 1/150	yec Yachiyo Engineering.,Co.LTD Tokyo Japan



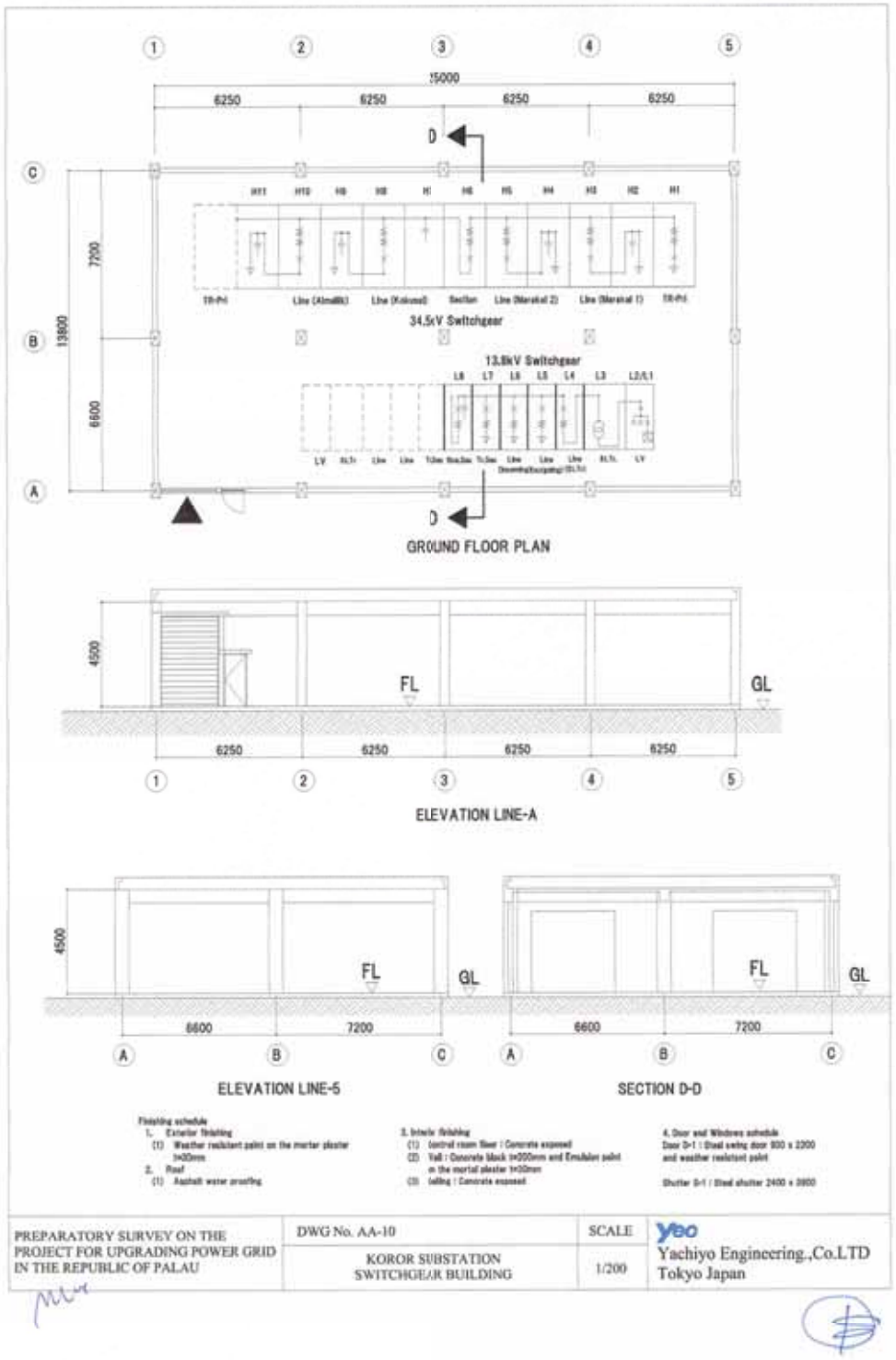
PREPARATORY SURVEY ON THE PROJECT FOR UPGRADING POWER GRID IN THE REPUBLIC OF PALAU	DWG No. AA-04 KOKUSAI SUBSTATION TOPOGRAPHIC MAPPING	SCALE 1/400	yec Yachiyo Engineering.,Co.LTD Tokyo Japan



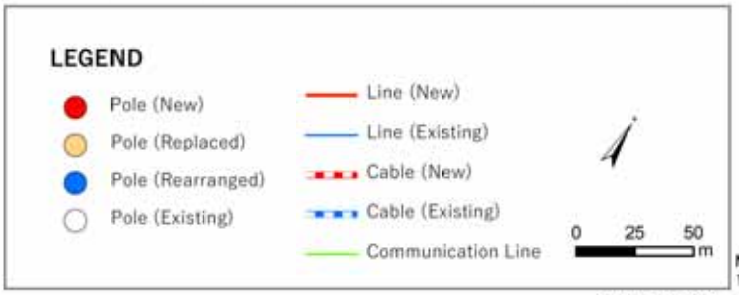
PREPARATORY SURVEY ON THE PROJECT FOR UPGRADING POWER GRID IN THE REPUBLIC OF PALAU	DWG No. AA-07	SCALE	Yachiyo Engineering.,Co.LTD Tokyo Japan
	KOROR SUBSTATION TOPOGRAPHIC SURVEY	1/800	



PREPARATORY SURVEY ON THE PROJECT FOR UPGRADING POWER GRID IN THE REPUBLIC OF PALAU	DWG No. AA-08	SCALE	Yachiyo Engineering.,Co.LTD Tokyo Japan
	KOROR SUBSTATION SITE PLAN	1/800	


15000
6250
6250
6250
6250
D
7200
6600
13800
34.5kV Switchgear
13.8kV Switchgear
GROUND FLOOR PLAN
4500
FL
GL
ELEVATION LINE-A
ELEVATION LINE-5
SECTION D-D
PREPARATORY SURVEY ON THE PROJECT FOR UPGRADING POWER GRID IN THE REPUBLIC OF PALAU
DWG No. AA-10
KOROR SUBSTATION SWITCHGEAR BUILDING
SCALE
1/200
Yachiyo Engineering.,Co.LTD
Tokyo Japan

Annex



Malakal
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Drawing No. TL-03 (1)

Detailed transmission line route drawings

LEGEND

- Pole (New)
- Pole (Replaced)
- Pole (Rearranged)
- Pole (Existing)
- Line (New)
- Line (Existing)
- Cable (New)
- Cable (Existing)
- Communication Line

0 25 50 m

Malakal
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Drawing No. TL-03 (3)

LEGEND

- Pole (New)
- Pole (Replaced)
- Pole (Rearranged)
- Pole (Existing)
- Line (New)
- Line (Existing)
- Cable (New)
- Cable (Existing)
- Communication Line

0 25 50 m

Malakal
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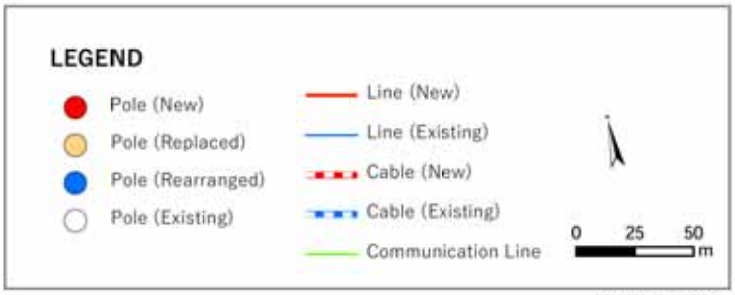
Drawing No. TL-03 (2)



Malakal
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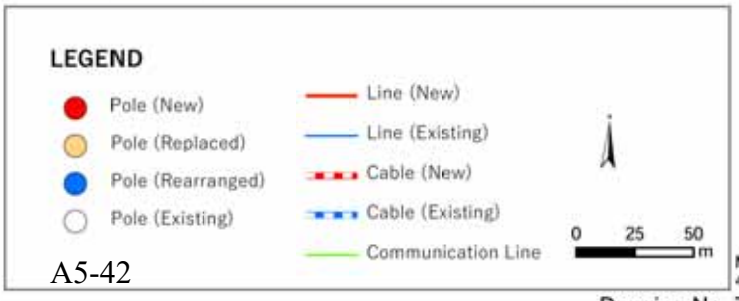

Malakal
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Drawing No. TL-03 (4)

LEGEND

- Pole (New)
- Pole (Replaced)
- Pole (Rearranged)
- Pole (Existing)
- Line (New)
- Line (Existing)
- Cable (New)
- Cable (Existing)
- Communication Line

0 25 50 m

Malakal
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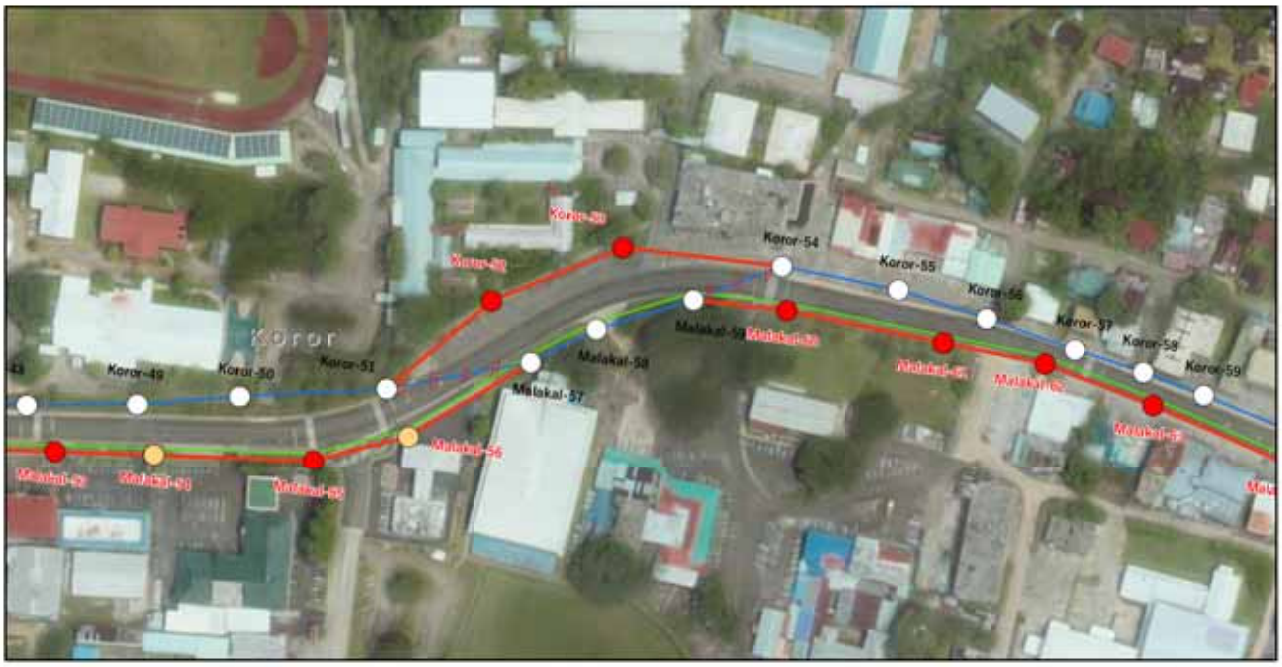
Drawing No. TL-03 (7)



LEGEND

- Pole (New)
- Pole (Replaced)
- Pole (Rearranged)
- Pole (Existing)
- Line (New)
- Line (Existing)
- Cable (New)
- Cable (Existing)
- Communication Line

0 25 50 m

Malakal
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Drawing No. TL-03 (6)

LEGEND

- Pole (New)
- Pole (Replaced)
- Pole (Rearranged)
- Pole (Existing)
- Line (New)
- Line (Existing)
- Cable (New)
- Cable (Existing)
- Communication Line

0 25 50 m

Malakal
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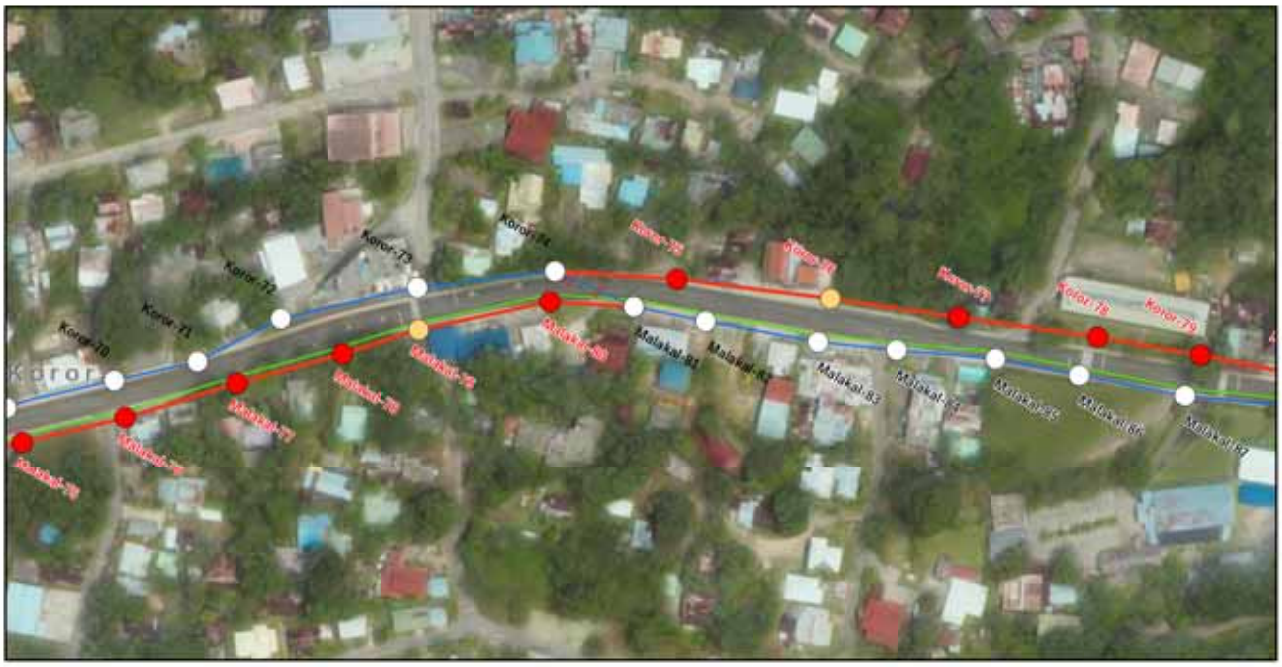
Drawing No. TL-03 (9)



LEGEND

- Pole (New)
- Pole (Replaced)
- Pole (Rearranged)
- Pole (Existing)
- Line (New)
- Line (Existing)
- Cable (New)
- Cable (Existing)
- Communication Line

0 25 50 m

Malakal
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Drawing No. TL-03 (8)

LEGEND

- Pole (New)
- Pole (Replaced)
- Pole (Rearranged)
- Pole (Existing)
- Line (New)
- Line (Existing)
- Cable (New)
- Cable (Existing)
- Communication Line

0 25 50 m

Malakal
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Drawing No. TL-03 (11)

LEGEND

- Pole (New)
- Pole (Replaced)
- Pole (Rearranged)
- Pole (Existing)
- Line (New)
- Line (Existing)
- Cable (New)
- Cable (Existing)
- Communication Line

0 25 50 m

Malakal
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Drawing No. TL-03 (10)

LEGEND

- Pole (New)
- Pole (Replaced)
- Pole (Rearranged)
- Pole (Existing)
- Line (New)
- Line (Existing)
- Cable (New)
- Cable (Existing)
- Communication Line

0 25 50 m

Malakal
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Drawing No. TL-03 (13)

LEGEND

- Pole (New)
- Pole (Replaced)
- Pole (Rearranged)
- Pole (Existing)
- Line (New)
- Line (Existing)
- Cable (New)
- Cable (Existing)
- Communication Line

0 25 50 m

Malakal
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Drawing No. TL-03 (12)

LEGEND

- Pole (New)
- Pole (Replaced)
- Pole (Rearranged)
- Pole (Existing)
- Line (New)
- Line (Existing)
- Cable (New)
- Cable (Existing)
- Communication Line

0 25 50 m

Malakal
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Drawing No. TL-03 (15)

LEGEND

- Pole (New)
- Pole (Replaced)
- Pole (Rearranged)
- Pole (Existing)
- Line (New)
- Line (Existing)
- Cable (New)
- Cable (Existing)
- Communication Line

0 25 50 m

Malakal
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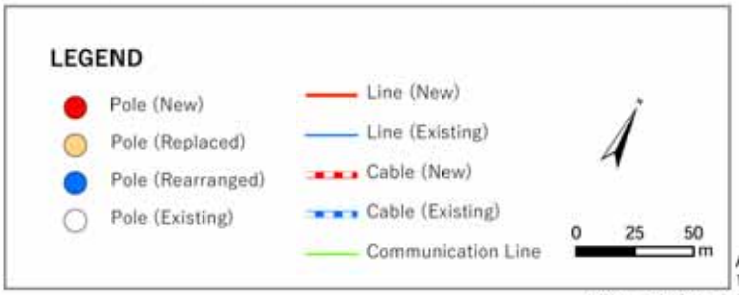
Drawing No. TL-03 (14)



Airai
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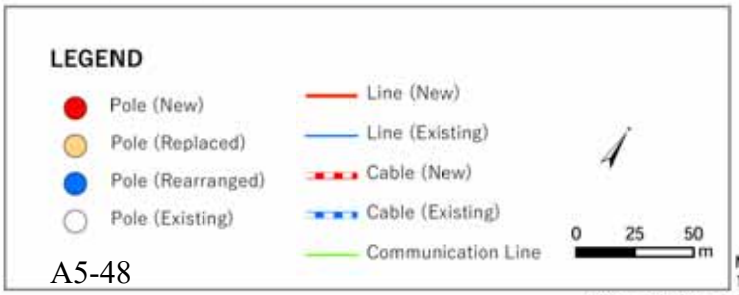
Drawing No. TL-03 (17)



Malakal
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Drawing No. TL-03 (16)

LEGEND

- Pole (New)
- Pole (Replaced)
- Pole (Rearranged)
- Pole (Existing)
- Line (New)
- Line (Existing)
- Cable (New)
- Cable (Existing)
- Communication Line

0 25 50 m

Kokusai
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Drawing No. TL-03 (19)

LEGEND

- Pole (New)
- Pole (Replaced)
- Pole (Rearranged)
- Pole (Existing)
- Line (New)
- Line (Existing)
- Cable (New)
- Cable (Existing)
- Communication Line

0 25 50 m

Airai
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Drawing No. TL-03 (18)

LEGEND

- Pole (New)
- Pole (Replaced)
- Pole (Rearranged)
- Pole (Existing)
- Line (New)
- Line (Existing)
- Cable (New)
- Cable (Existing)
- Communication Line

0 25 50 m

Kokusai
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Drawing No. TL-03 (21)

LEGEND

- Pole (New)
- Pole (Replaced)
- Pole (Rearranged)
- Pole (Existing)
- Line (New)
- Line (Existing)
- Cable (New)
- Cable (Existing)
- Communication Line

0 25 50 m

Kokusai
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Drawing No. TL-03 (20)

LEGEND

- Pole (New)
- Pole (Replaced)
- Pole (Rearranged)
- Pole (Existing)
- Line (New)
- Line (Existing)
- Cable (New)
- Cable (Existing)
- Communication Line

0 25 50 m

Kokusai
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Drawing No. TL-03 (23)

LEGEND

- Pole (New)
- Pole (Replaced)
- Pole (Rearranged)
- Pole (Existing)
- Line (New)
- Line (Existing)
- Cable (New)
- Cable (Existing)
- Communication Line

0 25 50 m

Kokusai
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Drawing No. TL-03 (22)

LEGEND

- Pole (New)
- Pole (Replaced)
- Pole (Rearranged)
- Pole (Existing)
- Line (New)
- Line (Existing)
- Cable (New)
- Cable (Existing)
- Communication Line

0 25 50 m

Kokusai
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Drawing No. TL-03 (25)

LEGEND

- Pole (New)
- Pole (Replaced)
- Pole (Rearranged)
- Pole (Existing)
- Line (New)
- Line (Existing)
- Cable (New)
- Cable (Existing)
- Communication Line

0 25 50 m

Kokusai
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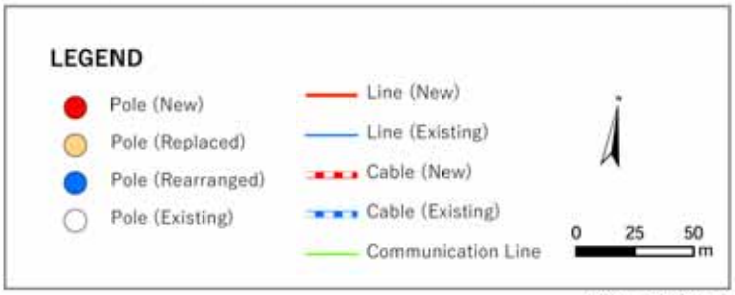
Drawing No. TL-03 (24)



Kokusai
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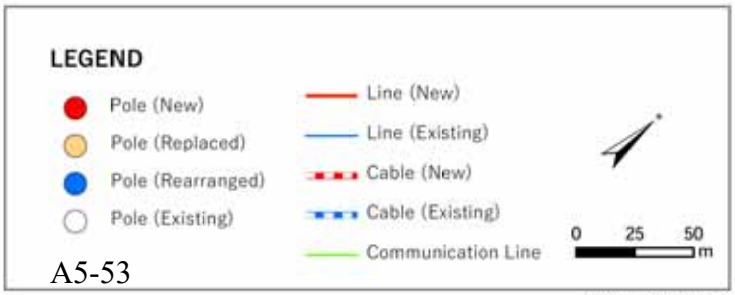
Drawing No. TL-03 (27)



Kokusai
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Drawing No. TL-03 (26)

LEGEND

- Pole (New)
- Pole (Replaced)
- Pole (Rearranged)
- Pole (Existing)
- Line (New)
- Line (Existing)
- Cable (New)
- Cable (Existing)
- Communication Line

0 25 50 m

Kokusai
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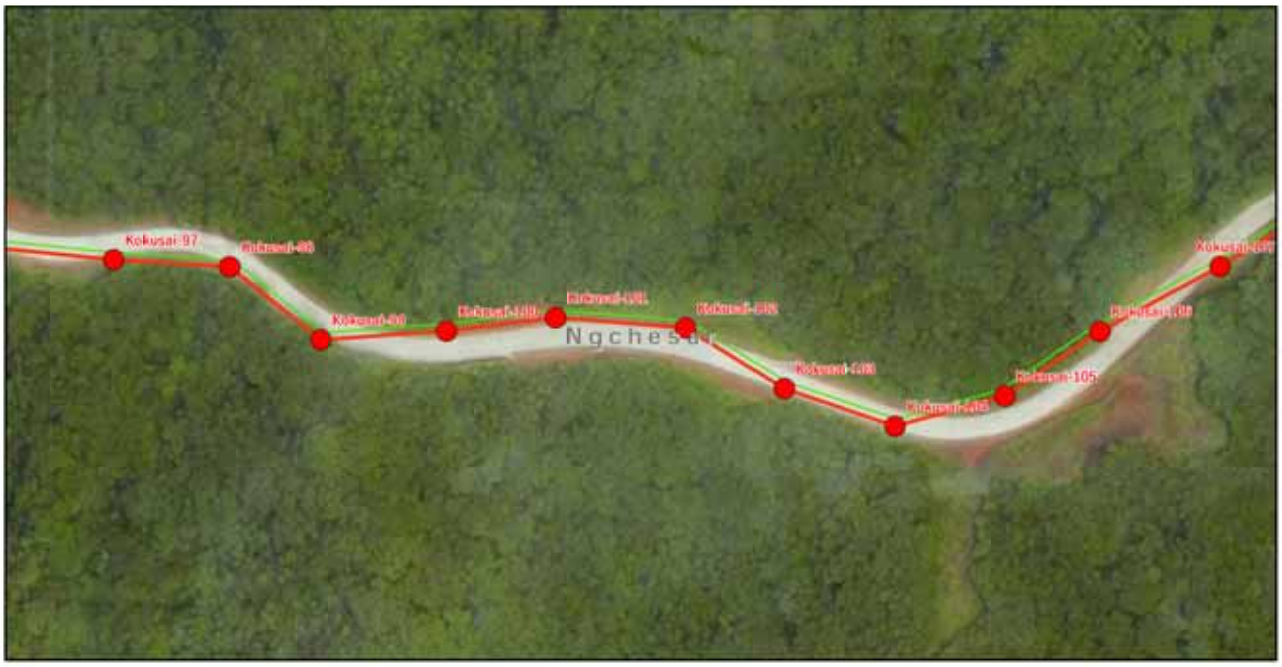
Drawing No. TL-03 (29)



LEGEND

- Pole (New)
- Pole (Replaced)
- Pole (Rearranged)
- Pole (Existing)
- Line (New)
- Line (Existing)
- Cable (New)
- Cable (Existing)
- Communication Line

0 25 50 m

Kokusai
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Drawing No. TL-03 (28)

LEGEND

- Pole (New)
- Pole (Replaced)
- Pole (Rearranged)
- Pole (Existing)
- Line (New)
- Line (Existing)
- Cable (New)
- Cable (Existing)
- Communication Line

0 25 50 m

Kokusai
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Drawing No. TL-03 (31)

LEGEND

- Pole (New)
- Pole (Replaced)
- Pole (Rearranged)
- Pole (Existing)
- Line (New)
- Line (Existing)
- Cable (New)
- Cable (Existing)
- Communication Line

0 25 50 m

Kokusai
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Drawing No. TL-03 (30)

LEGEND

- Pole (New)
- Pole (Replaced)
- Pole (Rearranged)
- Pole (Existing)
- Line (New)
- Line (Existing)
- Cable (New)
- Cable (Existing)
- Communication Line

0 25 50 m

Kokusai
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Drawing No. TL-03 (33)

LEGEND

- Pole (New)
- Pole (Replaced)
- Pole (Rearranged)
- Pole (Existing)
- Line (New)
- Line (Existing)
- Cable (New)
- Cable (Existing)
- Communication Line

0 25 50 m

Kokusai
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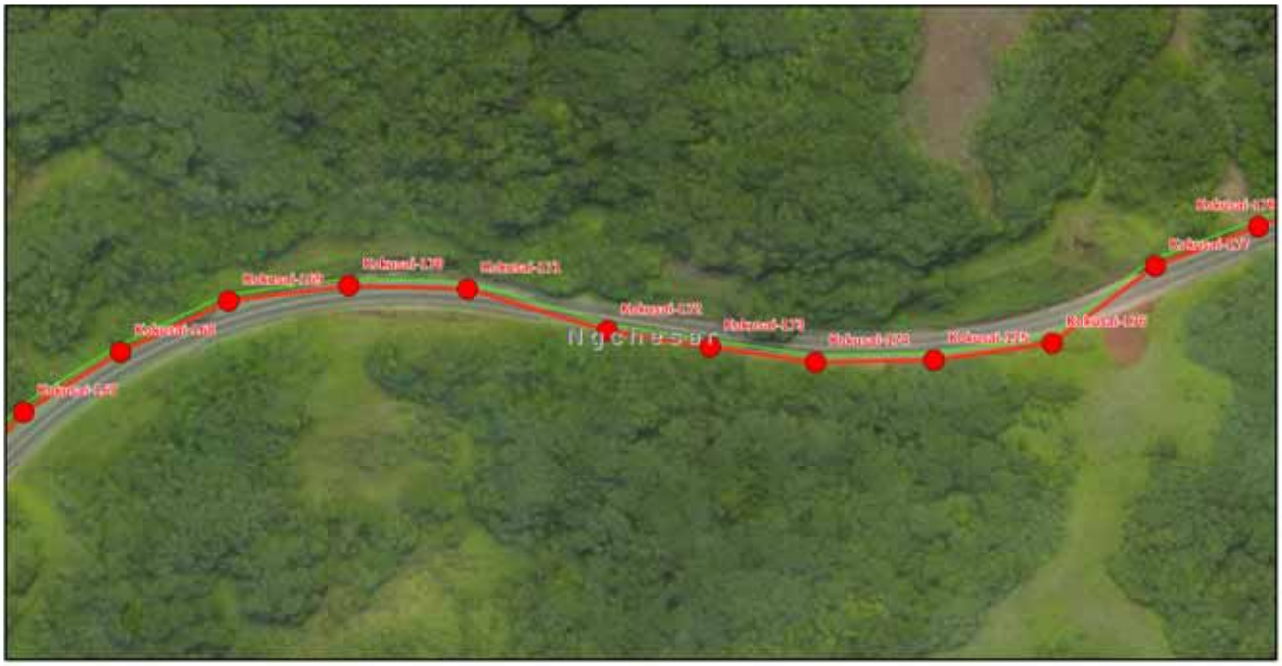
Drawing No. TL-03 (32)



LEGEND

- Pole (New)
- Pole (Replaced)
- Pole (Rearranged)
- Pole (Existing)
- Line (New)
- Line (Existing)
- Cable (New)
- Cable (Existing)
- Communication Line

0 25 50 m

Kokusai
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Drawing No. TL-03 (35)

LEGEND

- Pole (New)
- Pole (Replaced)
- Pole (Rearranged)
- Pole (Existing)
- Line (New)
- Line (Existing)
- Cable (New)
- Cable (Existing)
- Communication Line

0 25 50 m

Kokusai
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Drawing No. TL-03 (34)

LEGEND

- Pole (New)
- Pole (Replaced)
- Pole (Rearranged)
- Pole (Existing)
- Line (New)
- Line (Existing)
- Cable (New)
- Cable (Existing)
- Communication Line

0 25 50 m

Kokusai
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Drawing No. TL-03 (37)

LEGEND

- Pole (New)
- Pole (Replaced)
- Pole (Rearranged)
- Pole (Existing)
- Line (New)
- Line (Existing)
- Cable (New)
- Cable (Existing)
- Communication Line

0 25 50 m

Kokusai
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Drawing No. TL-03 (36)

LEGEND

- Pole (New)
- Pole (Replaced)
- Pole (Rearranged)
- Pole (Existing)
- Line (New)
- Line (Existing)
- Cable (New)
- Cable (Existing)
- Communication Line

0 25 50 m

Kokusai
21 / 48 ページ

Drawing No. TL-03 (39)

LEGEND

- Pole (New)
- Pole (Replaced)
- Pole (Rearranged)
- Pole (Existing)
- Line (New)
- Line (Existing)
- Cable (New)
- Cable (Existing)
- Communication Line

0 25 50 m

Kokusai
20 / 48 ページ

Drawing No. TL-03 (38)

LEGEND

- Pole (New)
- Pole (Replaced)
- Pole (Rearranged)
- Pole (Existing)
- Line (New)
- Line (Existing)
- Cable (New)
- Cable (Existing)
- Communication Line

0 25 50 m

Kokusai
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Drawing No. TL-03 (41)

LEGEND

- Pole (New)
- Pole (Replaced)
- Pole (Rearranged)
- Pole (Existing)
- Line (New)
- Line (Existing)
- Cable (New)
- Cable (Existing)
- Communication Line

0 25 50 m

Kokusai
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Drawing No. TL-03 (40)

LEGEND

- Pole (New)
- Pole (Replaced)
- Pole (Rearranged)
- Pole (Existing)
- Line (New)
- Line (Existing)
- Cable (New)
- Cable (Existing)
- Communication Line

0 25 50 m

Kokusai
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Drawing No. TL-03 (43)

LEGEND

- Pole (New)
- Pole (Replaced)
- Pole (Rearranged)
- Pole (Existing)
- Line (New)
- Line (Existing)
- Cable (New)
- Cable (Existing)
- Communication Line

0 25 50 m

Kokusai
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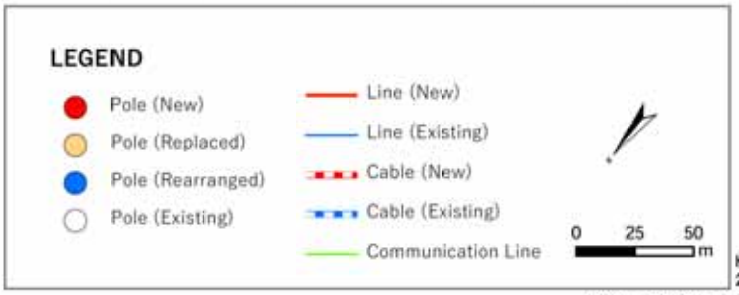
Drawing No. TL-03 (42)



Kokusai
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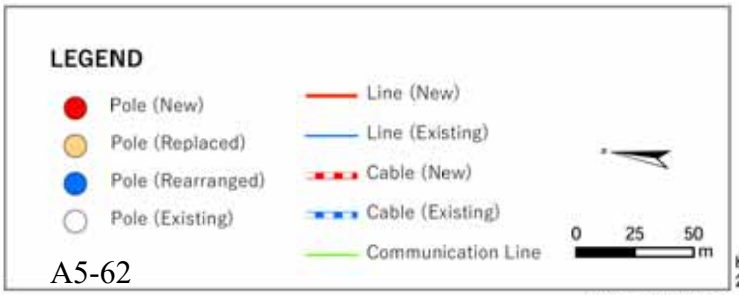
Drawing No. TL-03 (45)



Kokusai
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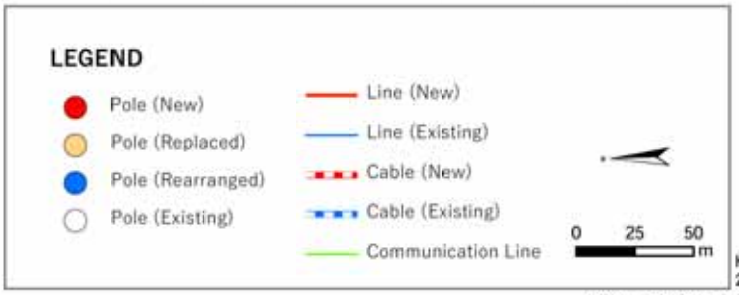
Drawing No. TL-03 (44)



Kokusai
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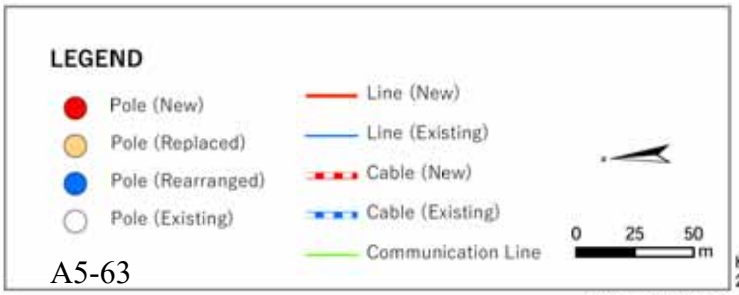
Drawing No. TL-03 (47)



Kokusai
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Drawing No. TL-03 (46)

LEGEND

- Pole (New)
- Pole (Replaced)
- Pole (Rearranged)
- Pole (Existing)
- Line (New)
- Line (Existing)
- Cable (New)
- Cable (Existing)
- Communication Line

0 25 50 m

Kokusai
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Drawing No. TL-03 (49)

LEGEND

- Pole (New)
- Pole (Replaced)
- Pole (Rearranged)
- Pole (Existing)
- Line (New)
- Line (Existing)
- Cable (New)
- Cable (Existing)
- Communication Line

0 25 50 m

Kokusai
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Drawing No. TL-03 (48)

LEGEND

- Pole (New)
- Pole (Replaced)
- Pole (Rearranged)
- Pole (Existing)
- Line (New)
- Line (Existing)
- Cable (New)
- Cable (Existing)
- Communication Line

0 25 50 m

Kokusai
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Drawing No. TL-03 (51)

LEGEND

- Pole (New)
- Pole (Replaced)
- Pole (Rearranged)
- Pole (Existing)
- Line (New)
- Line (Existing)
- Cable (New)
- Cable (Existing)
- Communication Line

0 25 50 m

Kokusai
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Drawing No. TL-03 (50)

LEGEND

- Pole (New)
- Pole (Replaced)
- Pole (Rearranged)
- Pole (Existing)
- Line (New)
- Line (Existing)
- Cable (New)
- Cable (Existing)
- Communication Line

0 25 50 m

Kokusai
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Drawing No. TL-03 (53)

LEGEND

- Pole (New)
- Pole (Replaced)
- Pole (Rearranged)
- Pole (Existing)
- Line (New)
- Line (Existing)
- Cable (New)
- Cable (Existing)
- Communication Line

0 25 50 m

Kokusai
34 / 48 ページ

Drawing No. TL-03 (52)

LEGEND

- Pole (New)
- Pole (Replaced)
- Pole (Rearranged)
- Pole (Existing)
- Line (New)
- Line (Existing)
- Cable (New)
- Cable (Existing)
- Communication Line

0 25 50 m

Kokusai
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Drawing No. TL-03 (55)

LEGEND

- Pole (New)
- Pole (Replaced)
- Pole (Rearranged)
- Pole (Existing)
- Line (New)
- Line (Existing)
- Cable (New)
- Cable (Existing)
- Communication Line

0 25 50 m

Kokusai
36 / 48 ページ

Drawing No. TL-03 (54)

LEGEND

- Pole (New)
- Pole (Replaced)
- Pole (Rearranged)
- Pole (Existing)
- Line (New)
- Line (Existing)
- Cable (New)
- Cable (Existing)
- Communication Line

0 25 50 m

Kokusai
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Drawing No. TL-03 (57)

LEGEND

- Pole (New)
- Pole (Replaced)
- Pole (Rearranged)
- Pole (Existing)
- Line (New)
- Line (Existing)
- Cable (New)
- Cable (Existing)
- Communication Line

0 25 50 m

Kokusai
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Drawing No. TL-03 (56)

LEGEND

- Pole (New)
- Pole (Replaced)
- Pole (Rearranged)
- Pole (Existing)
- Line (New)
- Line (Existing)
- Cable (New)
- Cable (Existing)
- Communication Line

0 25 50 m

Kokusai
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Drawing No. TL-03 (59)

LEGEND

- Pole (New)
- Pole (Replaced)
- Pole (Rearranged)
- Pole (Existing)
- Line (New)
- Line (Existing)
- Cable (New)
- Cable (Existing)
- Communication Line

0 25 50 m

Kokusai
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Drawing No. TL-03 (58)

LEGEND

- Pole (New)
- Pole (Replaced)
- Pole (Rearranged)
- Pole (Existing)
- Line (New)
- Line (Existing)
- Cable (New)
- Cable (Existing)
- Communication Line

0 25 50 m

Kokusai
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Drawing No. TL-03 (61)

LEGEND

- Pole (New)
- Pole (Replaced)
- Pole (Rearranged)
- Pole (Existing)
- Line (New)
- Line (Existing)
- Cable (New)
- Cable (Existing)
- Communication Line

0 25 50 m

Kokusai
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Drawing No. TL-03 (60)

LEGEND

- Pole (New)
- Pole (Replaced)
- Pole (Rearranged)
- Pole (Existing)
- Line (New)
- Line (Existing)
- Cable (New)
- Cable (Existing)
- Communication Line

0 25 50 m

Kokusai
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Drawing No. TL-03 (63)

LEGEND

- Pole (New)
- Pole (Replaced)
- Pole (Rearranged)
- Pole (Existing)
- Line (New)
- Line (Existing)
- Cable (New)
- Cable (Existing)
- Communication Line

0 25 50 m

Kokusai
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Drawing No. TL-03 (62)

LEGEND

- Pole (New)
- Pole (Replaced)
- Pole (Rearranged)
- Pole (Existing)
- Line (New)
- Line (Existing)
- Cable (New)
- Cable (Existing)
- Communication Line

0 25 50 m

Kokusai
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Drawing No. TL-03 (65)

LEGEND

- Pole (New)
- Pole (Replaced)
- Pole (Rearranged)
- Pole (Existing)
- Line (New)
- Line (Existing)
- Cable (New)
- Cable (Existing)
- Communication Line

0 25 50 m

Kokusai
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Drawing No. TL-03 (64)

LEGEND

- Pole (New)
- Pole (Replaced)
- Pole (Rearranged)
- Pole (Existing)
- Line (New)
- Line (Existing)
- Cable (New)
- Cable (Existing)
- Communication Line

0 25 50 m

Kokusai
48 / 48 ページ

Drawing No. TL-03 (66)

TECHNICAL NOTE
FOR
PREPARATORY SURVEY
(SECOND FIELD SURVEY)
ON
THE PROJECT
FOR
UPGRADING POWER GRID
IN THE REPUBLIC OF PALAU
AGREED BETWEEN
PALAU PUBLIC UTILITIES CORPORATION (PPUC)
AND
JICA PREPARATORY SURVEY TEAM

June 24th, 2022

Makoto Abe
Chief Consultant
JICA Preparatory Survey Team

Frank Kyota
Chief Executive Officer
Palau Public Utilities Corporation
(PPUC)
Executing Agency for the Project

JICA Preparatory Survey Team for the Project for Upgrading Power Grid in the Republic of Palau (hereinafter referred to as "the Team") and Palau Public Utilities Corporation (PPUC) had series of technical discussions to form a mutual understanding of the explanations made by the Team during the Second Field Survey in June, 2022 and the parties agreed to record the following points as a conclusion of the discussions.

1. **Main objectives of the Second Field Survey**
   The Team explained that the main objectives of the Survey are as follows:
   (1) To confirm the site condition
   (including the additional information/data on the distribution line (Koror and Malakal island-wide distribution network))
   (2) To explain components of the Project
   (3) To explain tentative implementation schedule
   (4) To explain major undertakings to be borne by the Recipient side
   (5) To explain project evaluation

2. **Project Components**
   No major change has been made since JICA and PPUC agreed in the Minutes of Discussion (M/D), as explained in the "Presentation used in the Second Field Survey" by the Team.

3. **Tentative Implementation Schedule**
   The Team explained and PPUC agreed to fulfill the obligations to be borne by the Recipient side in accordance with the tentative implementation schedule stated in the "Presentation used in the Second Field Survey".

4. **Collection of additional information/data on the operation of the distribution lines / Confirmation of the exact location of section switchgear on the distribution line (Koror and Malakal island-wide distribution network)**
   The following information was collected on the power distribution network:
   - Load allocation on each distribution line
   - Operation procedures for power distribution equipment in the event of a fault
   - Locations of the section switchgear
   - Priority of power supply area in the Koror and Malakal islands
   - Available distribution capacity from Malakal power plant to Koror area (specifications of distribution equipment)

   The Team also confirmed the condition of all section switchgears with PPUC and collected

information on section switchgear of those malfunctions, PPUC's plan for replacing those equipment, and those specifications. The Team will analyze the collected data, current issues and countermeasures for the power distribution network, and make recommendations to the PPUC for review by the end of July on how to minimize power outage time in the event of a fault.

5. **Confirmation of underground cable locations along the transmission line route in Koror State**

   In order to minimize the cutting of trees and protect the environment, the Team conducted a site inspection of the areas where underground cable are planned to be installed. The Team also confirmed that the designed specifications and quantities of the equipment in the scope of the Project were appropriate.

6. **Installation of 34.5 kV Cable in the KB bridge**

   In order to survey the cable route for the KB bridge section, the condition of the existing 34.5kV and 13.8kV cables was verified. In particular, existing dimensions of conduit pipe and locations of available holes were checked to determine detailed methods regarding cable entry into the bridge.

7. **Confirmation of the existing foundation due to amendment of the transformer specification**

   The Team confirmed that the transformer installation area at Malakal power plant, where the transformer capacity was increased from the originally designed. The dimensions of each section in particular were confirmed to determine the extent to which portion of the existing foundation could be used.

8. **Considerations of the duration of power outages during the implementation of installation work**

   The Team checked the current status of the distribution lines during the upgrading of Airai substation, which supplies power to important loads, in order to study rerouting for the 13.8kV distribution lines to reduce power outage time.

-End-

Attachment:

- **1 Presentation used in the Second Field Survey**
- **2 Project Implementation Schedule**

Attachment 1: Presentation used in the Second Field Survey

PREPARATORY SURVEY ON THE PROJECT FOR UPGRADING POWER GRID IN THE REPUBLIC OF PALAU

DRAFT FINAL REPORT

JUNE, 2022
JICA PREPARATORY SURVEY TEAM

Contents

1. Background of the Project

The Government of Palau set a goal

to increase the share of renewable energy to 45 % of total domestic power generation by 2025

- Revised the National Long-Term Energy Policy in 2015
- Palau Energy Roadmap in 2017
- Statement the goal as an NDC under the Paris Agreement

However,

there are concerns about the stable power supply in the future caused by the followings;

- Not enough transmission and distribution facilities to meet the national energy ratio targets.
- Unstable power supply greatly hinder economic development and the improvement of people's living standards.

In response,

the Government of Palau requested an assistance for *"the Project for Upgrading Power Grid"* from Japan.

1. Background of the Project

Objectives of the Project

- To improve the reliability and stability of electricity supply and to promote the introduction of renewable energy on the islands of Koror and Babeldaob,
- To improve of the living environment of residents
- To reduce of greenhouse gas emissions

2. Purpose of the Second Field Survey

Explanation of the Draft Final Report

- Scope of the Project
- Outline Design
- Project Cost
- Undertakings by the Recipient side
- Schedule
- Conclusion of Technical Notes

Reminder

- The Preparatory Survey Report will be used to decide by the Japanese Government whether some components of the Project are executed in the scheme of the Japan's Grant Aid or not.

3. Scope of the Project Summary of the Project Components

Main components	Quantity
Procurement and Installation	
1. Construction of 34.5 kV transmission line (Malakal – Kokusai line)	
(a) 34.5 kV overhead line	Approx. 32.0 km
(b) 34.5 kV underground cable	Approx. 3.0 km
(c) 34.5 kV transmission line (KB Bridge)	Approx. 0.3 km
(d) 34.5 kV underground cables (to the transmission line outlets of Malakal, Airai and Kokusai Substations)	1 lot
2. Construction of 13.8 kV distribution line (up to the existing connection point)	
(a) 13.8 kV overhead line and underground cable (up to the distribution line outlets of Malakal Power Plant)	1 lot
3. Expansion of Malakal Power Plant	
(a) 15 MVA 34.5/13.8 kV transformer	1 unit
(b) 34.5 kV switchgear (indoor)	4 lots
4. Renewal of Airai Substation	
(a) 15 MVA 34.5/13.8 kV transformer	1 unit
(b) 34.5 kV switchgear (indoor)	3 lots
5. Expansion of Kokusai Substation	
(a) 34.5 kV switchgear (indoor)	5 lots
Supply	
1. Maintenance tools for procured materials and equipment	1 lot
2. Spare parts and Consumables for procured materials and equipment	1 lot
Construction	
1. New substation building	3 buildings
2. Civil engineering work	1

3. Scope of the Project — Prioritization of the Project Components

No.	Component	Comment
1	34.5kV transmission line (Malakal - Kokusai line)	- The details of the IPP project and its progress toward the Palau government's renewable energy percentage target confirm the appropriateness of the expansion of the transmission and substation facilities in terms of the Palau government's policy aspects and the needs of the implementing agencies. - The project is promoted by the Asian Development Bank (ADB), which is consistent with development cooperation agencies.
2	-Expansion of Malakal Power Plant -Expansion of Kokusai Substation -13.8kV distribution line (Connection point)	- Additional facilities are essential to the construction of the transmission line, and the project will not be effective without the ancillary implementation of these components.
3	Construction of Koror Substation	- The operation of the substation will significantly improve the reliability of the power system, and since it is a facility to meet future demand, it is expected to enhance the impact of project implementation and provide sustainable benefits. - A candidate construction site has been selected, and preparations on the Palau side are progressing, including agreement at a stakeholder meeting to acquire the site.

Remarks:

As for the "3 Construction of Koror Substation" circled in blue, the component has a high priority as it was proposed in the "Power System Priority Plan 2021-2025" developed by PPUC and in the JICA Master Plan. However, the project was out of scope due to difficulties in selecting a candidate site for construction on the Palau side.

3. Scope of the Project — Location of the Project Sites

34.5 kV transmission line and
13.8 kV distribution line

Kokusai Substation

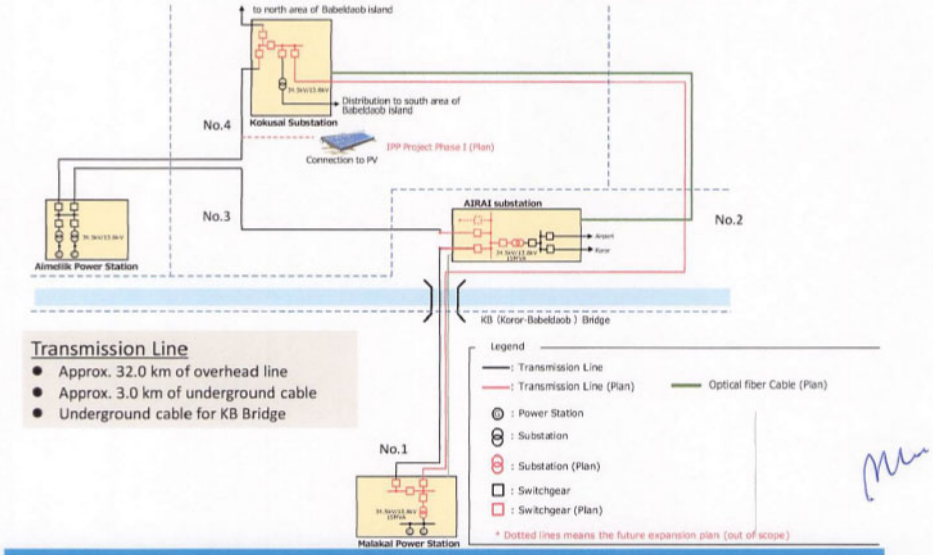
Airai Substation

Malakal Power Plant

3. Scope of the Project — Prioritization of the Project Components

No.	Component	Comment
4	Renewal of Airai Substation	- It has been 35 years since the transformer was installed, and it is deteriorating. Oil leakage occurred in the past, and emergency measures were taken. - Since approximately 40% of Palau's electricity is supplied through the said transformer, the impact on the power supply capacity in the event of failure is significant.
5	Upgrading the Transformer of Malakal power plant	- Twenty-seven years have passed since the transformer was installed: the transformer is aging. The substation is located near the coast, and there are many rusting spots. - Reduced risk of failure of transformers operating one bank, which supply approximately 70% of Palau's electricity, and increased reliability of power supply.
6	Digger Derrick Truck	- The purpose of the grant alone is not sufficient for validity.
7	Construction of Ngchesar substation	- It can be used as a base for supplying electricity to the northern region of Babeldaob Island, allowing for easy planning of the power transmission and distribution network. - There are no potential construction sites, and given the current low load and demand assumptions, there is no urgency to build.
8	Automation of Malakal Power Plant Generator Operation	- PPUC does not see the need to consider it, as it does not directly affect the effectiveness of the project and PPUC is seeking other donor support.
9	Operation guidance for grid monitoring and control (software component)	- PPUC plans to construct a National Control Center to monitor and control the supply of photovoltaic power during the implementation of Phase 1 of the IPP project. - In this project, PPUC will apply equipment specifications and install signal lines that will enable PPUC to monitor and control the grid in the future, and will coordinate with the ADB to promote IPP projects.

3. Scope of the Project — Power System Diagram of the Project Site



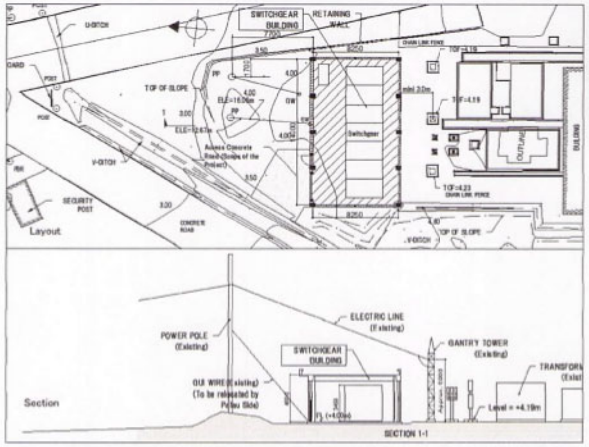
Transmission Line

- Approx. 32.0 km of overhead line
- Approx. 3.0 km of underground cable
- Underground cable for KB Bridge

3. Scope of the Project

Malakal Power Plant

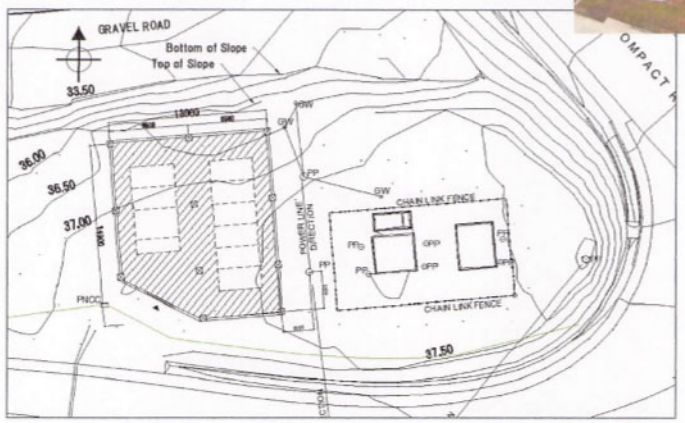
Component
- 15 MVA Main Transformer
- 34.5 kV Switchgear for double circuit
- New Building



3. Scope of the Project

Kokusai Substation

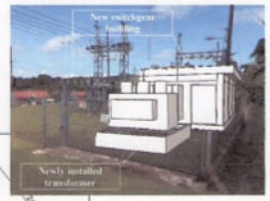
Component
- 34.5 kV Switchgear for double circuit
- New Building

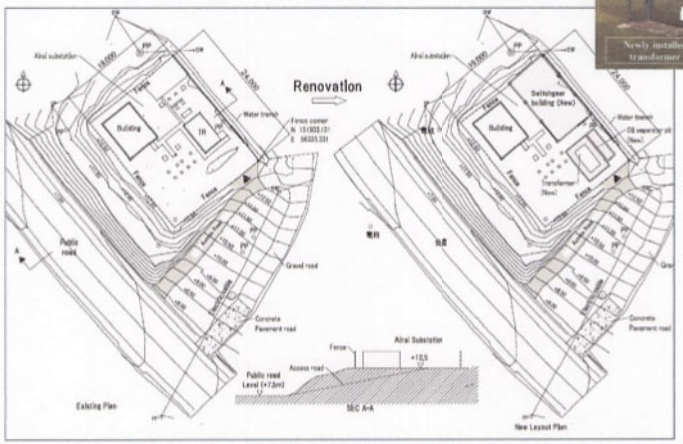


3. Scope of the Project

Airai Substation

Component
- 15 MVA Main Transformer
- 34.5 kV Switchgear for double circuit
- New Building





4. Environmental and Social Considerations

Schedule of EIA and ARAP

	2021			2022												2023		
	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
Preparation of ARAP																		
Meetings with Affected Landowners																		
Organizational Preparations																		
Land Acquisition																		
Grievance Redress Mechanism																		
Monitoring																		
Grant Agreement																		
Detailed Design																		
Bid Notice																		

Remark: Implementation of ARAP should be fully completed before the Bid Notice.

4. Environmental and Social Considerations
Land Acquisition and Resettlement

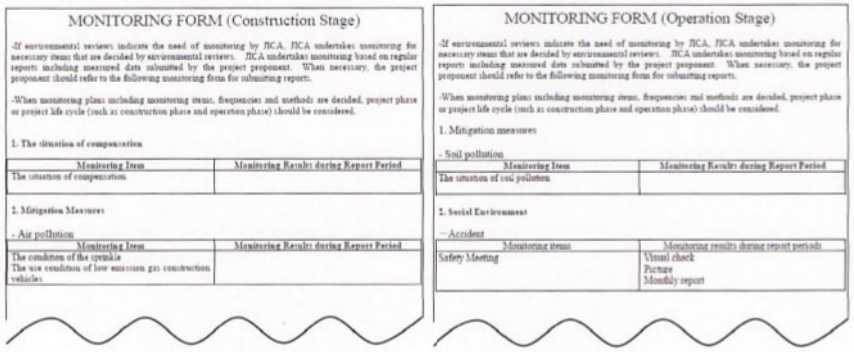
Sites to be Affected by the Project

Land	Area (m^2)
Koror state: (10) lands	2,139.03
Airai state: (12) lands	1,900.12
Ngchesar state: (5) lands	1,039.46
Ngatpang state: (2) lands	348.29
Total : (29) lands	5,426.90

Trees to be Affected by the Project

Types of trees	Number of trees
Coconut and Mango etc. (Large size)	361
Coconut and Mango etc. (Small size)	26
Total	387

4. Environmental and Social Considerations
Monitoring Form



MONITORING FORM (Construction Stage)

-If environmental reviews indicate the need of monitoring by JICA, JICA undertakes monitoring for necessary items that are decided by environmental reviews. JICA undertakes monitoring based on regular reports including measured data submitted by the project proponent. When necessary, the project proponent should refer to the following monitoring items for submitting reports.

-When monitoring plans including monitoring items, frequencies and methods are decided, project phase or project life cycle (such as construction phase and operation phase) should be considered.

1. The situation of compensation

Monitoring Item	Monitoring Results during Report Period
The situation of compensation	

2. Mitigation Measures

- Air pollution

Monitoring Item	Monitoring Results during Report Period
The condition of the sprinkle The use condition of low emission gas construction vehicles	

MONITORING FORM (Operation Stage)

-If environmental reviews indicate the need of monitoring by JICA, JICA undertakes monitoring for necessary items that are decided by environmental reviews. JICA undertakes monitoring based on regular reports including measured data submitted by the project proponent. When necessary, the project proponent should refer to the following monitoring items for submitting reports.

-When monitoring plans including monitoring items, frequencies and methods are decided, project phase or project life cycle (such as construction phase and operation phase) should be considered.

1. Mitigation measures

- Soil pollution

Monitoring Item	Monitoring Results during Report Period
The situation of soil pollution	

2. Social Environment

- Accident

Monitoring items	Monitoring results during report periods
Safety Meeting	Visual check Picture Monthly report

Remarks: The parties are responsible for conducting environmental management and monitoring.

	[Implementation]		[Supervising]
Before Construction:	PPUC	to	MPII
During Construction:	The Contractor	to	PPUC and EQPB
During Operation:	PPUC	to	MPII

5. Major Undertakings Before the Bid

No.	Items	Japan side	Palau side	In charge
A. Before the Bidding				
1	To sign the banking arrangement (B/A) with a bank in Japan (the Agent Bank) to open bank account for the Grant	-	●	MOF
2	To issue the authorization to pay (A/P) to the Agent Bank for the payment to the Consultant	-	●	MOF
3	To bear the following commissions to the Agent Bank for the banking services based upon B/A 1) Advising commission of A/P 2) Payment commission for A/P	- -	● ●	MOF
4	To approve EA/EIS (conditions of approval should be fulfilled, if any) and secure the necessary budget for the implementation of EMP and EMoP (and fulfilling conditions of approval, if any)	-	●	PPUC
5	To secure the necessary budget and implement land acquisition and resettlement (including preparation of resettlement sites), and compensation with full replacement cost in accordance with RAP	-	●	MOF
6	To implement social monitoring, and to submit the monitoring results to JICA, by using the monitoring form, on a quarterly basis as a part of Project Monitoring Report	-	●	PPUC
7	To secure and clear the following lands (land acquisition and the compensation, cutting trees, and clearance of obstacles) 1) project sites - for Kokusai Substation, Malakal Power Plant (if necessary) - for 34.5 kV transmission/ 13.8 kV distribution line within the right of way (approx. 32 km of overhead line route and approx. 3 km of underground cable route) 2) temporary storage yard for the equipment and materials	-	●	MPII/ PPUC
8	To obtain the planning, zoning, building permit from relevant authority (State Government of Koror, Airai, Ngatpang, Ngchesar and/or Others, if any)	-	●	PPUC
9	To clear, level and reclaim the following sites 1) leveling and reclaiming the sites - for Kokusai Substation, Malakal Power Plant (if necessary)	●	-	PPUC
10	To submit Project Monitoring Report (with the result of Detailed Design)	-	●	PPUC
11	To obtain permit for the Project implementation from relevant authority (right of way from road authority, State Government of Koror, Airai, Ngappang and/or Others, if any)	-	●	PPUC
12	To obtain earthmoving permit from EQPB	-	●	PPUC
13	To explain the Project to the residents living near the facility construction site and hold stakeholder meetings	-	●	PPUC

5. Major Undertakings During the Project Implementation (1)

No.	Items	Japan side	Palau side	In charge
B. During the Project Implementation				
1	To issue A/P to the Agent Bank for the payment to the supplier and the contractor	-	●	MOF
2	To bear the following commissions to the Agent Bank for the banking services based upon the B/A 1) Advising commission of A/P 2) Payment commission for A/P	- -	● ●	MOF
3	to ensure prompt unloading and customs clearance at ports of disembarkation in the country of the Recipient and to assist the Supplier(s) with internal transportation therein	-	●	MPII/ PPUC
4	To accord Japanese physical persons and/or physical persons of third countries whose services may be required in connection with the supply of the products and the services such facilities as may be necessary for their entry into the country of the Recipient and stay therein for the performance of their work	-	●	MPII/ PPUC
5	To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the country of the Recipient with respect to the purchase of the products and/or the services be exempted and/or be borne by its designated authority without using the Grant	-	●	MOF/ MPII
6	To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project	-	●	MPII/ PPUC
7	To notify JICA promptly of any incident or accident, which has, or is likely to have, a significant adverse effect on the environment, the affected communities, the public or workers	-	●	PPUC
8	To submit Project Monitoring Report after each work under the contract(s) such as shipping, hand over, installation and operational training	-	●	PPUC
9	To submit Project Monitoring Report (final) (including as-built drawings, equipment list, photographs, etc.)	-	●	PPUC
10	To submit a report concerning completion of the Project	-	●	PPUC

5. Major Undertakings During the Project Implementation (2)

No.	Items	Japan side	Palau side	In charge
B. During the Project Implementation				
11	To construct access roads (if any) 1) Outside the Project site (access road within the Project site is borne by Japan side)	-	●	PPUC
12	To provide facilities for distribution of electricity, water supply and drainage and other incidental facilities necessary for the implementation of the Project outside the site(s)	-	●	PPUC
13	To provide equipment, furniture, facilities necessary for the implementation of the Project in the site(s)	-	●	PPUC
14	To ensure the safety of persons engaged in the implementation of the Project	-	●	PPUC
15	To construct fence and gate around substation (However, if the fence needs to be restored due to the work in Airai Substation, this work will be borne by the Japanese side.)	-	●	PPUC
16	To implement EMP and EMoP	-	●	PPUC
17	To submit results of environmental monitoring to JICA, by using the monitoring form, on a quarterly basis as a part of Project Monitoring Report	-	●	PPUC
18	To implement RAP (livelihood restoration program)	-	●	MPII/PPUC
19	To implement social monitoring, and to submit the monitoring results to JICA, by using the monitoring form, on a quarterly basis as a part of Project Monitoring Report - Period of the monitoring may be extended if affected persons' livelihoods are not sufficiently restored. Extension of the monitoring will be decided based on agreement between PPUC and JICA.	-	●	PPUC
20	Construction of building and civil work	●	-	

5. Major Undertakings During the Project Implementation (3)

No.	Items	Japan side	Palau side	In charge
B. During the Project Implementation				
21	Procurement, installation, testing and adjustment of the Equipment and materials for the Project	●	-	
22	Procurement of the Spare parts and consumables	●	-	
23	Procurement of the Maintenance tools	●	-	
24	On-the-job training (OJT) for the Equipment	●	-	
	Transmission Line			
25	Survey of underground utilities including water pipes, communication line, unexploded ordnance search and removal (approx. 32 km of overhead line route and approx. 3 km of underground cable route)	-	●	PPUC
26	Rearrangement work of the attached equipment of existing poles for installation of 34.5 kV transmission line to be done by Japan side (13.8 kV distribution line, distribution transformer, low voltage distribution line, etc.)	-	●	PPUC
27	Temporary power outage plan for 34.5 kV transmission line during the work including the notice to the residents	-	●	PPUC
28	Re-connecting of existing 34.5 kV line to new line, and existing 13.8 kV line to new line for Malakal Power Plant (With the consensus and the presence of the Personnel of PPUC)	●	-	
29	Restoration of roads after pole erection and buried cables	●	-	
	Substation			
30	Site creation work for Kokusai Substation	●	-	
31	Application for transportation permit of heavy goods to relevant authority with improving the existing access roads from the port of Palau to the Project sites, if necessary	-	●	PPUC
32	Construction of access road within project site and parking lot for Malakal Power Plant	●	-	
33	Temporary power outage plan for substation during the work including the notice to the residents	-	●	PPUC
34	Removal and disposal of existing equipment in Airai Substation, Malakal Power Plant, and Other substation (if any) in order to install substation equipment by the Japanese side	-	●	PPUC

5. Major Undertakings After the Project

No.	Items	Japan side	Palau side	In charge
C. After the Project				
1	To implement EMP and EMoP	-	●	PPUC
2	To submit results of environmental monitoring to JICA, by using the monitoring form, semiannually - The period of environmental monitoring may be extended if any significant negative impacts on the environment are found. The extension of environmental monitoring will be decided based on the agreement between PPUC and JICA	-	●	PPUC
3	To carry out the following to maintain and use properly and effectively the facilities constructed and equipment provided under the Grant Aid 1) Allocation of maintenance cost 2) Operation and maintenance structure 3) Routine check/Periodical inspection	-	●	PPUC
4	Disposal of removed existing equipment	-	●	PPUC

Abbreviations:

A/P	: Authorization to Pay	EoJ	: Embassy of Japan
B/A	: Banking Arrangement	G/A	: Grant Agreement
EA	: Environmental Assessment	JICA	: Japan International Cooperation Agency
EIS	: Environmental Impact Statement	MOF	: Ministry of Finance
EMP	: Environmental Management Plan	MPII	: Ministry of Public Infrastructure and Industries
EMoP	: Environmental Monitoring Plan	PPUC	: Palau Public Utilities Corporation

6. Project Evaluation

Preconditions

- To minimize the power outage as much as possible.
- New transmission line shall be constructed in advance to reduce the power outage time.
- Consideration should be given to the use of bypass cables or emergency generators to supply temporary power to critical loads such as the 13.8 kV airport line supplied from Airai Substation, where temporary power outages are not allowed.
- To examine and clarify a protection relay system based on the coordination with existing facilities.
- No significant change in the scope of environmental and social impacts in the project area.
- To monitor the project to ensure that the private landowners area affected by the project are compensated.

6. Project Evaluation

Quantitative Key Indicators

Performance Indicators	Reference value (2021) Actual value	Target value (2027) (3 years after the start of service)
Transformer capacity (MVA)	51.05	61.05 (+10)
Reduction of transmission loss (MWh)	0	Without Project: 68,200 With Project: 65,240 Difference: 2,960
Reduction in CO_2 emissions (t-CO_2/year) -due to reduction of transmission loss	0	1,678
Reduction in CO_2 emissions (t-CO_2/year) -due to reduction of solar PV facilities by IPP Project (For reference)	0	7,620
SAIDI (Duration of power outage) (minutes/year/household)	1621	924
SAIFI (Frequency of power outage) (times/year/household)	30.82	19.82

Remarks: Target Value is subject to change depends on the result of further study

6. Project Evaluation

Benefit

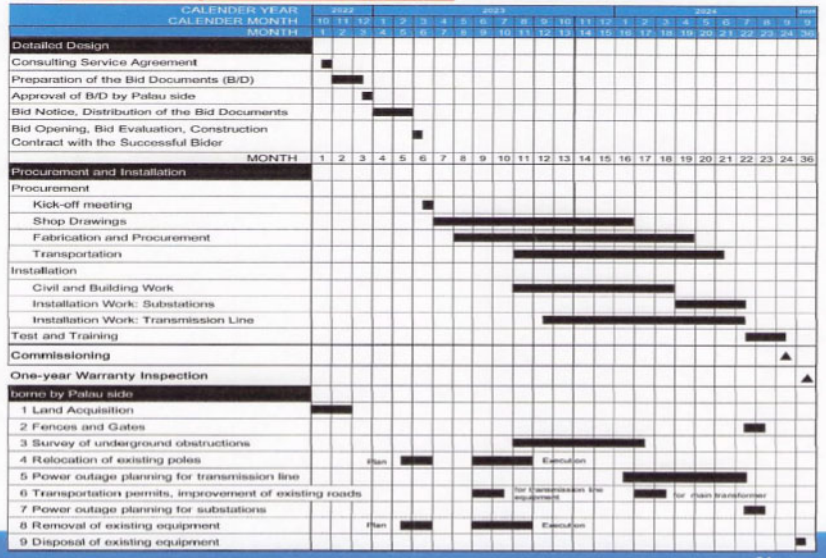
- The reduction of the maintenance burden on PPUC staff.
- promote the economic activities in Palau
- Solar power generation facilities by the IPP to be able to supply the full generation capacity

Ex-Post Evaluation

- Three years after project completion
- Criteria (ex. Relevance, Effectiveness, Efficiency, Impact, Sustainability)
- The result will be publicized

7. Timeline for the Project Implementation

Tentative Implementation Schedule



Thank you for your attention

Attachment 2: Project Implementation Schedule

As of 20th June, 2022

Project Implementation Schedule (Tentative)

The Project for Upgrading Power Grid

Consultant: Yachiyo Engineering Co., Ltd.