

(2) Minutes of Discussion of DOD (October 8th, 2020, On-line Conference)

**Minutes of Discussions  
on the Preparatory Survey for the Project for  
the Construction of Hydropower Station in Espiritu Santo Island  
(Explanation on Draft Preparatory Survey Report)**

With reference to the minutes of discussions signed between Ministry of Climate Change Adaptation, Meteorology, Geo-Hazards, Environment and Energy and the Japan International Cooperation Agency (hereinafter referred to as "JICA") on, 16<sup>th</sup> November, 2018, and in response to the request from the Government of Republic of Vanuatu (hereinafter referred to as "Vanuatu") dated 20<sup>th</sup>, August, 2019, JICA held on-line meeting for explanation of the Draft Preparatory Survey Report (hereinafter referred to as "the Draft Report") on the Project for the Construction of Hydropower Station in Espiritu Santo Island (hereinafter referred to as "the Project").

As a result of the discussions, both sides agreed on the main items described in the attached sheets.

Port Vila, 8<sup>th</sup>, October, 2020

Tokyo, 8<sup>th</sup>, October, 2020



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Director

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Energy

Vanuatu



## ATTACHEMENT

### 1. Objective of the Project

The objective of the Project is to decrease dependence on imported fuel through construction of a new run-of-river type hydro power station, thereby contributing to economic and social development of the region.

### 2. Title of the Preparatory Survey

Both sides confirmed the title of the Preparatory Survey as “the Preparatory Survey for the Project for the Construction of Hydropower Station in Espiritu Santo Island”.

### 3. Project site

Both sides confirmed that the site of the Project is in Espiritu Santo Island, 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 Department of Energy, Ministry of Climate Change Adaptation, Meteorology, Geo-Hazards, Environment and Energy 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 charts are shown in Annex 2.

4-2. The Vanuatu Utility and Infrastructure Limited (hereinafter referred to as “VUI”), will be commissioned operation and maintenance of the Project under existing concessional agreement for the Sarakata hydro power plant. The Executing Agency confirmed that the existing agreement is valid until 2040, and there is no defect to include the Project in it from legal point of view.

### 5. Contents of the Draft Report

After the explanation of the contents of the Draft Report by Japanese side, the Vanuatu side agreed to its contents and implementation schedule as described in Annex 3 and

4. JICA will finalize the Preparatory Survey Report based on the confirmed items. The report will be sent to the Vanuatu side around middle of December.

6. Cost estimate

The both sides confirmed that the cost estimate including the contingency explained by JICA is provisional and will be examined further by the Government of Japan for its approval. The contingency would cover the additional cost against natural disaster, unexpected natural conditions, etc.

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 Vanuatu side agreed that the procedures and basic principles of Japanese Grant (hereinafter referred to as “the Grant”) as described in Annex 5 shall be applied to the Project. In addition, the Vanuatu side agreed to take necessary measures according to the procedures.

9. Timeline for the project implementation

Japanese side explained to the Vanuatu 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 Vanuatu side will be responsible for the achievement of agreed key indicators targeted in year 2028 and shall monitor the progress for Ex-Post Evaluation based on those indicators.

[Quantitative indicators]

- Electric power sales (MWh/year)
- Reduction of greenhouse gasses (ton/year)
- Fuel cost for diesel power generation (kliter/year)

[Qualitative indicators]

- Promoting the use of renewable energy, which contributes to improved economic/social development and reduction of greenhouse gas emissions
- Diversification of electric power supply sources
- Achievement of a stable energy supply

- Expansion of power supply area and improvement of public services
- Improvement of public security and promotion of community activities

#### 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 Vanuatu side is required to provide necessary support for the data collection.

#### 12. Technical assistance (“Soft Component” of the Project)

Considering the sustainable operation and maintenance of the products and services granted through the Project, following technical assistance is planned under the Project. The Vanuatu side confirmed to deploy necessary number of counterparts who are appropriate and competent in terms of its purpose of the technical assistance as described in the Draft Report.

#### 13. Undertakings of the Project

Both sides confirmed the undertakings of the Project as described in Annex 6. With regard to exemption of customs duties, internal taxes and other fiscal levies as stipulated in of Annex 6, both sides confirmed that such customs duties, internal taxes and other fiscal levies, which shall be clarified in the bid documents by the Executing Agency during the implementation stage of the Project.

The Vanuatu 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 6 will be used as an attachment of G/A.

Both sides confirmed that the Executing Agency shall take necessary measures to ensure and maintain the safety of the Project site and the persons related to the implementation of the Project, in cooperation with relevant authorities during the Project period. Such safety measures shall reasonably reflect needs of the Consultant/the Contractor engaging in the Project, as shown in Annex 6.

Both sides agreed that in case the additional safety cost would be necessary for the implementation of the Project, such cost shall be borne by the Recipient without using the Grant.

14. 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 7. The timing of submission of the PMR is described in Annex 6.

15. 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.

16. Items and measures to be considered for the smooth implementation of the Project

The both sides confirmed the items and measures to be considered for the smooth implementation of the Project as below:

16-1 Coordination with the Utility Regulatory Authority

The Utility Regulatory Authority (hereinafter referred to as “URA”) plays a critical role in the Project in terms of concessional agreement on operation and maintenance, tariff setting, and contribution to the Green Energy Fund. The both sides agreed that the Executing Agency make coordination with URA to obtain approval necessary for the Project implementation, and secure budget for operation and maintenance to ensure sustainability of the Project.

17. Environmental and Social Considerations

17-1-1 Environmental Guidelines and Environmental Category

Japanese side 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 likely to have significant adverse impact on the environment under the JICA guidelines for environmental and social considerations April 2010 in terms of its sectors, characteristics and areas.

17-2 Issues need to be considered in the Survey

17-2-1 Stakeholder Meeting

As a formal procedure of the environmental and social consideration, it was agreed that the Executing Agency will organize a remaining stakeholder meeting for the affected land by in October to obtain consensus for the Project.

### 17-1-3 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 8. Both sides confirmed that in case of major modification of the content of the Environmental Checklist, the Vanuatu side shall submit the modified version to JICA in a timely manner.

### 17-4 Environmental Issues

#### 17-4-1 Environmental Impact Assessment (EIA)

Both sides confirmed the Executing Agency can start land acquisition procedures with the final EIA report as soon as the Project is approved by the Government of Japan, and will obtain approval by Department of Environment Protection and Conservation before the notice of bidding documents.

#### 17-4-2 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 9, 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.

#### 17-4-3 Other specific environmental issues which need to be confirmed/agreed between the parties.

Both sides confirmed that PEA and/or EIA process for the temporary soil yard will be implemented by DOE before the notice of bidding documents. DOE will secure and clear the land.

### 17-5 Social Issues

#### 17-5-1 Land Acquisition and Resettlement

Both sides confirmed the land for the hydropower facilities and access road would be acquired but no households would be relocated/affected due to the implementation of the Project.

### 17-6 Environmental and Social Monitoring

#### 17-6-1 Environmental Monitoring

Both sides agreed that the Vanuatu 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 6.

#### 17-6-2 Social Monitoring

Both sides confirmed that the Vanuatu side will implement social monitoring about land acquisition and resettlement / indigenous people plan proposed in the RAP / Indigenous People Plan (IPP). The both side agreed that the Executing Agency will submit results of social monitoring to JICA with PMR by using the monitoring form attached as Annex 10.

#### 17-6-3 Information Disclosure of Monitoring Results

The both sides confirmed that the Vanuatu side will disclose results of environmental and social monitoring to local stakeholders through their website / in their field offices.

The Vanuatu side agreed JICA will disclose results of environmental and social monitoring submitted by the Vanuatu side as the monitoring forms attached as Annex 10 on its website.

### 18. Other Relevant Issues

#### 18-1. 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.

#### 18-2 Preparation for the Global Climate Fund

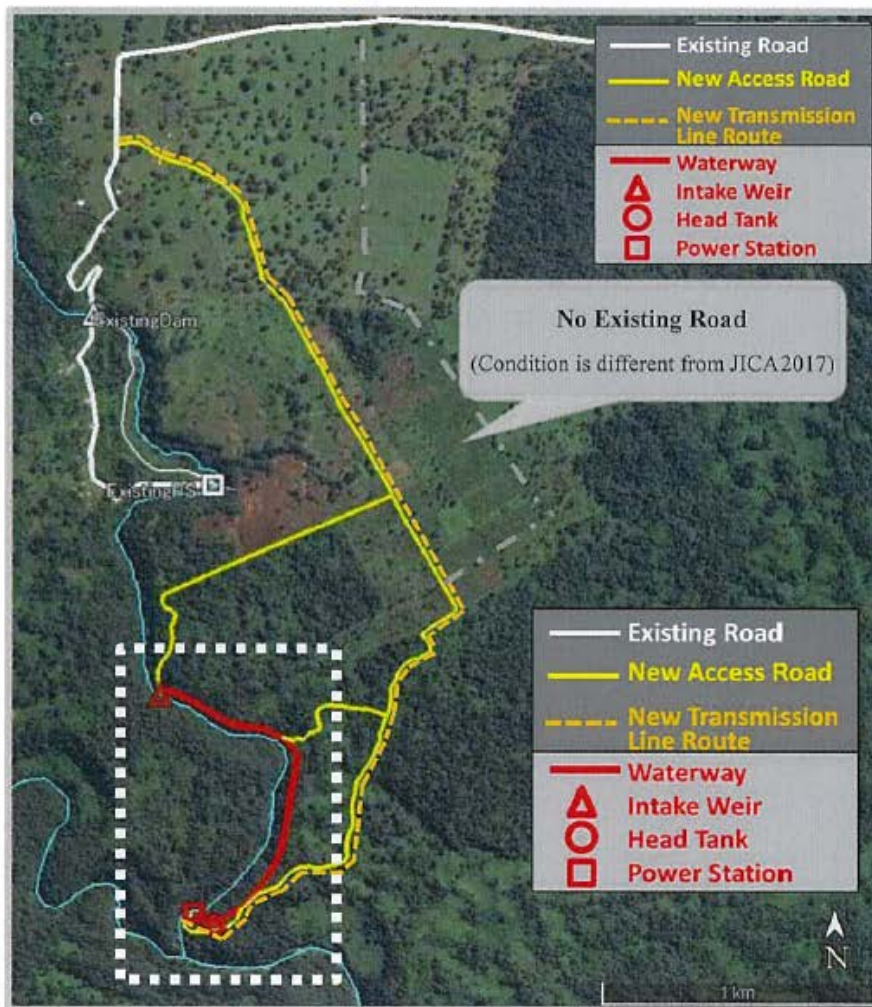
JICA side explained about the proposal options for the Global Climate Fund (hereinafter referred to as "GCF") that can contribute to the policy goal of the government of Vanuatu concerning the climate change, to achieve 100% renewable energy by 2030. The both sides confirmed the option A is preferable considering cost and benefit balance. The Executing Agency will obtain consensus among the concerned departments of the government, and submit the proposal by April 2021 to the designated authority so that the proposal is appraised at the earliest evaluation process of GCF secretariat.

(END)

- Annex 1 Project Site
- Annex 2 Organization Chart
- Annex 3 Outline of the Draft Report
- Annex 4 Project Implementation Schedule
- Annex 5 Japanese Grant Scheme
- Annex 6 Major Undertakings to be taken by the Government of Vanuatu
- Annex 7 Project Monitoring Report (template)
- Annex 8 Environmental Check List
- Annex 9 Environmental Management Plan/Environmental Monitoring Plan
- Annex 10 Environmental and Social Monitoring Form

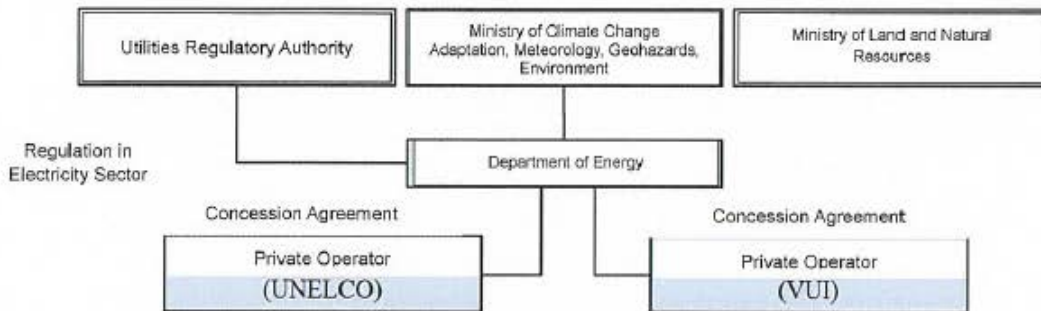


Annex 1 Project Site

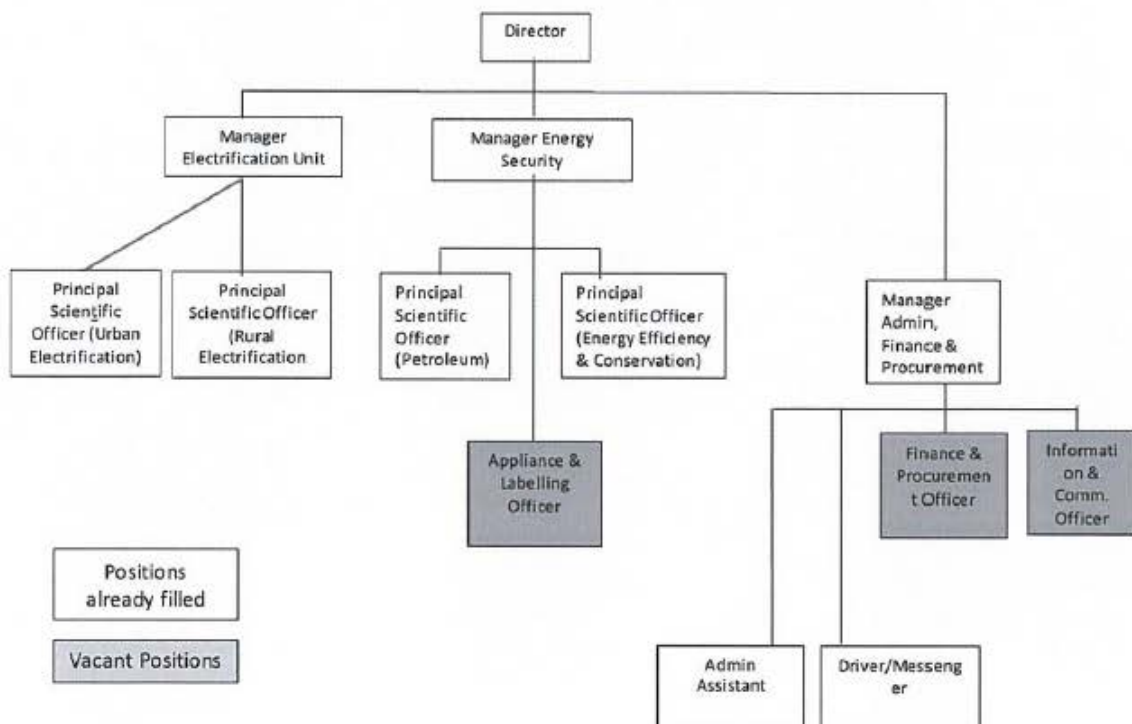


## Annex 2 Organization Chart

### Power Sector Structure in Vanuatu



### Organizational Structure of the Energy Department





Annex 3 Outline of the Draft Report

# PREPARATORY SURVEY FOR THE PROJECT FOR THE CONSTRUCTION OF HYDROPOWER STATION IN ESPIRITU SANTO ISLAND

October, 2020

NEWJEC Inc.  
CTI Engineering International Co., Ltd.



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## PREPARATORY SURVEY FOR THE PROJECT FOR CONSTRUCTION OF HYDROPOWER STATION IN ESPIRITU SANTO ISLAND Preparatory Survey Report (Draft)

October, 2020

### Table of Content

1. Background of the Project
  - 1.1 Background and Outline of the Requested Japanese Assistance
  - 1.2 Natural Conditions
  - 1.3 Environmental and Social Consideration (Excluded)
2. Contents of the Project
  - 2.1 Basic Concept of the Project
  - 2.2 Outline Design of the Japanese Assistance
  - 2.3 Security Plan
  - 2.4 Obligations of Recipient Country
  - 2.5 Project Operation Plan
  - 2.6 Project Cost Estimate
3. Project Evaluation
  - 3.1 Preconditions
  - 3.2 Necessary Inputs by Recipient Country
  - 3.3 Important Assumptions
  - 3.4 Project Evaluation

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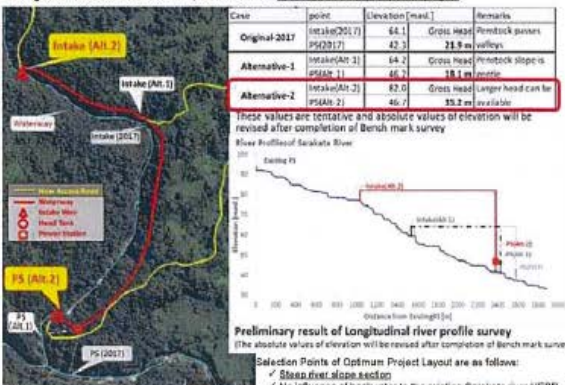
### Site Reconnaissance [Nov. 19-29, 2018]



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### General Plan & Profile of New Sarakata Hydropower Project

Based on site reconnaissance and river profile survey, alternative project layout having higher head in steep river gradient section was identified, which realizes 1,000kW-class hydropower project.



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### General Layout of New Sarakata Hydropower Project

The Project consists of 1,000kW-class hydropower plant, access road, 20kV transmission line and equipment enhancement of Luganville substation.



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### General Layout and Features of New Hydropower Project

Power Generation Type		Run-of-River type
Installed Capacity	Total	1,000 kW
	Single	500 kW
Plant Discharge	Total	4.2 m <sup>3</sup> /s
	Single	2.1 m <sup>3</sup> /s
Head	Gross Head	33.0 m
	Effective Head	32.3 m
Number of Turbine & Generator		unit 2
Annual Power Generation		MWh \$ 020



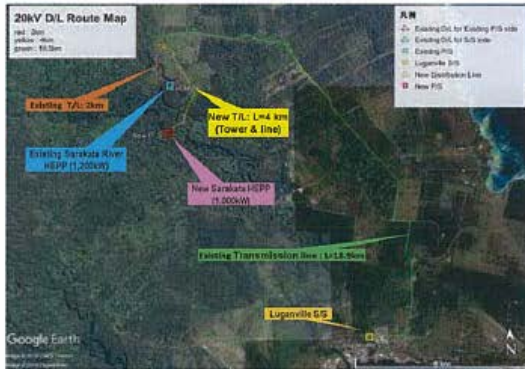
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### Access Route from new P/H to the Existing Road



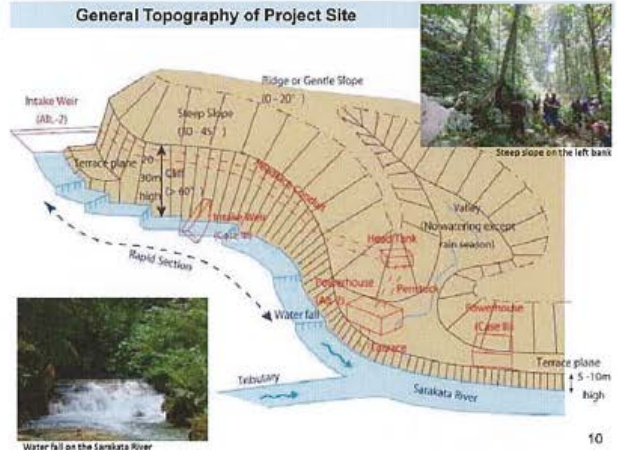
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### 20kV Transmission Line Route from new P/H to Lugenville S/S



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### General Topography of Project Site



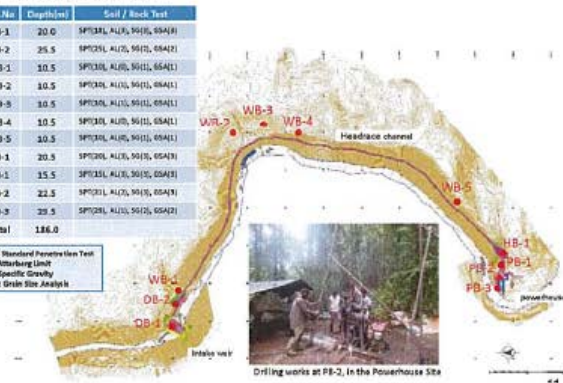
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### Geological Investigations

#### (1) Location of Boring

BH No	Depth (m)	Soil / Rock Test
DB-1	20.0	SP103(L), AL10, 50(10), 65(A1)
DB-2	25.5	SP103(L), AL10, 50(10), 65(A1)
WB-1	10.5	SP103(L), AL10, 50(10), 65(A1)
WB-2	10.5	SP103(L), AL10, 50(10), 65(A1)
WB-3	10.5	SP103(L), AL10, 50(10), 65(A1)
WB-4	10.5	SP103(L), AL10, 50(10), 65(A1)
WB-5	10.5	SP103(L), AL10, 50(10), 65(A1)
HB-1	20.5	SP103(L), AL10, 50(10), 65(A1)
PB-1	15.5	SP103(L), AL10, 50(10), 65(A1)
PB-2	22.5	SP103(L), AL10, 50(10), 65(A1)
PB-3	22.5	SP103(L), AL10, 50(10), 65(A1)
Total	186.0	

SP1: Standard Penetration Test  
 AL: Atterberg Limit  
 SG: Specific Gravity  
 GSR: Gravel Size Analysis



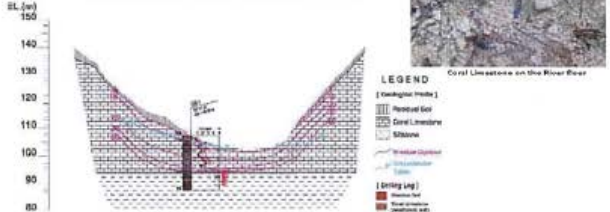
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### Geological Investigations

#### (2) Geologic Condition, Intake Site

Assumed Geological Profile on All-2, Intake Site (Looking from the upstream)

#### GEOLOGICAL PROFILE ALONG THE INTAKE WEIR



#### [Geotechnical Key-Points]

- > Riverbed consists of **gravelly coral limestones** which has 10 – 20 of N-values above 5m deep, on All-2 Intake Site.
- > The **right bank** shows continuous cliff and steep slopes (higher than 20m). A large amount of excavation will be.
- > Coral limestone having **20 of N-value** will possibly underpin the weir with no trouble.

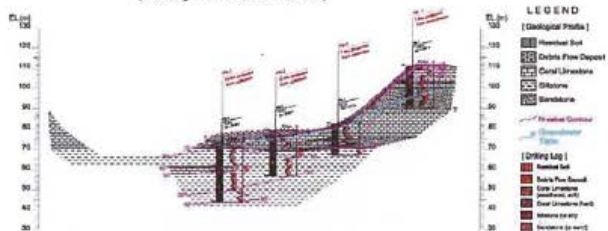
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### Geological Investigations

#### (3) Geologic Condition, Powerhouse Site

Assumed Geological Profile along Head Tank To Tailrace (Looking from the Downstream)

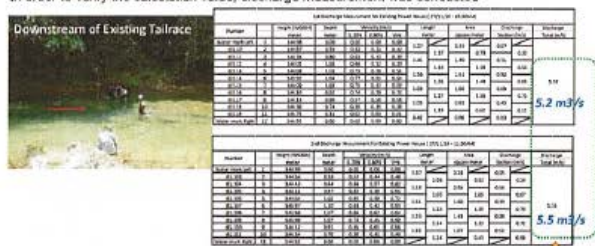


#### [Geotechnical Key-Points]

- > At the Head tank, a massive coral limestone appears within 3m deep.
- > An anchor block at the lower part of the penstock is located, N-values exceed 10 at 2m deep but certainly exceed 20 at 12m deep.
- > A thick siltstone layer continues deeper than 30m in depth. The siltstone has N-values ranging from 20 to 30.

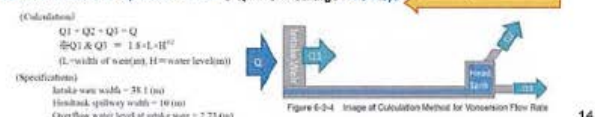
### Discharge Measurement

In order to verify the calculation value, discharge measurement was conducted



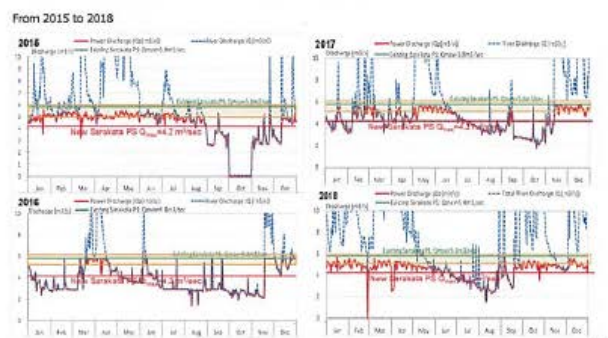
Calculation based on Operation record → Q: River Discharge : 4.9 m³/s

Almost fit well

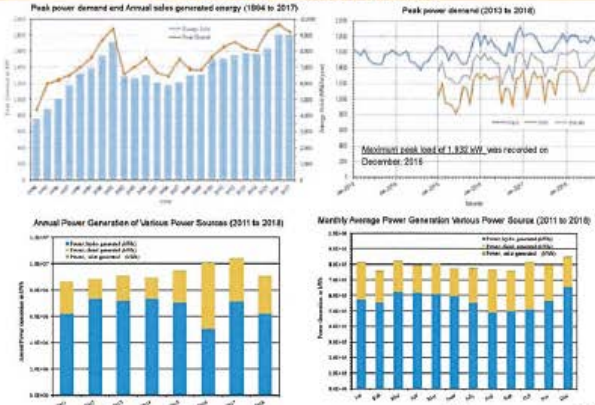


### Daily River Discharge based on Operation Records at Intake

River Discharge from January 2015 to October 2018 was calculated by using operation records of existing Sarakata River Hydropower plant.

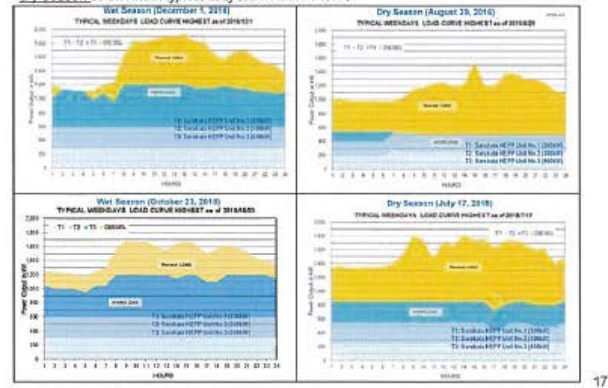


### Peak Load and Generated Energy



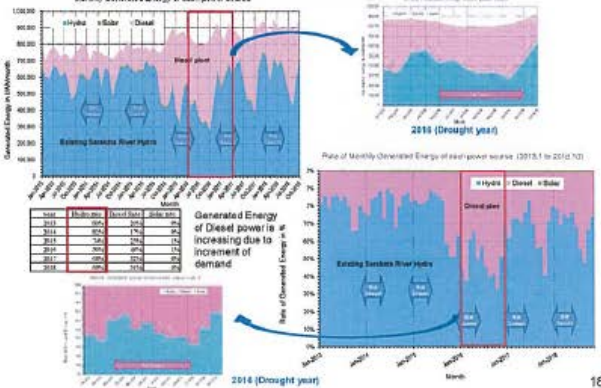
### Typical Daily Load Curve in Wet and Dry Seasons

The peak hour occurs in the daytime and a large amount of thermal generation is required in dry season as shown in typical daily load curves below.



### Hydropower Energy vs Diesel power Energy from 2013 to 2018

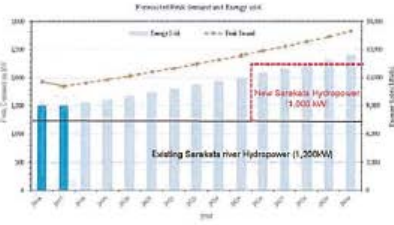
Rate of Hydro energy (Sarakata HEPP) is being decreased to around 70% as shown below. Especially in 2016 of drought year, hydropower rate is decreased up to only 50%.



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### Power Demand Forecast

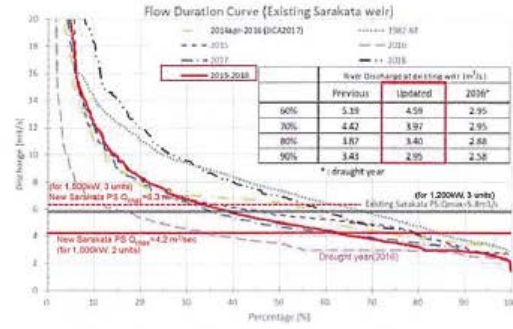
In the last 10 years (2018-2017), peak power demand and annual sales generated energy have increased at the rate of 3.3% and 3.7%, respectively. The power demand forecast up to 2030 was conducted using these rates. Peak demand of 2030 is assumed to be 146 % more than the existing one, i.e. around 2,800 kW and the annual sales of generated energy is assumed to be 160 % more than existing one, i.e. around 14,400 kWh/year.



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### Duration Curve at Intake Weir

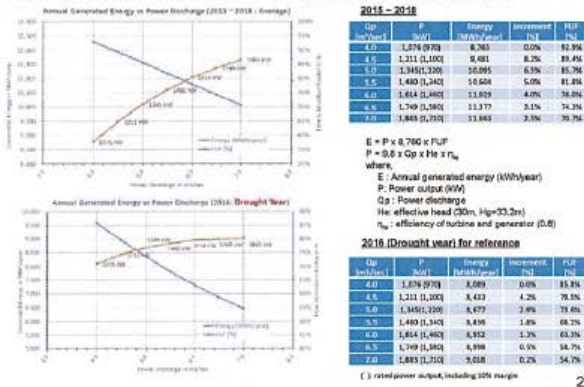
Updated duration curve applied to this scheme is obtained by using the river flow based on the operation records from 2015 to 2018



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### Power Discharge vs Power Output & Generated Energy

Maximum power discharge was determined by means of duration curve by using the river flow based on the operation records from 2015 to 2018 for 1,000kW-scale generation plan.



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### Optimization Study of New Hydropower Plant (1)

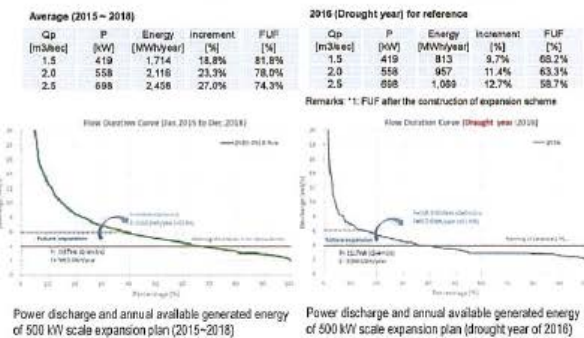
Comparison Study of various power discharge was conducted by using unit construction cost of JPY/kWh

	2 units		3 units		1,000kW		1,500kW	
	1,000kW	1,500kW	1,000kW	1,500kW	1,000kW	1,500kW	1,000kW	1,500kW
Q (m³/sec)	4.0	4.5	5.0	5.5	6.0	6.5	6.5	7.0
Weir H <sub>g</sub>	32.3	32.3	32.3	32.3	32.3	32.3	32.3	32.3
Total P (kW)	1,076	1,150	1,211	1,345	1,486	1,614	1,685	1,749
Total P (kW) (incl.)	970	1,030	1,100	1,220	1,340	1,460	1,540	1,580
20MWh/year	8,760	9,061	9,491	10,090	10,804	11,628	11,244	11,377
Number of unit	2	2	2	3	3	3	3	3
Unit P (kW)	485	510	550	407	447	407	513	527
Cost (cost)	1,632.6	1,852.1	1,861.2	2,010.4	2,060.1	2,108.9	2,136.7	2,168.4
Direct cost	1,243.5	1,256.6	1,276.4	1,364.0	1,387.8	1,431.6	1,451.8	1,471.3
Operation facility	742.7	751.4	767.4	838.3	865.7	893.0	908.4	925.1
Access road	265.6	265.6	265.6	265.6	265.6	265.6	265.6	265.6
Intake road etc.	589.2	596.4	604.8	645.3	662.3	678.3	687.9	697.1
Architectural works	104.4	104.4	104.4	156.6	156.6	156.6	156.6	156.6
Intake gate	83.2	83.2	83.2	124.8	124.8	124.8	124.8	124.8
Intake gate etc.	21.2	21.2	21.2	31.8	31.8	31.8	31.8	31.8
Purchasing and installation of equipment	1,239.5	1,287.0	1,363.0	1,490.6	1,604.5	1,718.5	1,794.4	1,858.7
Construction equipment	1,263.4	1,248.5	1,232.2	1,447.2	1,557.8	1,668.4	1,742.1	1,804.8
Transformer (Japan-style 50Hz)	80.0	80.0	80.0	93.3	93.3	93.3	106.7	106.7
Transmission line (kV-class)	229.3	229.3	229.3	229.3	229.3	229.3	229.3	241.6
General administrative cost	36.1	37.5	39.7	43.4	46.8	50.1	52.3	54.2
Additional 20kV TTL (L=20.5km)	300.0	300.0	300.0	300.0	300.0	300.0	300.0	300.0
Total Construction cost	3,176.5	3,243.5	3,348.6	3,677.6	3,821.3	3,960.0	4,153.7	4,398.7
Total Construction cost incl. 20kV TTL	3,476.5	3,543.5	3,648.6	3,977.6	4,121.3	4,260.0	4,463.7	4,698.7
Construction Cost per kWh	362.5	358.0	353.2	362.3	360.4	361.3	363.6	367.9
Construction Cost per kWh incl. 20kV TTL	399.7	391.1	384.8	392.0	388.7	390.6	394.1	402.8

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### Optimization of 500 kW scale Expansion Plan (1)

Optimum expansion plan is examined by means of duration curve using the river flow based on the operation records from 2015 to 2018



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### Optimization of 500 kW scale Expansion Plan (2)

Construction coverage of the expansion plan (future Unit No.3 of 500kW) during the construction of a new plant is determined considering the following aspects.

Civil facility	new plant construction	expansion construction	(a)	(b)	(c)	(d)	(e)
Intake weir*1	all works incl. expansion	No work	○	○	○	○	○
Intake	all works incl. expansion	No work	○	○	○	○	○
Settling basin	all works incl. expansion	No work	○	○	○	○	○
Headrace (Open channel)	all works incl. expansion	No work	○	○	○	○	○
Head tank	all works incl. expansion	No work	○	○	○	○	○
Spillway	all works incl. expansion	No work	○	○	○	○	○
Penstock	No.1 & 2	No.3	○	○	○	○	○
Foundation of power house	all works incl. expansion	No work	○	○	○	○	○
Power house building	Works for No.1 & No.2 Units	Works for No.3 Unit	○	○	○	○	○
Site preparation of power house	all works incl. expansion	No work	○	○	○	○	○
Tailrace and Outlet	Works for No.1 & No.2 tailrace	Works for No.3 tailrace facility	○	○	○	○	○
Transmission line	Works excl. expansion	Works for additional capacity	○	○	○	○	○
Substation facility	Works excl. expansion	Works for additional capacity	○	○	○	○	○
Turbine and generator	No.1 & No.2 units	No.3 unit	○	○	○	○	○
Control and protection equipment	No.1 & No.2 units	No.3 unit	○	○	○	○	○

- (a) To minimize the stoppage duration of the new power generation during expansion construction
- (b) To shorten the construction duration of expansion scheme
- (c) To largely reduce the construction cost of the expansion scheme
- (d) Not necessary to carry out repair and replacement works caused by deterioration during expansion construction
- (e) Design changes of expansion scheme will not occur even though the expansion construction is conducted earlier

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### Optimization Study of New Hydropower Plant (2)

Present scheme (1,000kW) including expansion work and expansion work (500kW)

	Present scheme (1,000 kW)	Expansion work (500 kW)	After Expansion work (1,500 kW)	Rate of present scheme to AF works (%)
Q (m³/sec)	4.2	2.1	8.3	
W (m)	32.3	32.3	32.3	
Total P (kW)	1,130	665	1,695	
Total P (kW/ratio)	1,630	510	1,540	
ESM00/year	9,061	2,111	11,172	
Number of unit	2	1	3	
Unit P (kW)	510	510	513	
Civil works	2,085.3	88.1	2,173.4	96.8%
Linear cost	1,414.9	46.2	1,461.1	96.8%
Generation facility	879.5	37.4	916.9	95.8%
Access road	265.6	0.0	265.6	100.0%
Intake cost etc.	670.4	21.9	692.3	96.8%
Headrace works	124.4	32.2	156.6	86.7%
Outlet cost	83.2	41.6	124.8	66.7%
Outlet cost etc.	21.2	10.8	31.8	66.7%
Purchase and Installation of Equipment	1,287.0	525.4	1,812.4	71.0%
Generating equipment	1,249.5	510.1	1,759.6	71.0%
Transformer (Laganville 500V)	90.0	40.0	130.0	66.7%
Transmission line (Laganville)	229.3	0.0	229.3	100.0%
General administrative cost	37.5	19.9	57.4	71.0%
Additional 300V TL (2005new)	0.0	330.0	330.0	0.0%
Total Construction cost	3,476.7	845.7	4,322.4	84.5%
Total Construction cost incl. 20kV TL	3,476.7	845.7	4,322.4	78.6%
Construction Cost per kWh	383.8	305.8	389.0	
Construction Cost per kWh incl. 20kV TL	383.7	305.8	395.8	

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### Power Generation Plan

Head tank WL	105.1m
Tailrace pit WL	In operation 72.2m (for Maximum power discharge) in stopping 71.5m
Gross head	32.9m (for Maximum power discharge)
Maximum power discharge	4.2m³/sec (total of 2 units)
Effective head	32.3m
Maximum power output	1,100 kW <sup>1</sup> (each unit 565kW <sup>1</sup> , combined efficiency of turbine and generator η=0.85) <sup>1</sup> : considering around 10% margin for 1,000kWscale

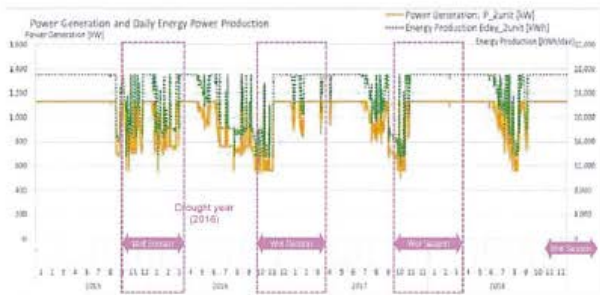
		2015	2016	2017	2018	Average
Jan	MWh/month	841	689	793	841	791
Feb	MWh/month	759	559	730	758	702
Mar	MWh/month	841	759	824	841	816
Apr	MWh/month	814	814	807	814	812
May	MWh/month	841	771	841	841	823
Jun	MWh/month	-	750	814	799	787
Jul	MWh/month	841	589	812	696	734
Aug	MWh/month	638	563	669	585	609
Sep	MWh/month	636	569	637	751	648
Oct	MWh/month	-	487	505	841	611
Nov	MWh/month	632	585	793	814	706
Dec	MWh/month	766	841	841	841	822
Annual	MWh/year		7,975	9,085	9,420	8,922
FUF (%)		80.56%	91.78%	95.17%	90.13%	

Drought year

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### Power Generation Plan

Power output and energy production of a new Sarakats hydropower plant were calculated by the river flow based on the operation records from 2015 to 2018.



Calculation results of generated energy based on duration curve of each year (2015~2018)

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### Basic Design of Civil Facilities (1)

#### (1) Overall Plan

Civil facilities of the new hydroelectric power plant consist of the intake weir, sand settling basin, headrace channel, head tank, penstock, spillway, tailrace and powerhouse.

The power discharge of 4.2 m³/sec for two (2) units of hydraulic turbines is taken from the river and transmit it to the turbine, and release it back to the river.

The main components of civil engineering facilities are shown below.

Components	Specifications
Intake weir	H=12.5m, W=57.8m
Sand settling basin	L=27.25m, H=4.1m, W=7m
Headrace channel	Single line, L=1.2km, W=2m, H=2m, Slope=1/500
Head tank	L=38m, H=3.9m, W=8m
Penstock and spillway	ID1,500mm-ID1,100mm, L=59.8m / ID1,500mm-ID1,100mm, L=43.0m
Tailrace channel	2 lines, No.1 L=1m, W=1m, H=1.8m, Slope=1/100, No.2 L=2m, W=1m, H=1.8m, Slope=1/100
Building of powerhouse	Two-storied reinforced concrete building, total floor area: 350m²

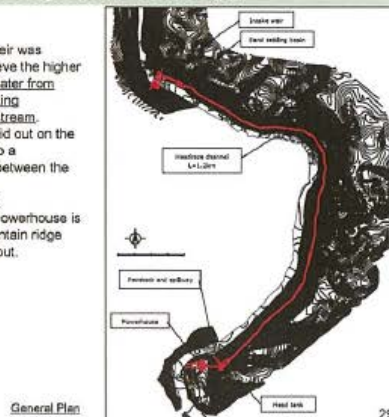
Civil and building structures are designed in conformity with Japanese standards so as to ensure adequate stability, structural mechanics and durability.

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### Basic Design of Civil Facilities (2)

#### (2) Layout Plan

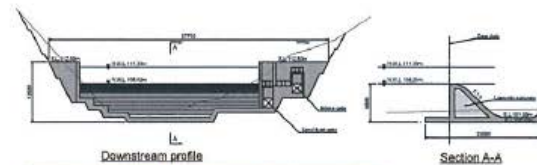
- The location of the intake weir was determined in order to achieve the higher head and to prevent back water from adversely affecting the existing hydropower plant at the upstream.
- The headrace channel is laid out on the left bank of the river, to keep a longitudinal slope of 1/500 between the intake weir and head tank.
- The length of the channel is approximately 1.2km. The powerhouse is located at the foot of a mountain ridge where the head tank is set out.



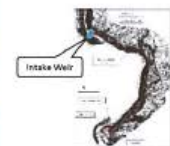
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### Basic Design of Civil Facilities (3)

#### (3) Intake Weir



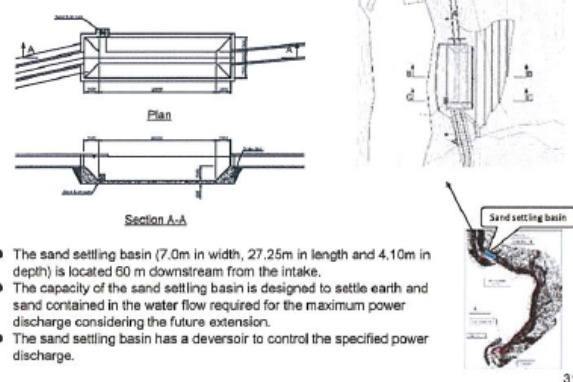
Type of weir	concrete gravity
Gate facilities	intake gate: sluice gate 2m x 2m sand flush gate: sluice gate 2m x 2m
Weir height	12.50m
Crest length	57.75m
Slope gradient	Vertical at upstream 1:1.0 at downstream
Normal water level	EL.108.00m
Flood water level	EL.111.39m
Seismic coefficient	0.15 in horizontal, 0 in vertical



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**Basic Design of Civil Facilities (4)**

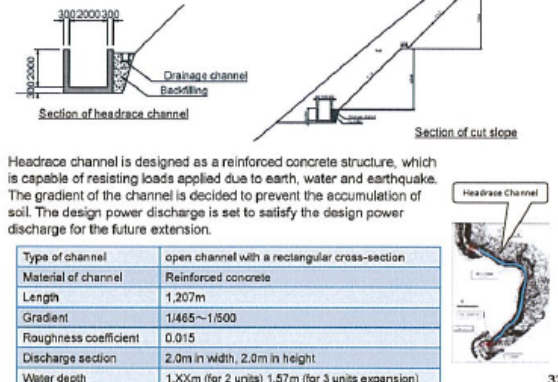
**(4) Sand Settling Basin**



- The sand settling basin (7.0m in width, 27.25m in length and 4.10m in depth) is located 60 m downstream from the intake.
- The capacity of the sand settling basin is designed to settle earth and sand contained in the water flow required for the maximum power discharge considering the future extension.
- The sand settling basin has a deversoir to control the specified power discharge.

**Basic Design of Civil Facilities (5)**

**(5) Headrace Channel**

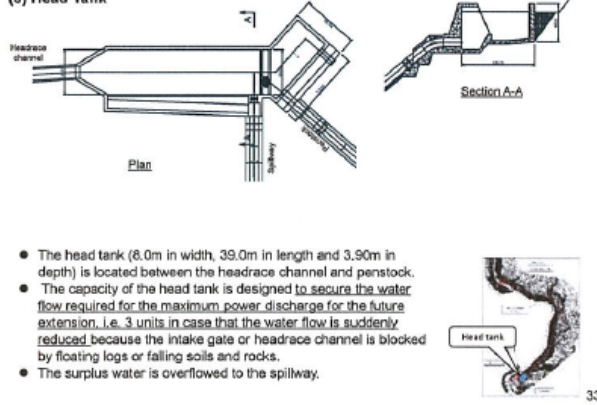


- Headrace channel is designed as a reinforced concrete structure, which is capable of resisting loads applied due to earth, water and earthquake.
- The gradient of the channel is decided to prevent the accumulation of soil. The design power discharge is set to satisfy the design power discharge for the future extension.

Type of channel	open channel with a rectangular cross-section
Material of channel	Reinforced concrete
Length	1,207m
Gradient	1/465~1/500
Roughness coefficient	0.015
Discharge section	2.0m in width, 2.0m in height
Water depth	1.1Xm (for 2 units) 1.57m (for 3 units expansion)

**Basic Design of Civil Facilities (5)**

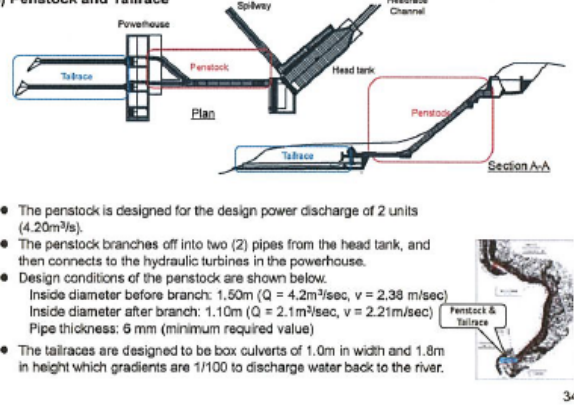
**(5) Head Tank**



- The head tank (8.0m in width, 39.0m in length and 3.90m in depth) is located between the headrace channel and penstock.
- The capacity of the head tank is designed to secure the water flow required for the maximum power discharge for the future extension, i.e. 3 units in case that the water flow is suddenly reduced because the intake gate or headrace channel is blocked by floating logs or falling soils and rocks.
- The surplus water is overflowed to the spillway.

**Basic Design of Civil Facilities (6)**

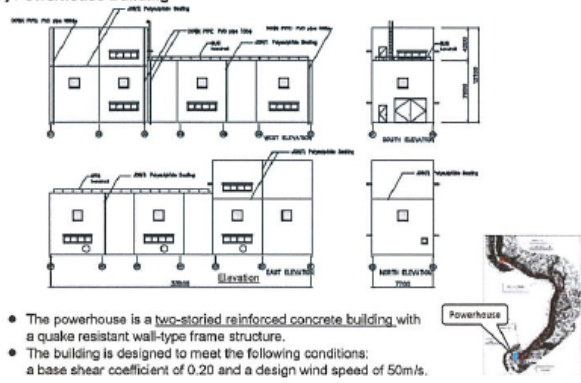
**(6) Penstock and Tailrace**



- The penstock is designed for the design power discharge of 2 units (4.20m<sup>3</sup>/s).
- The penstock branches off into two (2) pipes from the head tank, and then connects to the hydraulic turbines in the powerhouse.
- Design conditions of the penstock are shown below.  
 Inside diameter before branch: 1.50m (Q = 4.2m<sup>3</sup>/sec, v = 2.38 m/sec)  
 Inside diameter after branch: 1.10m (Q = 2.1m<sup>3</sup>/sec, v = 2.21m/sec)  
 Pipe thickness: 6 mm (minimum required value)
- The tailraces are designed to be box culverts of 1.0m in width and 1.8m in height which gradients are 1/100 to discharge water back to the river.

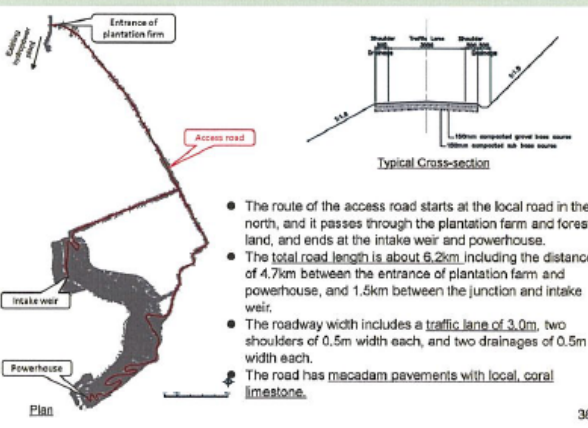
**Basic Design of Civil Facilities (7)**

**(7) Powerhouse Building**



- The powerhouse is a two-storied reinforced concrete building with a quake resistant wall-type frame structure.
- The building is designed to meet the following conditions: a base shear coefficient of 0.20 and a design wind speed of 50m/s.

**Access Road Plan**



- The route of the access road starts at the local road in the north, and it passes through the plantation farm and forest land, and ends at the intake weir and powerhouse.
- The total road length is about 6.2km including the distance of 4.7km between the entrance of plantation farm and powerhouse, and 1.5km between the junction and intake weir.
- The roadway width includes a traffic lane of 3.0m, two shoulders of 0.5m width each, and two drainages of 0.5m width each.
- The road has macadam pavements with local coral limestone.

EG

### Construction Plan

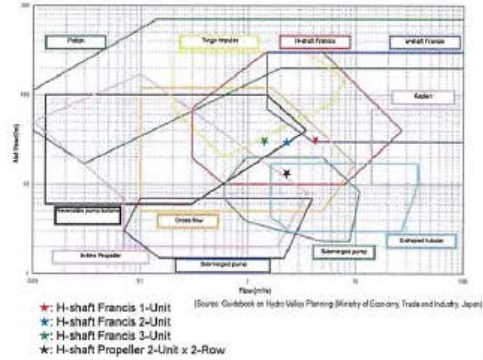
- A headrace channel and access road are constructed in and around a deep V-shaped valley, therefore, a large volume of surplus soil, estimated to be more than 300,000 m<sup>3</sup>, will be dug out from the construction site. Such remarkable feature makes this project difficult.
1. Temporary soil yard (Disposal area)  
A large temporary soil yard for surplus soil is needed near the project site. Concerned parties such as PRV, DOE and DOL conducted consultation meeting to deal with the issue of temporary soil yard for surplus soil
  2. Construction period  
A large amount of earthwork requires a long period of time. The construction period is estimated to be around 43 months.

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### Basic Design for Electro-mechanical Equipment (1)

#### (1) Selection of the Water Turbines

Large Head/ Low Flow Rate → Horizontal axis Francis / Horizontal axis Propeller



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### Basic Design for Electro-mechanical Equipment (2)

#### (2) Comparison of Number of Turbines

2 unit case is more appropriate than 3 unit case in consideration of cost-effectiveness because the difference of energy production is minimal and cost of 2 Unit case is cheaper.

	H-shaft Francis 1 unit	H-shaft Francis 2 units	H-shaft Francis 3 units	H-shaft Propeller 2 x 2=4 units
Synchronized operation	N.A	++++	++++	+++
Power reduction during maintenance and accident	+	++	+++	+++
Price of Turbine (affordability)	++++	+++	+	+
Cost of transportation/ erection (affordability)	+	+++	+++	+++
Operation efficiency during drought	+	++	+++	++
Amount of spare parts (general versatility)	+	++	+++	+++
Comprehensive evaluation	8	16	18	15

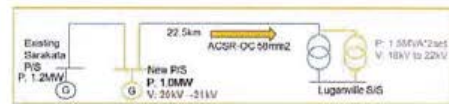


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### Basic Design for Electro-mechanical Equipment (3)

#### (3) Operation system

- A π branch will be performed between the existing Sarakata River Hydroelectric Power station and the existing Substation as shown in the figure below.

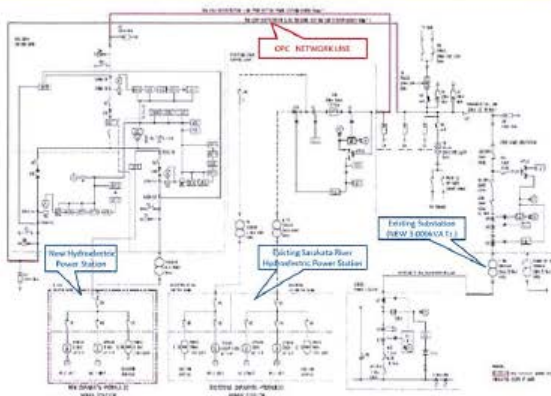


#### Study results:

- The protection of the three-branch transmission line becomes complicated.
- The total power output can be confirmed by receiving the power generated at the existing Hydroelectric Power station at the new Hydroelectric Power station.
- Local communication Network system (IP-VPN/3G4G/Microwave) low reliability. ....Outbreak of Signal err and Time Lag.
- Security measures (firewall) are required to use the external network.
- The CCTV image transfer method, shall be necessary to consider remote control network.
- a remote supervisory control operated by means of an automatic control operation system from the existing Sarakata river hydroelectric power plant.
- the remote control operation from the existing power plant by means of Optical Fiber Complex Overhead Ground Wire (OPC).

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### Power System Facilities



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### Remote control System (SCADA)

#### Remote Control System (SCADA)

The basic configuration of the remote control system is as follows:

- The New Hydroelectric Power Station will be operated from Existing Hydroelectric Power Station.
- Existing Hydroelectric Power Station will be operated manually as before.
- Not connected in the new remote control system because of concern that the existing operation/control/protection system will be affected.
- The operation console (CPU) has two systems (Regular use/Standby use).
- Totally 4 operation consoles (CPU) at the Existing Hydroelectric Power Station and the New Hydroelectric Power Station.
- The interface panel will be installed to connect to The operation console (CPU) assuming that CCTV, Control equipment and measuring equipment, etc. will break or become old/Maintenance).

<<This will increase the reliability and quality of the New Hydroelectric Power Station for power generation.>>

EG

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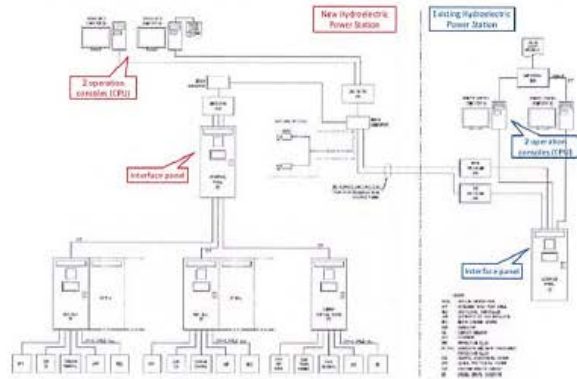
### Grid Connection for New Hydropower Plant

Grid connection plan to connect the new hydropower plant to existing 20kV transmission line was examined considering reliability, feasibility, environmental and social impact and cost.  $\pi$ -branch connection is to be applied.

Power System Duplex	Existing	Plan 1 ( $\pi$ -branch)	Plan 2 ( $\pi$ -branch)	Plan 3 (Connection to existing P/S)
	Reliability	Power System Strong Connection	All Feeder by Line expansion	+
Feasibility	Expansion Line/T/L Power System Power System	+	+	+
Environmental Social Impact	+	+	+	+
Cost	+	+	+	+
Total Structure	+	+	+	+

Comparative study of alternatives to connect the new hydropower plant

### Remote control System (SCADA)



### Power System Study for New Hydropower Plant

Power system after the operation of 1,000kW new hydropower plant is examined based on line capacity, voltage drop and stability.

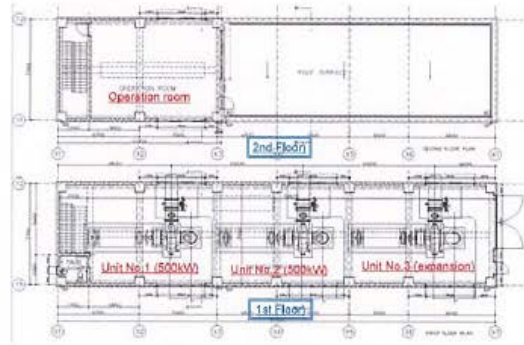


**Line Capacity**  
**Distribution line**  
 Necessary capacity : 2.2MW (64A) < Existing capacity : 7.4MW (205A)  
 → acceptable  
**Substation transformer**  
 Necessary capacity : 2.2MW/0.8=2.75MVA < Capacity after 1set Tr expansion : 3.0MVA → acceptable

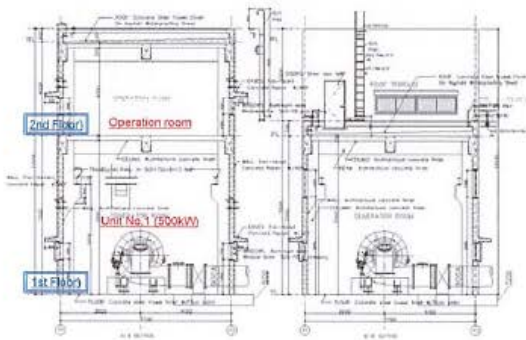
**Voltage Drop**  
 Since the S/S voltage is nearly the lower limit (18kV) by 20kV step-up Tr voltage, We recommend to the tap of the step up Transformer to 21kV.

- In this new Hydro Power project, It is necessary to implement the following items
- $\pi$  branch to new P/S after existing line cut off
  - Expansion new power transformer at the Luganville S/S
  - Step-up voltages set 21kV (higher voltage) at existing and new P/S

### Arrangement of Turbine and Generator (1)



### Arrangement of Turbine and Generator (2)



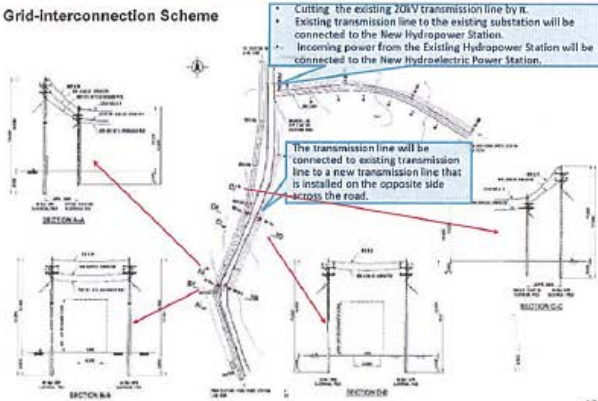
### General Feature of Hydropower Generating Equipment

- Hydraulic Turbine
  - Quantity: 2
  - Type: Horizontal-shaft, Francis
  - Power: 550 kW
  - Speed: 500 rpm
  - Discharge: 2.10 m<sup>3</sup>/s
  - Rated head: 32.3m
- Synchronous Generator
  - Quantity: 2
  - Type: synchronous
  - Power factor: 0.8
  - Power: 690kVA
  - Voltage: 6,500V, three (3) phases
  - Speed: 500rpm
  - Frequency: 50Hz
- Power Transformer
  - Quantity: 1
  - Type: Self-cooled, outdoor, oil-immersed
  - Power: 1500kVA
  - Voltage: 6.5/20kV, three (3) phases
- 20kV Switchgear
  - Quantity: 1

EG

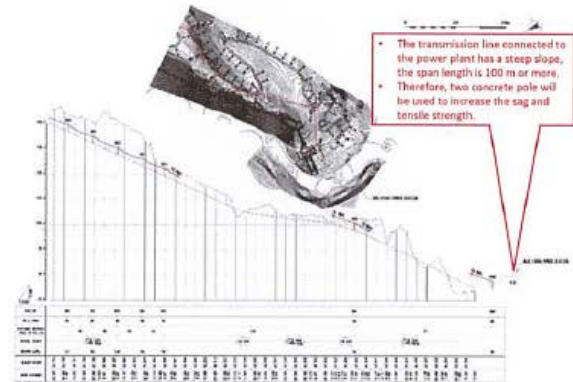
### 20kV Transmission Line

#### Grid-Interconnection Scheme



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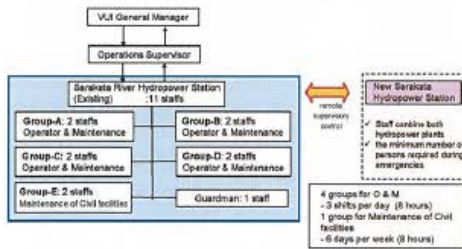
### 20kV Transmission Line



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### Operation & Maintenance of Hydropower Plant

- The new hydroelectric power plant is planned to be a **remote supervisory control** operated by means of an **automatic control operation system** from the existing Sarakata river hydroelectric power plant.
- Operation and monitoring of the new power plant can be done by using control, monitoring and measuring devices.
- Manpower for the operation and maintenance of the new power plant is equivalent to the **minimum number of persons required during emergencies**



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### Operation and Maintenance Cost

Year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025		
Total generated energy	8876	10,112	10,942	10,221	10,022	10,222	10,012	10,012	10,012	10,012	10,012	10,012	10,012	10,012	10,012	10,012	10,012	10,012	10,012	10,012	10,012	
Fixed cost	8000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000
Variable cost	876	1,112	1,942	2,221	2,022	2,222	2,012	2,012	2,012	2,012	2,012	2,012	2,012	2,012	2,012	2,012	2,012	2,012	2,012	2,012	2,012	2,012
Electricity cost	11,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
Operation and maintenance cost	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000

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### Soft Component (1)

#### Objective of Soft Component

V.U. which manages the power supply business under the concession system, shall establish a sustainable management system for proper operation, maintenance and management of the new power plant, in addition to the optimum operation of the existing Sarakata River power plant. As a result, reduction of electricity fee is to be achieved by maximizing the reduction of the fuel consumption.

Item	Work Items
Establish proper methods for the inspection and maintenance of generation equipment	1. preparation of inspection and maintenance manuals for generation equipment 2. daily operation record 3. maintenance and repair records 4. preparation of ledger of facility, spare parts and equipment
Establish proper methods for inspection and maintenance of civil facilities	1. preparation of inspection and maintenance manuals for civil facilities 2. OJT by using manual 3. daily inspection records 4. maintenance and repair records
Strengthen optimum operation of the existing and the new hydroelectric power plants and strengthen the ability to deal with malfunctions, troubles and accidents.	1. formulation of optimum operation scheme of existing and new hydroelectric power plants 2. application of optimum operation 3. Prepare response manual in case of accident and emergency 4. On-the-job training for each case study by using the manual 5. Middle and long term maintenance plan
Establishment of Monitoring System	1. Periodic monitoring system for generation equipment, transmission line and distribution facilities 2. Periodic monitoring of electricity bill and green energy fund

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### Soft Component (2)

#### Schedule of Soft Component

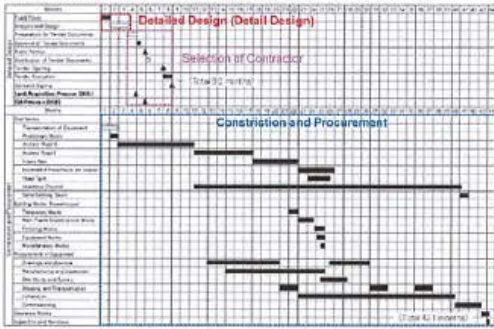
Task	Activity	City																				
		1	2	3	4	5	6	7	8	9	10	11	12									
Preparation of Standard Plan of O&M	Preparation of Standard Plan of O&M																					
	Preparation of inspection and maintenance manuals for generation equipment																					
	Preparation of inspection and maintenance manuals for civil facilities																					
	Preparation of response manual in case of accident and emergency																					
	Formulation of optimum operation scheme of existing and new power plants																					
	Formulation of middle and long term maintenance plan																					
	Preparation of Ledger of facility, spare parts and equipment																					
	Preparation of Actual Status Report																					
	Preparation of Completion Report																					
	OJT of inspection and maintenance manuals for generation equipment																					
OJT of inspection and maintenance manuals for civil facilities																						
Strengthen optimum operation for the existing and new power plants (OJT)																						
Strengthen response capability against malfunctions, trouble and accidents (OJT)																						
Establishment of Monitoring System of O&M																						
Team Leader / Advisor of monitoring																						
Advisor of Optimum operation / Maintenance for generating equipment																						
Advisor of Maintenance for TL, and GIS facilities																						
Advisor of Maintenance for civil facilities																						

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### Implementation Schedule

There are three (3) stages in the Project:

- Detailed design (3 months)
- Selection of contractor including the preparation of tender document, announcement of tender, evaluation of tender (5 months)
- construction (civil and building works) and procurement. (43 months)



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### Procurement for Equipment & Construction Materials

#### Procurement of equipment

Items	Country of origin			Reasons for procurement place	Procurement ways
	Vanuatu	Japan	Third countries		
Hydraulic turbine generator		○		For comprehensive operation and maintenance	Marine transportation from Japan
Distribution equipment		○		For comprehensive operation and maintenance	Marine transportation from Japan
Substation equipment		○		For comprehensive operation and maintenance	Marine transportation from Japan
SCADA		○		For comprehensive operation and maintenance	Marine transportation from Japan
Transmission line		○		Not locally available	Marine transportation from Japan

#### Procurement of construction materials

Items	Country of origin			Reasons for procurement place	Procurement ways
	Vanuatu	Japan	Other countries		
Cement	○				Vanuatu
Reinforcing bar	○				
Formwork material	○				
Coarse aggregate	○		○	Depending on the required quality	Marine transportation from Japan or other countries
Fine aggregate	○				
Peristock			○	Not locally available	Marine transportation from Japan
Gate and screen			○	Not locally available	Marine transportation from Japan
Steel door and aluminum sash			○	Not locally available	Marine transportation from Japan

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### Procurement for Equipment

The country of origin for the equipment being procured for the Project shall be fundamentally considered as shown in the following Table.

ITEM	Country of Origin		
	Japan	Vanuatu	Other
<b>Hydropower equipment</b>			
Turbine	○		
Generator	○		
Inlet Valves	○		
Generator Circuit Breaker Outside	○		
6.6 kV/250-220V Station Service Transformer Outside	○		
DC Battery panel	○		
Low Voltage Power Supply Panel	○		
1,500 kVA 6.6 kV/230V Step-up Transformer	○		
14TN Overhead Travelling Crane	○		
Emergency Diesel Engine Generator	○		
6.6 kV Disconnecting Switch Outside	○		
Out Going In Coming Feeder Switchgear	○		
Turbogenerator Control System	○		
SCADA System	○		
<b>20kV Existing Substation Equipment</b>			
3,000kVA, 20kV/5.5 kV, Step-Down transformer	○		
AC/DC Supply Distribution Box, 100V DC System	○		
<b>20kV New Distribution Line</b>			
Power conductor (ACSR/2C/58 mm <sup>2</sup> )	○		
Overhead Grounding Wire	○		
Optical Fiber Cable (22 mm <sup>2</sup> )	○		
Electric line pole	○		
Insulators Set and Fittings	○		

All equipment of the hydropower generation, substation and transmission line are premised on Japanese-made supply.

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### Transportation of Equipment from Japan

The equipment required for hydropower plant, transmission line and substation procured in Japan will arrive at the Luganville International Port in Santo Island, Vanuatu. The target sites are located in Canal-Fanafa area, which is located about 25km from the port.

The access road to existing Sarakata river hydropower plant can be used. It is well maintained, however the repair work is required in the rough road section. The new access road is to be constructed in the last 5km to the new powerhouse.



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### Inland transportation

Luganville International Port



Luganville International Port



Existing Road Condition

Existing Asphalt Road



Existing Macadam Road



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### Obligation of Vanuatu Side

#### Cost borne by the Vanuatu side

Contents	VUV
Site acquisition/ Compensation for land users and owners/ land rent for disposal area if necessary	60,375,000
Repairs and maintenance expenses for existing access roads	2,247,000
Preparation and provision of lands for stockyard and parking place	105,000
Preparation and provision of lands for site offices	105,000
Commission related to Banking Arrangement (B/A) and Authorization to Pay (A/P)	3,790,000
Customs clearance of the products at ports of disembarkation in Vanuatu	3,500,000
Approval of EIA (Conditions of approval should be fulfilled, if any) and securing of the necessary budget for implementation	100,000
Obtaining the planning, zoning, building, and water works permit	50,000
Preparation and provision of lands for temporary disposal area for surplus soil	1,208,000
<b>Total</b>	<b>71,480,000</b>

1 VUV = JPY 1.01

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EG

### Project Evaluation

#### Preconditions

- (1) **Land Acquisition and Easement**  
The land for the power station including part of the access roads will be acquired, and the easement of the access roads and transmission line route will be obtained.
- (2) **Environmental Approval**  
DOE will obtain an EIA approval from DEPC.  
It was confirmed that there was no living area for residents in the Project area, and no resettlement of residents occurred.
- (3) **Tax Exemption Procedure**  
DOE, as a responsible agency, will perform tax exemption procedure of customs duties and value added tax (VAT) for this Project.
- (4) **Permission for Construction**  
For the construction works in the river (construction of the weir), "Water work permit" should be required from DOWR.
- (5) **Power Generating Operation License, etc.**  
Before the operation of the power plant, it is necessary to obtain "Water Use License" from DOWR.

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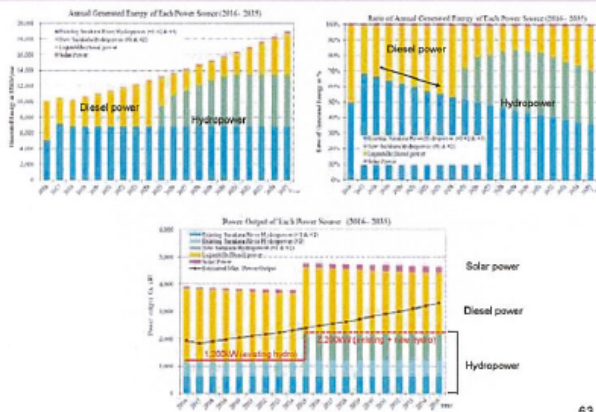
### Project Evaluation

#### (6) Forecast of Balance of Power Supply and Demand

- Forecast of balance of power and demand was carried out up to 2035 under the following conditions.
- > Annual increase rate of peak power output is 3.3% and one of electric energy sales is 3.7%
  - > Electric energy sales are calculated 10% such as transmission loss, collection of electricity bill etc. less than available generated energy based on a rate of actual generated energy and electric energy sales.
  - > Annual decrease rate of power output of diesel power plants is assumed to be 1%.
  - > Annual increase of generated energy of solar power is assumed to be 10 MW/year.
  - > Annual generated energy of the existing Sarakata River hydropower plant is 6,776MWh/year based on average of actual generated energy from 2011 to 2017.
  - > Annual generated energy of a new Sarakata hydropower plant is 7,435MWh/year (available generated energy 8,992MWh/year X (10/12)) considering 2 month operation per year stoppage due to periodical maintenance and accidents etc. Electric energy sales is assumed to be 6,692MWh/year, which is 10% reduction of the generated energy.
  - > Commercial operation will start from June 2025. After 3 years from commercial operation all generated energy become electric energy sales with 10% reduction.
  - > For efficiency of energy generated from hydropower and solar power diesel power plants are to be operated. Diesel volume per kWh is 0.29 liter/kWh. Unit price of diesel fuel is assumed to be 90 VUV/liter in 2018, 100 VUV/liter in 2019 and 108 VUV/liter after 2020.

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### Project Evaluation



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### Project Evaluation

#### Relevance

- (1) **Increase the renewable energy ratio in Vanuatu**  
the existing and new hydropower stations constructed by Japan's grant aid project will supply most of the electricity demand as the main power source.
- (2) **Reduce dependence on imported fuels and reduce electricity tariff**  
The existing and new hydropower stations will cover most of the peak demand and base load power demand.
- (3) **Contribute to climate change countermeasures by reducing dependence on imported fuel**
- (4) **Contribute to rural electrification projects**  
The Vanuatu government established a 2 VUV/kWh National Green Energy Fund (GEF) in 2019.
- (5) **Consistent with the hybrid island concept**  
This project will be implemented as a part of supporting the achievement of low-carbon development through continuous implementation, in line with this "Hybrid Island Concept".

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### Project Evaluation

#### Effectiveness

##### Quantitative Effect

The target year is 2028, three (3) years after the commencement of commercial operation.

- (1) Electric power sales by new hydropower station
- (2) Reduction in fuel cost for diesel power generation
- (3) Renewable energy ratio
- (4) Reduction of greenhouse gasses
- (5) Electricity tariff reduction and source of green energy fund

##### Quantitative Effects

Index name	Standard value (2017)	Target Value (2028) (3 years after the completion of the Project)
Electric power sales (MWh/year)	6,776 MWh/year	13,770 MWh/year (total of existing and new hydro)
Reduction of greenhouse gasses (ton/year)	—	624,915 ton/year
Fuel cost for diesel power generation (kiter/year)	—	2,013 kiter/year

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### Project Evaluation

#### Effectiveness

##### Qualitative effect

- (1) Promoting the use of renewable energy, which contributes to improved economic/social development and reduction of greenhouse gas emissions
- (2) Diversification of electric power supply sources
- (3) Achievement of a stable energy supply
- (4) Expansion of power supply area and improvement of public services
- (5) Improvement of public security and promotion of community activities

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EG

**Major Undertakings to be taken by each Government [1/2]**

No.	Items	To be covered by Grant	To be covered by Vanuatu Side
1	To secure land necessary for the implementation of the Project and to clear the sites		○
2	To construct/procure the following facilities/equipment		
	1) Construction of facilities	○	
	2) Procurement of equipment	○	
	3) Installation of gates and fences in plantation		○
3	To provide facilities for distribution of electricity, water supply and drainage and other incidental facilities necessary for the implementation of the Project outside the sites		
	1) Electricity		
	a. Processing application for the distributing power line to the site		○
	b. Drop wiring and internal wiring within the site	○	
	c. Main circuit breaker and transformer	○	
	2) Water supply and drainage		
	a. Water supply system within the site (receiving and tanks)	○	
	b. Drainage system (for toilet sewer, common waste, storm drainage and others) within the site	○	
	3) Road		
	a. Road within the site (access road)	○	
	b. Road outside the site		○
	5) Furniture		○

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**Major Undertakings to be taken by each Government [2/2]**

No.	Items	To be covered by Grant	To be covered by Vanuatu Side
4	To ensure prompt unloading and customs clearance of the products at ports of disembarkation in Vanuatu and to assist internal transportation of the products		
	1) Marine transportation of Products from Japan to Vanuatu	○	
	2) Tax exemption and custom clearance of Products at the port of disembarkation		○
	3) Internal transportation from the port of disembarkation to the project site	○	
5	To ensure that customs duties, internal taxes and other fiscal levies, which may be imposed in Vanuatu with respect to the purchase of the products and the services, are exempted		○
6	To accord Japanese nationals 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 Vanuatu and stay therein for the performance of their work		○
7	To ensure that the Facilities and the products are maintained and used properly and effectively for the implementation of the Project		○
8	To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project		○
9	To bear the following commissions paid to the Japanese bank for banking services based upon the B/A		○
	1) Advising commission of A/P		○
	2) Payment commission		○
10	To give due environmental and social consideration in the implementation of the Project		○

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**Obligations of Recipient Country [1/2]**

	Obligations of the recipient country	Allocation of Responsibilities
1	Acquisition and free provision of land (Generation facilities) necessary for the project.	DOE is the responsible agency and will coordinate with DOL
2	Lease right and free provision of land (Transmission line and access road) necessary for the project.	DOE is the responsible agency and will coordinate with DOL
3	Acquisition and free provision of land necessary for the temporary facilities and land clearance	DOE is the responsible agency and will coordinate with VUI
4	Provision of free temporary soil yard necessary for the project.	DOE is the responsible agency and will coordinate with DOL
5	Provision of free disposal sites required for the waste soil and waste materials	DOE is the responsible agency and will coordinate with DEPC and Local government
6	Provision of free storage site necessary for the equipment and materials.	DOE is the responsible agency and will coordinate with VUI
7	Maintenance and repair of existing access roads outside of the project	DOE is the responsible agency and will coordinate with Local government
8	Provision of free appropriate disposal sites necessary for the waste water and waste oil	DOE is the responsible agency and will coordinate with DEPC and Local government
9	Bearing of commissions applied by the bank in Japan for banking services based upon the Bank Arrangement (B/A) (ex; Payment of bank commission)	DOE is the responsible agency
10	Application and acquisition of permission required for construction.	DOE is the responsible agency and will coordinate with the relevant agency

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**Obligations of Recipient Country [2/2]**

	Obligations of the recipient country	Allocation of Responsibilities
11	All expenses and prompt execution of unloading and customs clearance at the airport and the port of disembarkation in the recipient country	DOE is the responsible agency
12	Ensuring presence test of equipment and materials by experts and technical transfer to operators and maintenance staff for proper operation and maintenance	DOE is the responsible agency and will coordinate with VUI
13	Assignment of counterparts specialized for the project.	DOE is the responsible agency
14	Accommodating of Japanese nationals and/or nationals of third countries, including persons employed by the agent whose services may be required in connection with the components such facilities, as may be necessary for their entry into the recipient country and stay therein for their works	DOE is the responsible agency
15	Ensuring that customs duties, internal taxes and other fiscal levies that may be imposed in the recipient country with respect to the purchase of the components and to the employment of the agent will be exempted by the Government of recipient country	DOE is the responsible agency and will coordinate with relevant agency
16	Proper and effective operation and maintenance of the facilities and equipment that is provided under the Grant Aid Program.	VUI shall implement under control of DOE, which is the responsible agency
17	All expenses, other than those covered by the Grant Aid Program and its accrued interest, necessary for the purchase of the components as well as the agent's fees.	DOE is the responsible agency
18	Compliance to environmental and social considerations for the Grant Aid Program	DOE is the responsible agency and will coordinate with DEPC

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EG



# PREPARATORY SURVEY FOR THE PROJECT FOR THE CONSTRUCTION OF HYDROPOWER STATION IN ESPIRITU SANTO ISLAND

Environmental & Social Consideration  
Land Acquisition for the Project

October, 2020

NEWJEC Inc.  
CTI International Co., Ltd.

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## Temporary Soil Yard

### Undertakings for Temporary Soil Yard

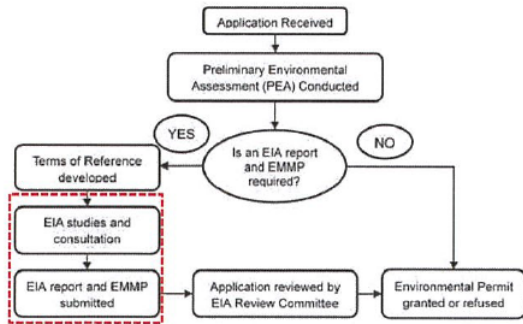
In case proposed Temporary Soil Yard is prepared by Vanuatu side, following items shall be taken by Vanuatu side

- ✓ To secure the 7ha land (leased from PRV)
- ✓ Location shall be aside the access road (separated 2~3 locations are available if needed)
- ✓ To clear the site (felling and rough leveling of ground)
  - ⇒ Estimated cost: 1,200,000 VUV
- ✓ PEA and/or EIA for the temporary soil yard
- ✓ All works shall be completed before the notice of tender



## Environmental & Social Consideration

### Environmental Impact Assessment (EIA) Process in Vanuatu

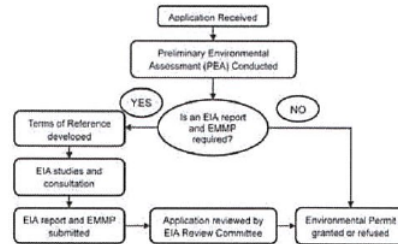


3

## Environmental & Social Consideration

### EIA for Temporary Soil Yard

- All EIA procedure must be conducted by DOE with a new environmental consultant
- JICA team can provide the materials of application form, EIA report and EMMP (Environmental Management and Monitoring Plan)



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## Environmental & Social Consideration

### Schedule

- Consultation meeting on/after October 2020
- Submission of Draft EIA report to DOE, and to DEPC for reviewing within 2020
- Submission of final EIA report after land acquisition process
- Deadline of the EIA approval is before the notice of tender
- PEA/EIA for Temporary Soil Yard should also be approved before the notice of tender

Activities	2020												2021															
	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
Quarry Design Stage																												
Approval of Government of Vanuatu																												
Contract Design / Tender Stage																												
Construction Stage																												
EIA Approval for main facilities																												
Submission of EIA report																												
Approval of EIA (Permit) granted																												
EIA for Temporary Soil Yard																												
Preparation of PEA & EIA reports																												
Submission of EIA report & Approval																												
Land Acquisition Process																												

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## Environmental & Social Consideration

### Result of EIA Studies (Pollution)

Items	Evaluation		Reason
	Before/ During Construction	Operation	
Air pollution	B-	D	<b>[Before/ During Construction]</b> Ambient air quality will be affected by the dust and emission gas generated during the earth works etc., but its impact will be limited due to the limited number of heavy machines and trucks, and limited project area. <b>[Operation]</b> Generation of the dust and emission gas is not expected by the operation of the hydropower facilities.
Water pollution / Bottom sediment	B-	D	<b>[Construction]</b> Excavation/embankment work within/along the river and the construction of intake weir could worsen river water quality during the construction period. Rainfall during or just after above work could also cause turbid water. <b>[Operation]</b> Generation of the water pollution and turbid water is not expected during the operation phase of the hydropower facilities.
Waste	B-	D	<b>[Construction]</b> Construction waste such as excavated soil, concrete debris, organic waste and soil including organic waste will be generated. And, general waste would be generated from construction workers but the impacts caused by it would be very limited. <b>[Operation]</b> Little general waste will be generated but its impact is not expected.
Noise and Vibrations	B-	D	<b>[Construction]</b> Construction work by heavy machines and trucks will affect to noise and vibrations. <b>[Operation]</b> Noise and vibration of generator will be limited since the generator will be installed in the building.

A++: Significant positive impacts to be expected.  
B++: Positive impacts expected to some extent.  
C: Issues of public concern impact on residents. (These issues to be resolved. Impacts may become clear as study progresses.)  
D: No impact is expected.

EG

**Environmental & Social Consideration**

**Result of EIA Studies (Natural)**

Items	Evaluation		Reason
	Before/ During Construction	Operation	
Protection area	D	D	There is no protected area inside/around the project site.
Ecosystems	B-	D	[During Construction] Earth works and construction of conduit and access road would have negative impacts to plants and animals inside the project area. [Operation] Impacts to ecosystems by the operation of the hydropower facilities is not expected.
Hydrology	B-	B-	[Construction] Temporally damming and excavation of the riverbed could have impact on the hydrology of the downstream. [Operation] Decreasing of water flow volume between intake and hydropower house is expected by the withdrawing of water but its impact will be limited since amount of intake will be managed.
Geographical features	B-	D	[Construction] Geographical impacts by the earth works of headrace conduits and access road construction would be expected. [Operation] Negative impacts are not expected.

A++ Significant positive/negative impact is expected.  
 B++ Positive/negative impact is expected to some extent.  
 C: Border of positive/negative impact is unknown (Construction is needed, impacts may become clear as study progresses).  
 D: No impact is expected.

**Environmental & Social Consideration**

**Result of EIA Studies (Social environment)**

Items	Evaluation		Reason
	Before/ During Construction	Operation	
Land acquisition and resettlement	B-	D	[Pre-construction] No house holds need to be resettled, but a certain area of land is needed to be permanently acquired or temporarily used. And, Compensation and support for land, structures, trees and crops would be estimated and implemented based on the Land acquisition plan during the preconstruction.
Local economies	B+/-	D	[Construction] The project will bring about some benefits such as job creation and economic opportunities to sell foods/goods to workers, while a part of farmland/plantation will lose that area. [Operation] Compensation for the farmland/plantation would be done.
Land use	B-	D	[Construction] A part of farmland/plantation cannot temporarily or permanently be used by the construction of access road. [Operation] Compensation for the farmland/plantation would be done.
Water use	D	D	Since there is not river water supply around the project site, water use will not be limited.
Existing social infrastructures and Services	B-	B+	[Construction] The wiring connection between new cable and existing cable will cause a problem such as power failure. [Operation] After the operation, hydropower facilities will contribute to stable power supply in Sante Island.
Cultural heritage	D	D	There is no cultural heritage inside/around the project site.

A++ Significant positive/negative impact is expected.  
 B++ Positive/negative impact is expected to some extent.  
 C: Border of positive/negative impact is unknown (Construction is needed, impacts may become clear as study progresses).  
 D: No impact is expected.

**Environmental & Social Consideration**

**Result of EIA Studies (Other)**

Items	Evaluation		Reason
	Before/ During Construction	Operation	
Working conditions (work safety)	B-	D	[Construction] There would be accidents, injuries and health problems at the construction sites especially along river side. [Operation] Problems related to working safety are not expected.
Accidents	B-	D	[Construction] There would be traffic accidents, involving local people, during the construction work. [Operation] Accidents are not expected.
Global warming	B-	B+	[Construction] A limited amount of greenhouse gas (GHG) will be emitted by the construction, but its impacts are limited. [Operation] Amount of the fossil fuel use and generation of GHG will be reduced by the shift of power generation method.

A++ Significant positive/negative impact is expected.  
 B++ Positive/negative impact is expected to some extent.  
 C: Border of positive/negative impact is unknown (Construction is needed, impacts may become clear as study progresses).  
 D: No impact is expected.

**Environmental & Social Consideration**

**Environmental Management and Monitoring Plan (EMMP)**

Items	Monitoring item	Parameter / Indicator	Location	Frequency	Responsible	Budget
<b>Pre-construction</b>						
Land acquisition, compensation payment and other support	Compensation for land and other assets	Area of land acquisition and lease Number of assets	Project area	Once before construction	DOE	Land acquisition monitoring
	Complaints resolutions	Grievance and Complaints Redress Mechanism (GRM) log book	Project area	Time of complaints	DOE	Land acquisition monitoring
<b>Construction phase</b>						
Accident and incident	Complaint (in general such as noise, traffic jam, and accidents)	Records of complaints	Project area	Time of complaints	Contractor DOE	Construction cost
Air Pollution	Equipment and automobiles in good shape	Regular inspection and maintenance (daily check sheet/work report)	Project area	Daily	Contractor	No cost
	Air quality	Level of dust (visual observation)	Project area	Daily	Contractor	Construction cost
	Mitigation measures such as sprinkling water, washing tires	Records on water sprinkling/washing (check sheet/work report)	Project area	Daily	Contractor	Construction cost
Air pollution/ noise & vibrations	Equipment and automobiles with less emission gas and noise	Number of Automobiles with certification on site	Project area	As appropriate	Contractor	No cost
Water pollution	Surface water quality	Suspended Substance (SS) (by portable water quality meter) oil & grease (observation)	Discharge point / Upper/lower of river	Weekly	Contractor	Construction cost
	Condition of turbidity measures work	Condition of function and damage (visual inspection)	Project area	Daily	Contractor	Construction cost

**Environmental & Social Consideration**

**Environmental Management and Monitoring Plan (EMMP)**

Items	Monitoring Item	Parameter / Indicator	Location	Frequency	Responsible	Budget
<b>Construction phase</b>						
Waste	Management of excavated soil, concrete debris and others	Proper storage nor not (check sheet/work report) / Reuse or not (check sheet/work report)	Project area	Monthly	Contractor	Construction cost
	Management of general waste	Records of waste disposal	Project area	Monthly	Contractor	Construction cost
Bottom sediment/ Ecosystem	Mitigation measures	Mitigation measures are done or not (check sheet/work report)	Project area	Weekly	Contractor	Construction cost
Hydrology	Condition of steep slope	Condition of steep slope along river (visual inspection)	Project area	Weekly	Contractor	Construction cost
Work conditions	Occupational Safety&Health plan	Availability of OHS Plan	Project area	Monthly	Contractor	Construction cost
	Meetings and trainings	Number of meetings and trainings				
	Occurrence of accidents	Records of accident and injuries				
Accident/ Traffic congestions	Traffic management Plan	Availability of TMP	Project area	Monthly	Contractor	Construction cost
	Implementation of TMP	Availability of guard, signboard, and so on (activity records)	Project area	Monthly	Contractor	Construction cost
<b>Operation phase</b>						
Hydrology	River channel	River channel is changed or not	Between intake / power house	Twice a year (Dry & Wet)	DOE	Operational cost



**Environmental & Social Consideration**

**Draft Environmental and Social Monitoring Form (1/5)**

**1. Response/Actions to Comments and Guidance from Government Authorities and the Public**

Monitoring Item	Monitoring Results during Report Period
Number and contents of formal comments made by the public	
Number and contents of responses from Government agencies	

**2. Pollution**

1) Air Quality

Item	Unit	Situations of Dust Based on the observation	Monitoring Point	Frequency
Dust	-	1. Good 2. Acceptable level 3. Bad	Construction site	Daily

2) Surface Water Quality

Item	Unit	Discharge point of the treated water	Measurement Point	Standards for Contract	Referred Standards	Frequency
Suspended Substance (SS)	mg/l		Downstream of Barakuta river	Upstream of Barakuta river	200	Japan's standard
Oil & grease	mg/N <sub>l</sub>			observed		weekly

**3) Waste (Construction waste)**

Date: \_\_\_\_\_ Item: Waste Management Mark "✓" if management is done as required

Location	Kind of waste	Volume of waste (m <sup>3</sup> )	Final disposal or reuse	Stored at designated place	Waste separation	Remark

EG

**Environmental & Social Consideration**

**Draft Environmental and Social Monitoring Form (2/5)**

4) Mitigation Measures

Date: \_\_\_\_\_ Mark "✓" if mitigation measure is done

No	Item	Monitoring Site	Mitigation measure is done or not	Remarks	Frequency
1	Check the conditions of vehicles (start & noise control)				Daily
2	Sprinkling (start control)				Daily
3	Washing tires (start control)				Daily
4	Condition of temporary sedimentation				Daily
5	Condition of sedimentation ponds/straggle				Daily

3) Natural Environment

1) Ecosystems / Bottom sediment

Item	Monitoring Site	Monitoring Results during Report Period	Measures to be Taken	Frequency
Clearance activities (visual inspection)				Weekly
Management of top soil (visual inspection)				Weekly

2) Hydrological Situations

Item	Monitoring Site	Monitoring Results during Report Period	Measures to be Taken	Frequency
Impact of construction work on steep slope (visual inspection)				Twice a year (Dry & Wet season)
Impact of operation of hydropower facilities on river channels (visual inspection)				

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**Environmental & Social Consideration**

**Draft Environmental and Social Monitoring Form (3/5)**

1) Land Acquisition

Pre-Construction phase

Resettlement, Land expropriation and compensation for assets and crops (monthly report)

Item	Planned Total	Unit	Month/Year		Month/Year		Month/Year		Month/Year		Expected completion date	Responsible organization
			Qty	%	Qty	%	Qty	%	Qty	%		
1. Locate PAPs and start Final Asset Valuation												DOL
F1: Measurement of Final PAP's*		HA										
F2: Arrangement to Adjust Final PAP's		Time										
F3: Monthly survey and final asset valuation for expropriation		Time										
F4: Compensation means from PAP's		Time										
F4.1: Agreement signed by PAP's		HA										
F4.2: Progress of resettlement		HA										
F5: Resettlement of households												DOL
F6: Progress of land acquisition												
S1: Permanent land acquisition (Category 1st)	10,000	ha2										
S2: Permanent land acquisition (Category 2nd)	227,800	ha2										
S3: Temporary and use leased land	10,000	ha2										
A: Progress of compensation in cash												DOL
A.1: Agricultural Products	140	kg/m										
A.2: Trees	75	unit										
A.3: Livestock	100	unit										
B: Cash and In-kind (Household Assets)												
B.1: Cash												
B.2: In-kind												
C: Unpaid cases												

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**Environmental & Social Consideration**

**Draft Environmental and Social Monitoring Form (4/5)**

Record of Complaint and Grievance Management

No	Date	Complaint and Grievance from PAP's	Solution / Result / Any actions to be taken

Consultation meetings

No	Date	Sector	No. of Participants	Key agenda and result of discussion

2) Livelihood

Before Construction

Item	Monitoring Results during Report Period	Measures to be Taken	Frequency
Provide A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z			Weekly

3) Safety Management (Health and Occupational Safety)

Safety management plan

The construction phase

Date	Safety management plan is prepared and submitted	Approved by the Consultant	Remarks

Training programs

No	Date	Training	Agency	Participant

During Construction

Safety management

Check

No	Item	Result	Remarks
1	Number of meetings organized with the previous monitoring		
2	Safety gear distribution (No)		
3	How timely in assessing and curing property loss (No)		
4	Insulation of fence, arrangement of guard (No)		

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**Environmental & Social Consideration**

**Draft Environmental and Social Monitoring Form (5/5)**

Record of Accidents

No	Date	Details of accidents	Solution / Result / Any actions to be taken

4) Other checked

Date: \_\_\_\_\_ Mark "✓" if mitigation measure is done

No	Item	Monitoring Site	Mitigation measure is done or not	Remarks
1	Committee get the information on the construction schedule			
2	Committee know get the information of traffic management			
3	Inspection of signboard			

5) Record of Complaint

No	Date	Complaint	Solution / Result / Any actions to be taken

**Environmental & Social Consideration**

**1<sup>st</sup> & 2<sup>nd</sup> Consultation Meeting on Nov.&Dec.2018 @ Sanma Province Chamber**

<b>Purpose</b>	<ul style="list-style-type: none"> <li>To obtain the understanding and agreement through the explanation of the project background.</li> <li>To explain the project and land issue caused by the project</li> </ul>
<b>Participant</b>	DOL in Santo, Officers of Sanma province, DOE, VUJ, Land owners
<b>Result</b>	<ul style="list-style-type: none"> <li>Communication framework between land owners and DOE was confirmed</li> <li>Project Committee and its role were established in order to communicate related to the project and hire the local</li> </ul>



**Environmental & Social Consideration**

**3<sup>rd</sup> Consultation Meeting on Jun. 2019 @ Santo (Natoto Village)**

<b>Purpose</b>	<ul style="list-style-type: none"> <li>To explain contents of the environmental and social survey</li> <li>To share the benefit and problems regarding hydropower facility</li> </ul>
<b>Participant</b>	Local residents
<b>Result</b>	<ul style="list-style-type: none"> <li>Interesting and intension to support for the project were received</li> <li>It has been agreed that any information concerning the proposed project must be communicated through the committee established with land owning group</li> </ul>



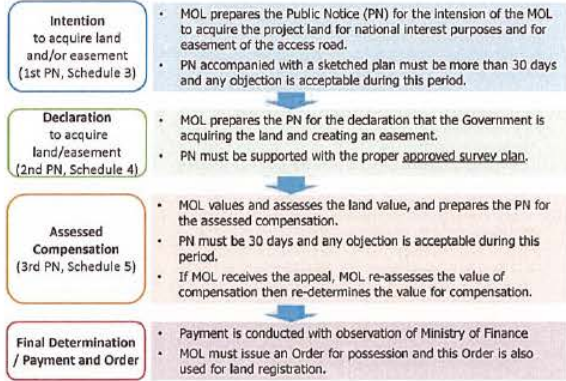
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Land Acquisition for the Project			
	Location	Required area	Remarks
Land Acquisition	Main facilities construction site around Intake to Powerhouse	Approx. 350,000m <sup>2</sup> (35ha)	
Lease from PRV	Temporary soil yard beside access road	Approx. 70,000m <sup>2</sup> (7ha)	Negotiation with PRV
Easement	Access road / Transmission line	Approx. 79,000m <sup>2</sup> (7.9ha)	



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### Land Acquisition for the Project Process Summary



### Land Acquisition Plan

#### Types of Loss and compensation Coverage (typical matrix)

Types of Loss	Application	Definition of Affected Persons	Compensation Coverage
Land for Permanent Use (Land for Main Facilities and Access road)	Acquired land and Easement land	Lessor/ Lessee/ Customary Landholder/ Land user (4 landowner & PRV)	Compensation in market value base
		illegal settlers without legal rights (not expected)	Compensation for non-land assets (agricultural products, trees, structures and etc.) in the land affected by this project.
Land for Temporary Use (Land for temporary soil yard)	Land to be used during construction	Lessor/ Lessee/ Customary Landholder/ Land user (PRV)	Necessary to agree with landholders or affected persons. Affected landholders and persons shall be paid for an agreed lease expense. After use, the land shall be returned to owners after restoration of the land to its original condition.
Agricultural Products and Trees (Land for Main Facilities and Access road)	Agricultural products and trees in affected land	Owners of agricultural products or trees (regardless with or without legal/ customary rights) (4 landowner & PRV)	Harvest notification of agricultural products and trees is issued before land acquisition. If harvest is impossible, compensation is made in monetary form based on market price.
Unforeseen or Unintended Impacts	Impacts revealed by the detailed design	Affected residents	Complying with JICA guidelines for other cases which are not covered by the above points

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### Land Acquisition Plan

#### Cost Estimate for Land Acquisition Implementation

	Item	Amount (Vatu)	Note
Assets (Land)	Land (Permanent Use)	33,000,000	Estimated based on valuation (replacement cost) by DOL.
	Land (Temporary Use)	7,000,000	Tentative price. This depends on the negotiation between the leaseholder and the DOE.
	Subtotal (1)	40,000,000	
Compensation/ Support	Agricultural products/ Trees	8,318,000	Estimated based on Agriculture Compensation Policy.
	Livelihood Support / Support for Socially Vulnerable Households	0	
	Inconvenience Fee	400,000	To PRV
	Subtotal (2)	8,718,000	
<b>Total (3)</b>		<b>50,000,000</b>	Approximately (1) + (2)
Plan Activity Cost	(4)	7,500,000	15% of Total (3) (round-off)
Physical Contingency	(5)	2,875,000	5% of Total (3) + (4) (round-off)
<b>Grand Total</b>		<b>60,375,000</b>	(3) + (4) + (5)

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### Land Acquisition Plan

#### Grievance and Complaints Redress Mechanism (GRM)

- Duration of each stage will be agreed with the DOE and communities when grievance happened
- The GRM Focal Point is selected by DOE and will work with DOE officers to support the handling of complaints
- The Grievance Management Committee, is comprised of members from GRM Focal Point, the DOE offices supporting the handling of complaints, representatives from the Project development.



### Land Acquisition Plan

#### Land Acquisition Plan Schedule

	Year	2019												2021												
		10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10
Outline Design Stage		[Gantt bars]												[Gantt bars]												
Approval of Government of Japan		[Gantt bars]												[Gantt bars]												
Detail Design / Tender Stage		[Gantt bars]												[Gantt bars]												
Construction Stage		[Gantt bars]												[Gantt bars]												
Land Acquisition Process		[Gantt bars]												[Gantt bars]												
Intention (Schedule 3)		[Gantt bars]												[Gantt bars]												
Declaration (Schedule 4)		[Gantt bars]												[Gantt bars]												
Compensation Assess (Schedule 5)		[Gantt bars]												[Gantt bars]												
Final Determination (Schedule 6 / 7)		[Gantt bars]												[Gantt bars]												
RAP Implementation		[Gantt bars]												[Gantt bars]												
Framework Agreement of RAP (single-company per DSM)		[Gantt bars]												[Gantt bars]												
Notice and Acquisition of prior Consent		[Gantt bars]												[Gantt bars]												
Consultation, Grievance Redress		[Gantt bars]												[Gantt bars]												
Agreement of Compensation		[Gantt bars]												[Gantt bars]												
State Assistance		[Gantt bars]												[Gantt bars]												
Monitoring & Evaluation (annual & External)		[Gantt bars]												[Gantt bars]												

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**Components for GCF – Concept Note** NEWPEC, JICA survey team Oct., 8<sup>th</sup>, 2020  
**(Santo Island RE100%)**

**Project Objective**

Over all Goal: Achieving 100% renewable energy in Vanuatu Islands  
 (National Energy Road Map Goals are targeting RE 100% by 2030)  
 Objective: Achieving 100% renewable energy in Luganville grid system  
 in Santo Island

※This project will be conducted as a pilot project for the over all goal

**Draft Program**

No.	Project	M.USD	Source
1	New Hydropower (Sarakata2) : 1,000 kW	35	Japan
2	Expansion of Existing Hydropower (Sarakata1) : 300 kW	2	VUI
3	Transmission Line from Sarakata to Luganville	3	GCF(1)
4	PV	*	GCF(2)
5	Battery	*	GCF(3)
6	TA (Technical Assistance)	*	GCF(4)

No.4,5 \* : Scenario-A and B will be studied for combination of PV and Battery

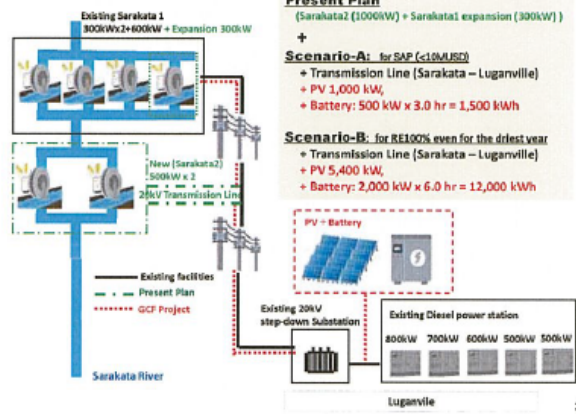
**Summary – comparison of GCF project**

Scenario		Scenario-00			Scenario-A			Scenario-B		
		Present Plan			Present Plan + TL + PV + Battery (Luganville for 40%)			Present Plan + TL + PV + Battery		
Existing Plan	Existing Sarakata-1	kW	1,000		1,000		1,000			
	Expansion of Sarakata-1	kW	300		300		300			
	New Sarakata-2	kW	1,000		1,000		1,000			
GCF	*Add (1) New Sarakata (Sarakata2)		-		-		-			
	Invested Battery	kW	0		500		2,000			
	Capacity PV	kW	0		1,000		5,400			
	Total Capacity including existing hydro-power	kW	2,500		4,000		9,500			
RE rate (%)	RE rate (%)		92%		96%		100%			
	RE 100% day (24hr/day) (RE 100%)		117-day		292-day		366-day			
	Max. Hourly Percentage of Fossil-fuel		9%		37%		54%			
	RE rate (%) with 2018 discharge		92%		92%		92%			
RE rate (%) with 2030 discharge	RE rate (%) with 2030 discharge		92%		92%		92%			
	RE 100% day (24hr/day) (RE 100%)		117-day		292-day		366-day			
	Max. Hourly Percentage of Fossil-fuel		9%		37%		54%			
	RE rate (%) with 2030 discharge		92%		92%		92%			
Draft Cost (MUSD)	(1) Sarakata-2 Extension									
	(2) Transmission Line		0.0		3.0		3.0			
	(3) Battery		0.0		2.0		11.0			
	(4) TA		0.0		4.0		21.0			
Total (MUSD)	Total (MUSD)		0.0		10.0		34.0			
	Remarks									

1

2

**Overview of Projects**



**Present Plan**  
 (Sarakata2 (1000kW) + Sarakata1 expansion (300kW))

+ Scenario-A: for SAP (<10MUSD)  
 + Transmission Line (Sarakata – Luganville)  
 + PV 1,000 kW,  
 + Battery: 500 kW x 3.0 hr = 1,500 kWh

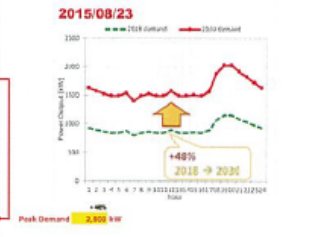
Scenario-B: for RE100% even for the driest year  
 + Transmission Line (Sarakata – Luganville)  
 + PV 5,400 kW,  
 + Battery: 2,000 kW x 6.0 hr = 12,000 kWh

3

**Assumed Condition for Study**

- Assume Power Supply 2018 = Demand 2018
- 2030 Demand assumption
  - Demand growth 3.3%/year → Increase 48% from 2018 to 2030
  - (Hourly demand of 2030) = (Hourly demand of 2018) x 1.48
- 2030 Demand & Supply Calculation
  - Supply : Existing Sarakata1(1200kW) + Expanded Sarakata1 (300kW) + New Sarakata2 (1,000kW) + PV + Battery
  - Loss : 10 %

Year	Peak Demand (kW)	Energy Sold (kWh/year)	Estimated growth rate (Peak Demand)
2018	1,018	6,961,224	2.0%
2019	1,044	7,480,124	2.0%
2020	1,070	8,014,476	2.0%
2021	1,096	8,564,832	2.0%
2022	1,122	9,131,692	2.0%
2023	1,148	9,715,664	2.0%
2024	1,174	10,317,368	2.0%
2025	1,200	10,937,424	2.0%
2026	1,226	11,575,472	2.0%
2027	1,252	12,232,128	2.0%
2028	1,278	12,907,904	2.0%
2029	1,304	13,602,432	2.0%
2030	1,330	14,317,312	2.0%
Total growth rate	24% (2%)	25% (1%)	



Source: Site Survey Report (Lugan, 2018)  
 Assuming demand growth rates for peak (kW) as 3.3 % and energy production (kWh) as 1.7%

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**Effectiveness of Installation of Additional Transmission Line**

Scenario		Scenario-00		Scenario-A1	
		Present Plan		Present Plan + Additional Transmission Line	
Existing Plan	Existing Sarakata-1	kW	1,000		1,000
	Expansion of Sarakata-1	kW	300		300
	New Sarakata-2	kW	1,000		1,000
GCF	*Add (1) New Sarakata (Sarakata2)		-		To be added
	Invested Battery	kW	0		0
	Capacity PV	kW	0		0
	Total Capacity including existing hydro-power	kW	2,500		3,500
RE rate (%)	RE rate (%)		92%		96%
	RE 100% day (24hr/day) (RE 100%)		117-day		292-day
	Max. Hourly Percentage of Fossil-fuel		9%		5%
	RE rate (%) with 2018 discharge		92%		92%

- Improve the Stability and Reliability,
- Reduce the Electric Transmission Loss, (assumed to be reduced : 10% → 5%)
- and
- Enhance the Resilience against Natural Disasters such as Cyclones

This project aims to support paradigm shifts in both

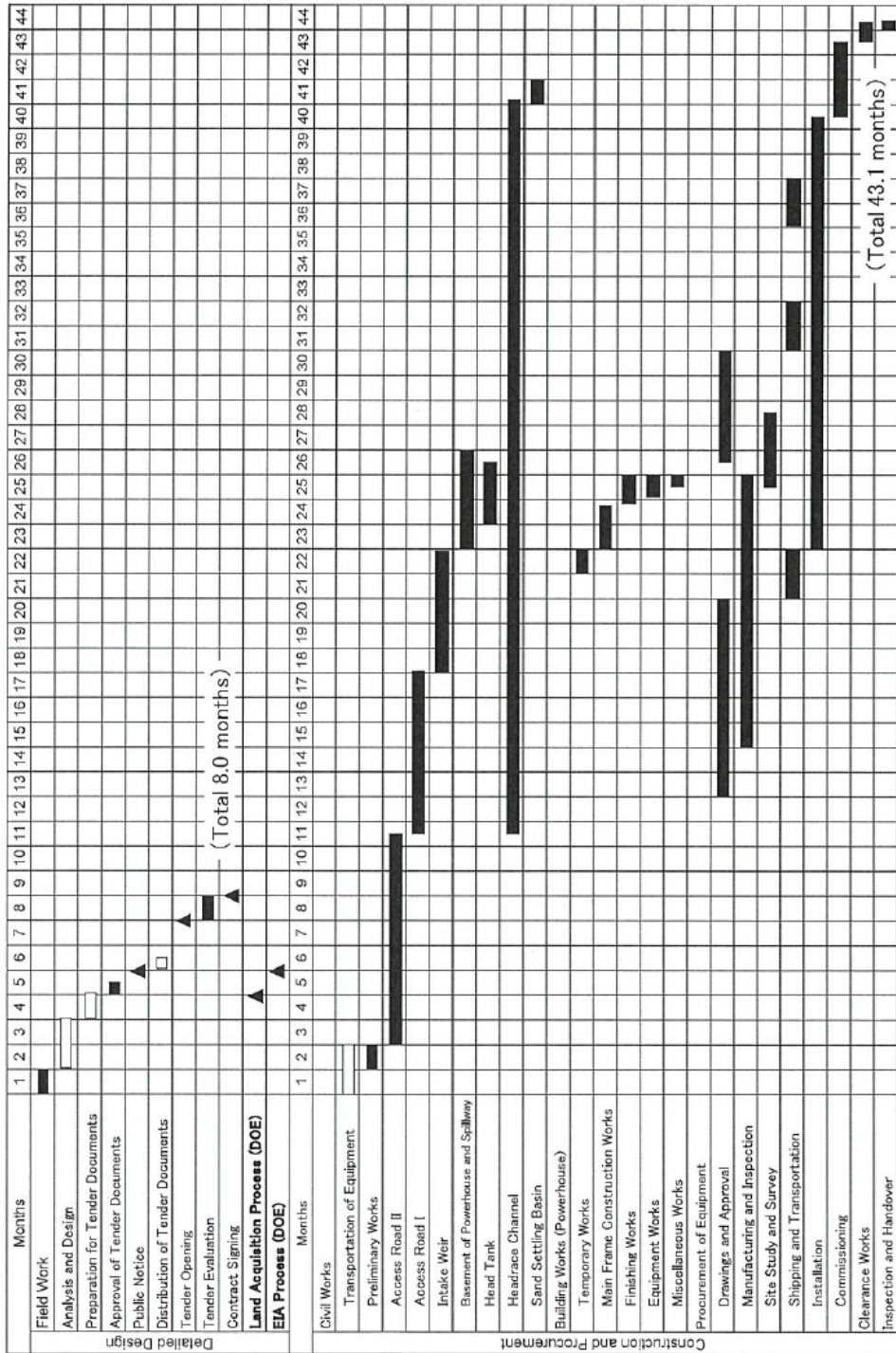
- 'Mitigation' = Reduce GHG Emission (Using RE instead of Fossil Fuel)
- and
- 'Adaptation' = Increase Climate Change Resilience



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# Annex 4 Project Implementation Schedule



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## Annex 5 Japanese Grant

### 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 signed 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.



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- 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.



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PROCEDURES OF JAPANESE GRANT

Stage	Procedures	Remarks	Recipient Government	Japanese Government	JICA	Consultants	Contractors	Agent Bank
Official Request	Request for grants through diplomatic channel	Request shall be submitted before appraisal stage.	x	x				
1. Preparation	(1) Preparatory Survey Preparation of outline design and cost estimate		x		x	x		
2. Appraisal	(2) Preparatory Survey Explanation of draft outline design, including cost estimate, undertakings, etc.		x		x	x		
	(3) Agreement on conditions for implementation	Conditions will be explained with the draft notes (E/N) and Grant Agreement (G/A) which will be signed before approval by Japanese government.	x	x (E/N)	x (G/A)			
	(4) Approval by the Japanese cabinet			x				
3. Implementation	(5) Exchange of Notes (E/N)		x	x				
	(6) Signing of Grant Agreement (G/A)		x		x			
	(7) Banking Arrangement (B/A)	Need to be informed to JICA	x					x
	(8) Contracting with consultant and issuance of Authorization to Pay (A/P)	Concurrence by JICA is required	x			x		x
	(9) Detail design (D/D)		x			x		
	(10) Preparation of bidding documents	Concurrence by JICA is required	x			x		
	(11) Bidding	Concurrence by JICA is required	x			x	x	
	(12) Contracting with contractor/supplier and issuance of A/P	Concurrence by JICA is required	x				x	x
	(13) Construction works/procurement	Concurrence by JICA is required for major modification of design and amendment of contracts.	x			x	x	
(14) Completion certificate		x			x	x		
4. Ex-post monitoring & evaluation	(15) Ex-post monitoring	To be implemented generally after 1, 3, 10 years of completion, subject to change	x		x			
	(16) Ex-post evaluation	To be implemented basically after 3 years of completion	x		x			

notes:

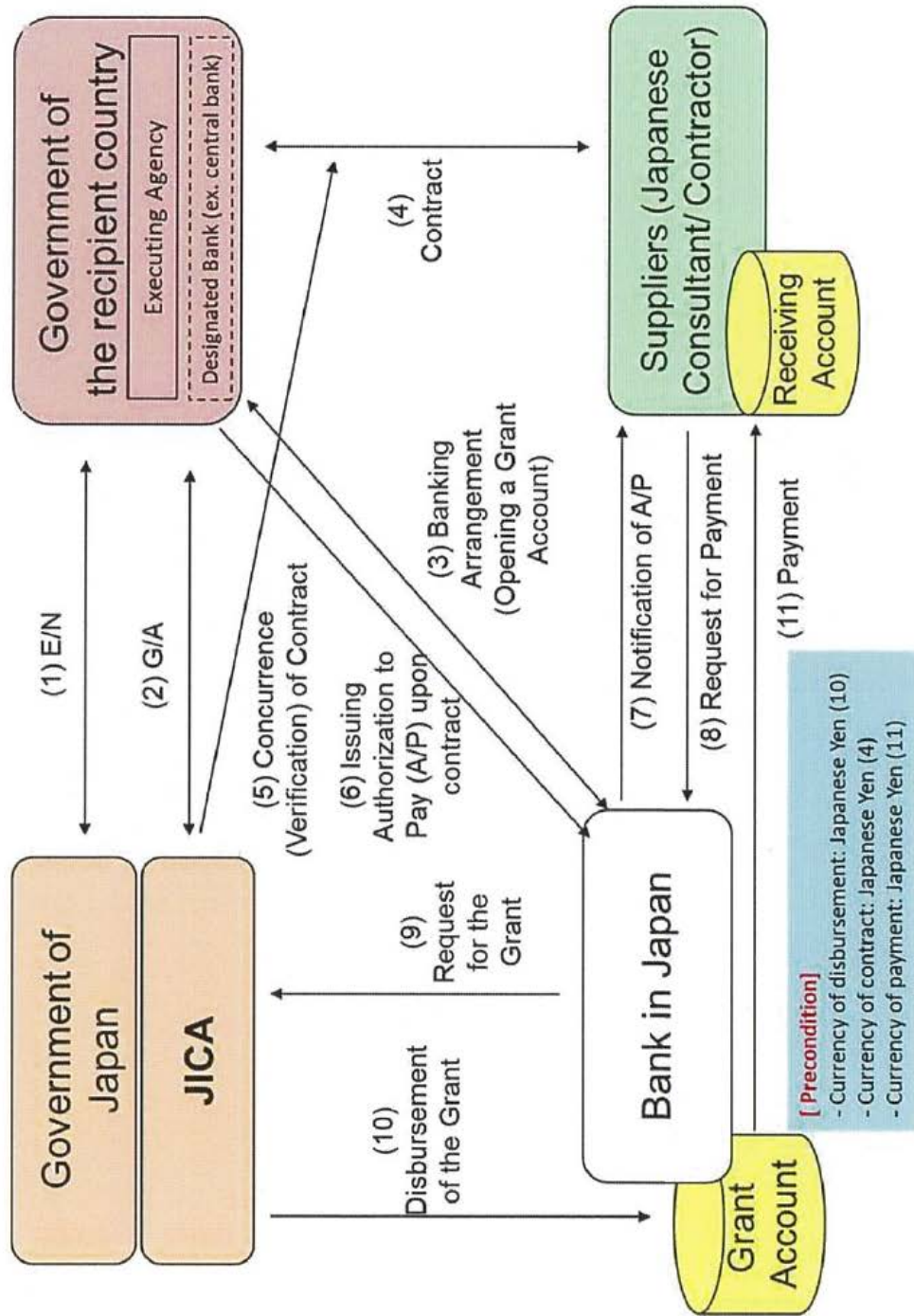
1. Project Monitoring Report and Report for Project Completion shall be submitted to JICA as agreed in the G/A.

2. Concurrence by JICA is required for allocation of grant for remaining amount and/or contingencies as agreed in the G/A.



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## Financial Flow of Japanese Grant (A/P Type)



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Annex 6 Major Undertakings to be taken by the Government of Vanuatu

**1. Specific obligations of the Government of Vanuatu which will not be funded with the Grant**

(1) Before the Tender

NO	Items	Deadline	In charge	Estimated Cost	Ref.
1	To open bank account (B/A)	within 1 month after the signing of the G/A	DOE/MFEM		
2	To issue A/P to a bank in Japan (the Agent Bank) for the payment to the consultant	within 1 month after the signing of the contract(s)	DOE		
3	To approve EIA (Conditions of approval should be fulfilled, if any) and secure the necessary budget for implementation.	before notice of the bidding document(s)	DOE/DEPC	100,000	
4	To secure the necessary budget and implement land acquisition and resettlement if any (including preparation of resettlement sites), and compensation with full replacement cost in accordance with RAP	before notice of the bidding document(s)	DOE/DOL	60,375,000	
5	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	till land acquisition and resettlement complete	DOE		
6	To secure and clear the temporary construction yard and stock yard near the Project area	before notice of the bidding document(s)	DOE	210,000	
7	To secure and clear the temporary disposal area for surplus soil	before notice of the bidding document(s)	DOE	1,208,000	
8	To obtain the planning, zoning, building, and water works permit	before notice of the bidding document(s)	DOE	50,000	
9	To submit Project Monitoring Report (with the result of Detail Design)	before preparation of bidding document(s)	DOE		



## (2) During the Project Implementation

NO	Items	Deadline	In charge	Estimated Cost	Ref.
1	To issue A/P to a bank in Japan (the Agent Bank) for the payment to the Supplier(s)	within 1 month after the signing of the contract(s)	DOE/MFEM		
2	To bear the following commissions to a bank in Japan for the banking services based upon the B/A			3,790,000	
	1) Advising commission of A/P	within 1 month after the signing of the contract(s)	DOE/MFEM		
	2) Payment commission for A/P	every payment	DOE/MFEM		
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	DOE	3,500,000	
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	DOE		
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	during the Project	DOE		
6	To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project	during the Project	DOE		
7	1) To submit Project Monitoring Report	every month	DOE		
	2) To submit Project Monitoring Report (final)	within one month after signing of Certificate of Completion for the works under the contract(s)	DOE		
8	To submit a report concerning completion of the Project	within six months after completion of the Project	DOE		
9	To repair and maintain existing access roads	during the construction	DOE	2,247,000	
10	To implement Environment Management Plan (EMP) and Environment Monitoring Plan (EMoP)	during the construction	DOE/DEPC		
11	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 construction	DOE		
12	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	- until the end of livelihood restoration program (In case that	DOE		



	monitoring will be decided based on agreement between DOE and JICA.	livelihood restoration program is provided) <i>- for two years after land acquisition and resettlement complete (In case that livelihood restoration program is not provided)</i>			
--	---	--	--	--	--

(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	DOE		
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 DOE and JICA.	for three years after the Project	DOE		
3	To maintain and use properly and effectively the facilities constructed and equipment provided under the Grant. - In case O&M of the facilities and equipment will be entrusted to a private concessionaire, DOE shall make necessary arrangement to ensure; 1) Allocation of maintenance cost 2) Adequate operation and maintenance structure 3) Routine check/Periodic inspection	After completion of the construction	DOE/UR A		
4	To make necessary arrangement to utilize the financial benefit derived from the facilities constructed and equipment provided under the Grant for the public interest.	After completion of the construction	DOE		

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**2. Other obligations of the Government of Vanuatu funded with the Grant**

NO	Items	Deadline	Amount (Million Japanese Yen)*
1	To construct hydropower station		
2	To construct transmission line		
3	To implement detailed design, bidding support and construction supervision (Consulting Service)		
4	To prepare access road		
5	Contingencies		
	Total		

\* The Amount is provisional. This is subject to the approval of the Government of Japan.





Annex 7 Project Monitoring Report (template)

Date:

Ref. No.

JAPAN INTERNATIONAL COOPERATION AGENCY  
JICA XXX OFFICE

*[Address specified in the Article 5 of the Grant Agreement]*

Attention: Chief Representative

Ladies and Gentlemen:

NOTICE CONCERNING PROGRESS OF PROJECT

Reference : Grant Agreement, dated (signed date of the G/A), for (name of the Project)

In accordance to the Article 6 (3) of the Grant Agreement, we would like to report on the progress of the Project up to the following stages:

[Common]

- Preparation of bidding documents - result of detailed design
- Completion of final works under construction/procurement contract

[Construction]

- Monthly progress [Month/Year]

[Procurement of Equipment]

- Shipping/delivery, hand-over (take over) of equipment
- Installation works
- Operational training

- Other \_\_\_\_\_

Please see the details as per attached Project Monitoring Report (PMR).

Very truly yours,

[Signature]  
[Name of the signer]



EG

G/A NO. XXXXXXXX  
PMR prepared on DD/MM/YY

*[Title of the signer]*

*[Name of the executing agency]*

cc:

Director General

Financial Cooperation Implementation Department

Japan International Cooperation Agency

*[Address specified in the Article 5 of the Grant Agreement]*



<p><b><i>Project Monitoring Report</i></b>  <i>on</i>  <b><i>Project Name</i></b>  <b><i>Grant Agreement No. XXXXXXXX</i></b>          20XX, Month</p>
--

**Organizational Information**

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

**General Information:**

<b>Project Title</b>	
<b>E/N</b>	Signed date: Duration:
<b>G/A</b>	Signed date: Duration:



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<b>Source of Finance</b>	Government of Japan: Not exceeding JPY _____ mil. Government of (_____): _____
<b>1: Project Description</b>	

**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 <i>(proposed in the outline design)</i>	Actual
1.		

**2-2 Scope of the work**

Components	Original* <i>(proposed in the outline design)</i>	Actual*
1.		



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Reasons for modification of scope (if any).

(PMR)
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**2-3 Implementation Schedule**

Items	Original		Actual
	<i>(proposed in the outline design)</i>	<i>(at the time of signing the Grant Agreement)</i>	

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	Original		Actual	
	<i>(proposed in the outline design)</i>	<i>(in case of any modification)</i>	<i>(proposed in the outline design)</i>	<i>Actual</i>
1.				
<b>Total</b>				

Note: 1) Date of estimation:

2) Exchange rate: 1 US Dollar = Yen

**2-5-2 Cost borne by the Recipient**



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Components			Cost (1,000 Taka)	
	Original <i>(proposed in the outline design)</i>	Actual <i>(in case of any modification)</i>	Original <sup>1),2)</sup> <i>(proposed in the outline design)</i>	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**



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- 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.)

<b>Original</b> (at the time of outline design)
<b>Actual</b> (PMR)

**3-2 Budgetary Arrangement**

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

<b>Original</b> (at the time of outline design)
<b>Actual</b> (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:
2. (Description of Risk)	Probability: High/Moderate/Low
	Impact: High/Moderate/Low
	Analysis of Probability and Impact:
	Mitigation Measures:



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	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:
<b>Actual Situation and Countermeasures</b> (PMR)	Contingency Plan (if applicable):

**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,



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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)



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

	Domestic (Recipient Country) A	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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## Annex 8 Environmental Check List

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
1 Permits and Explanation	(1) EIA and Environmental Permits	(a) Have EIA reports been already prepared in official process?	(a) Y	(a) Draft report is prepared in this survey and will be finalized after land acquisition process
		(b) Have EIA reports been approved by authorities of the host country's government?	(b) N	(b) Report will be submitted to authorities (DEPC) after land acquisition process
		(c) Have EIA reports been unconditionally approved? If conditions are imposed on the approval of EIA reports, are the conditions satisfied?	(c) Y	(c) Land acquisition is the condition conducted by DOE and Department of Land.
		(d) In addition to the above approvals, have other required environmental permits been obtained from the appropriate regulatory authorities of the host country's government?	(d) -	(d) None.
	(2) Explanation to the Local Stakeholders	(a) Have contents of the project and the potential impacts been adequately explained to the Local stakeholders based on appropriate procedures, including information disclosure? Is understanding obtained from the Local stakeholders?	(a) Y	(a) Explanation was conducted and understanding was obtained from local residents in stakeholder meetings
		(b) Have the comment from the stakeholders (such as local residents) been reflected to the project design?	(b) Y	(b) Done.
(3) Examination of Alternatives	(a) Have alternative plans of the project been examined with social and environmental considerations?	(a) Y	(a) Done.	
2 Pollution Control	(1) Water Quality	(a) Does the water quality of dam pond/reservoir comply with the country's ambient water quality standards? Is there a possibility that proliferation of phytoplankton and zooplankton will occur?	(a) -	(a) Construction of dam pond/reservoir is not expected
		(b) Does the quality of water discharged from the dam pond/reservoir comply with the country's ambient water quality standards?	(b) -	(b) There is no standard of water quality
		(c) Are adequate measures, such as clearance of woody vegetation from the inundation zone prior to flooding planned to prevent water quality degradation in the dam pond/reservoir?	(c) -	(c) Same as (a)
		(d) Is there a possibility that reduced the river flow downstream will cause water quality degradation resulting in areas that do not comply with the country's ambient water quality standards?	(d) N	(d) In order to maintain the maintenance water flow, degradation of water quality is not expected.
		(e) Is the discharge of water from the lower portion of the dam pond/reservoir (the water temperature of the lower portion is generally lower than the water temperature of the upper portion) planned by considering the impacts to downstream areas?	(e) -	(e) Same as (a)
	(2) Wastes	(a) Are earth and sand generated by excavation properly treated and disposed of in accordance with the country's regulations?	(a) Y	(a) After temporary storage, residual soil is expected to be reused in public works.
3 Natural Environment	(1) Protected Areas	(a) Is the project site located in protected areas designated by the country's laws or international treaties and conventions? Is there a possibility that the project will affect the protected areas?	(a) N	(a) There are no protected areas within / around the project site.
	(2) Ecosystem	(a) Does the project site encompass primary forests, tropical rain forests, ecologically valuable habitats (e.g., coral reefs, mangroves, or tidal flats)?	(a) N	(a) The area around the project site is covered by a secondary forest, and no important habitat is expected.
		(b) Does the project site encompass the protected habitats of endangered species designated by the country's laws or international treaties and conventions?	(b) N	(b) Endangered species are not expected around the project site.
		(c) Is there a possibility that the project will adversely affect downstream aquatic organisms, animals, plants, and ecosystems? Are adequate protection measures taken to reduce the impacts on the ecosystem?	(c) -	(c) Construction of dam pond/reservoir is not expected
		(d) Is there a possibility that installation of structures, such as dams will block the movement of the migratory fish species (such as salmon, trout and eel those move between rivers and sea for spawning)? Are adequate measures taken to reduce the impacts on these species?	(d) N	(d) Migratory fish have not been identified.
	(3) Hydrology	(a) Is there a possibility that hydrologic changes due to the installation of structures, such as weirs will adversely affect the surface and groundwater flows (especially in "run of the river generation" projects)?	(a) Y	(a) Since hydropower facility is a flow type, it is expected to affect the flow of surface water, but its impact is limited because the maintenance water flow is controlled and maintained.
	(4) Topography and Geology	(a) Is there a possibility that reductions in sediment loads downstream due to settling of suspended particles in the reservoir will cause impacts, such as scouring of the downstream riverbeds and soil erosion? Is there a possibility that sedimentation of the reservoir will cause loss of the storage capacity, water logging upstream, and formation of sediment deposits at the reservoir entrance? Are the possibilities of the impacts studied, and adequate prevention measures taken?	(a) N	(a) Since there is no plan to install a dam pond / reservoir, the impact of sediment volume is not expected.
		(b) Is there a possibility that the project will cause a large-scale alteration of the topographic features and geologic structures in the surrounding areas (especially in run of the river generation projects and geothermal power generation projects)?	(b) Y	(b) Although topographical changes are expected due to the construction of headrace conduit and access roads (earth work), the changes are expected to be minimal in consideration of the balance between soil cut and embankment.

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Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
4 Social Environment	(1) Resettlement	(a) Is involuntary resettlement caused by project implementation? If involuntary resettlement is caused, are efforts made to minimize the impacts caused by the resettlement?	(a) Y	(a) Land acquisition is needed and resettlement is not expected.
		(b) Is adequate explanation on compensation and resettlement assistance given to affected people prior to resettlement?	(b) Y	(b) Explanations on land acquisition are conducted through stakeholder meetings.
		(c) Is the resettlement plan, including compensation with full replacement costs, restoration of livelihoods and living standards developed based on socioeconomic studies on resettlement?	(c) Y	(c) Compensation prices for land acquisition have been examined and reflected in the report.
		(d) Are the compensations going to be paid prior to the resettlement?	(d) Y	(d) Compensation payments will be completed before the commence of construction.
		(e) Are the compensation policies prepared in document?	(e) Y	(e) Compensation policies was prepared and reflected in the report.
		(f) Does the resettlement plan pay particular attention to vulnerable groups or people, including women, children, the elderly, people below the poverty line, ethnic minorities, and indigenous peoples?	(f) -	(f) Resettlement is not expected.
		(g) Are agreements with the affected people obtained prior to resettlement?	(g) Y	(g) Resettlement is not expected.
		(h) Is the organizational framework established to properly implement resettlement? Are the capacity and budget secured to implement the plan?	(h) Y	(h) The organization framework for land acquisition is established and its plan has been reflected in the report.
		(i) Are any plans developed to monitor the impacts of resettlement?	(i) Y	(i) Monitoring plan was prepared and reflected in the report.
	(j) Is the grievance redress mechanism established?	(j) Y	(j) Grievance redress mechanism will be established and its plan was reflected in the report.	
	(2) Living and Livelihood	(a) Is there any possibility that the project will adversely affect the living conditions of inhabitants? Are adequate measures considered to reduce the impacts, if necessary?	(a) N	(a) There are no affected residents in the project site, and impact to residents is not expected.
		(b) Is there any possibility that the project causes the change of land uses in the neighboring areas to affect adversely livelihood of local people?	(b) N	(b) Impact to the land use is not expected.
		(c) Is there any possibility that the project facilities adversely affect the traffic systems?	(c) N	(c) Impact to the traffic system is not expected.
		(d) Is there any possibility that diseases, including infectious diseases, such as HIV, will be brought due to the immigration of workers associated with the project? Are adequate considerations given to public health, if necessary?	(d) N	(d) Since employment of local residents is expected, impact to the public health is not expected.
		(e) Is the minimum flow required for maintaining downstream water uses secured?	(e) Y	(e) Minimum flow required for maintaining downstream water uses is secured.
		(f) Is there any possibility that reductions in water flow downstream or seawater intrusion will have impacts on downstream water and land uses?	(f) N	(f) Changes of water quantity and quality to the downstream area are not expected.
		(g) Is there any possibility that water-borne or water-related diseases (e.g., schistosomiasis, malaria, filariasis) will be introduced?	(g) N	(g) Diseases are not expected through the project implementation.
		(h) Is there any possibility that fishery rights, water usage rights, and common usage rights, etc. would be restricted?	(h) N	(h) It is not expected to restrict river-related rights.
	(3) Heritage	(a) Is there a possibility that the project will damage the local archeological, historical, cultural, and religious heritage? Are adequate measures considered to protect these sites in accordance with the country's laws?	(a) N	(a) There is no historical heritage in / around the project site.
	(4) Landscape	(a) Is there a possibility that the project will adversely affect the local landscape? Are necessary measures taken?	(a) N	(a) The project site is located in the deep forest area where people generally cannot access, and there is no landscape to consider.
	(5) Ethnic Minorities and Indigenous Peoples	(a) Are considerations given to reduce impacts on the culture and lifestyle of ethnic minorities and indigenous peoples?	(a) N	(a) Impact to ethnic minorities is not expected.
		(b) Are all of the rights of ethnic minorities and indigenous peoples in relation to land and resources to be respected?	(b) Y	(b) Customary land will be acquired through a formal process.
	(6) Working Conditions	(a) Is the project proponent not violating any laws and ordinances associated with the working conditions of the country which the project proponent should observe in the project?	(a) Y	(a) It will be observed in accordance with the labor standards of Vanuatu.
		(b) Are tangible safety considerations in place for individuals involved in the project, such as the installation of safety equipment which prevents industrial accidents, and management of hazardous materials?	(b) Y	(b) Installation of safety equipment will be obligated to contractors.
		(c) Are intangible measures being planned and implemented for individuals involved in the project, such as the establishment of a safety and health program, and safety training (including traffic safety and public health) for workers etc.?	(c) Y	(c) Preparation of safety and health plan will be obligated to contractors.
		(d) Are appropriate measures taken to ensure that security guards involved in the project not to violate safety of other individuals involved, or local residents?	(d) Y	(d) Establishment of an appropriate security system will be obligated to contractors.



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Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
5 Others	(1) Impacts during Construction	(a) Are adequate measures considered to reduce impacts during construction (e.g., noise, vibrations, turbid water, dust, exhaust gases, and wastes)?	(a) Y	(a) Mitigation measures have been planned and reflected in the report.
		(b) If construction activities adversely affect the natural environment (ecosystem), are adequate measures considered to reduce the impacts?	(b) Y	(b) Impact to the natural environment is expected, but the impact is limited since the construction scope and construction period are limited. Mitigation measures have been planned and reflected in this survey report.
		(c) If construction activities adversely affect the social environment, are adequate measures considered to reduce the impacts?	(c) Y	(c) The impact to the land acquisition is expected. Mitigation measures have been planned and reflected in the report.
	(2) Accident Prevention Measures	(a) Is a warning system established to alert the inhabitants to water discharge from the dam?	(a) -	(a) Construction of a dam is not planned
	(3) Monitoring	(a) Does the proponent develop and implement monitoring program for the environmental items that are considered to have potential impacts?	(a) Y	(a) A monitoring plan has been prepared and reflected in the report.
		(b) What are the items, methods and frequencies of the monitoring program?	(b) Y	(b) Refer the Environmental Monitoring Plan for details.
		(c) Does the proponent establish an adequate monitoring framework (organization, personnel, equipment, and adequate budget to sustain the monitoring framework)?	(c) Y	(c) Refer the Environmental Monitoring Plan for details.
(d) Are any regulatory requirements pertaining to the monitoring report system identified, such as the format and frequency of reports from the proponent to the regulatory authorities?		(d) Y	(d) Refer the Environmental Monitoring Plan for details.	
6 Note	Reference to Checklist of Other Sectors	(a) Where necessary, pertinent items described in the Forestry Projects checklist should also be checked (e.g., projects in the mountains including large areas of deforestation).	(a) -	(a) Not applicable.
		(b) In the case of dams and reservoirs, such as irrigation, water supply, and industrial water purposes, where necessary, pertinent items described in the Agriculture and Water Supply checklists should also be checked.	(b) -	(b) Not applicable.
		(c) Where necessary, pertinent items described in the Power Transmission and Distribution Lines checklist should also be checked (e.g., projects including installation of electric transmission lines and/or electric distribution facilities).	(c) -	(c) Not applicable.
	Note on Using Environmental Checklist	(a) If necessary, the impacts to transboundary or global issues should be confirmed (e.g., the project includes factors that may cause problems, such as transboundary waste treatment, acid rain, destruction of the ozone layer,	(a) Y	(a) Impact of construction work on global warming has been reflected in the report.



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Annex 9 Environmental Management Plan/Environmental Monitoring Plan

Environmental items	Monitoring item	Parameter/Indicator	Location	Frequency	Responsible	Budget
<b>Pre-construction</b>						
Land acquisition, compensation payment and other support	Compensation for land and other assets	- Area of land acquisition and lease - Number of assets	Project area	Once before construction	DOE	Land acquisition plan monitoring
	Complaints resolutions	GRM log book	Project area	Time of complaints happen	DOE	Land acquisition plan monitoring
<b>Construction phase</b>						
Accident and incident	Complaint (in general such as noise, traffic jam, and accidents)	Records of complaints	Project area	Time of complaints happen	Contract or DOE	Construction cost
Air Pollution	Equipment and automobiles in good shape	Regular inspection and maintenance (daily check sheet/work report)	Project area	Daily	Contract or	No cost applicable to monitor.
	Air quality	Level of dust (visual observation)	Project area	Daily	Contract or	Construction cost
	Mitigation measures such as sprinkling water, washing tires	Records on water sprinkling/ washing (check sheet/work report)	Project area	Daily	Contract or	Construction cost
Air pollution/ noise & vibrations	Equipment and automobiles with less emission gas and noise	Number of Automobiles with certification on site		As appropriate	Contract or	No cost applicable to monitor.
Water pollution	Surface water quality	Suspended Substance (SS) (by portable water quality meter) oil & grease (observation)	Discharge point / Upper site/ lower site of Sarakata river	Weekly	Contract or	Construction cost
	Condition of turbidity measures work	Condition of function and damage (visual inspection)	Project area	Daily	Contract or	Construction cost
Waste	Management of excavated soil, concrete debris and others	Proper storage nor not (check sheet/work report) Reuse or not (check sheet/ work report)	Project area	Monthly	Contract or	Construction cost
	Management of general waste	Records of waste disposal	Project area	Monthly	Contract or	Construction cost



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Environmental items	Monitoring item	Parameter/Indicator	Location	Frequency	Responsible	Budget
Bottom sediment/ Ecosystem	Mitigation measures	Mitigation measures are done or not (check sheet/ work report)	Project area	Weekly	Contractor	Construction cost
Hydrology	Condition of steep slope	Condition of steep slope along river (visual inspection)	Project area	Weekly	Contractor	Construction cost
Work conditions	Occupational Safety and Health plan	Availability of OHS Plan	Project area	Monthly	Contractor	Construction cost
	Meetings and trainings	Number of meetings and trainings				
	Safety goods for workers	Number of workers with safety gear				
	Occurrence of accidents and injuries	Records of accident and injuries				
Accident/ Traffic congestions	Traffic management Plan	Availability of TMP	Project area	Monthly	Contractor	Construction cost
	Implementation of TMP	Availability of guard, signboard, and so on (activity records)	Project area	Monthly	Contractor	Construction cost
<b>Operation phase</b>						
Hydrology	River channel	River channel is changed or not	Between intake weir and hydropower house	Twice a year (Dry & Wet season)	DOE	Operational cost

To implement above plan, following status is to be considered.

**a) Status of EIA approval**

EIA report shall be submitted by DOE to Department of Environment Protection and Conservation after the land acquisition.

**b) Consultation Meetings**

Consultation Meetings with local stakeholders in Santo were conducted and the project is accepted by them. The meetings shall be continued to communicate with them and share the project information.

**c) Policy of Grievance and Complaints Redress Mechanism (GRM)**

The GRM process should be disclosed publicly and available during the pre-construction, construction and operation phases of the project, and to be used by all affected stakeholders, including employees and contractors.



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**d) Policy of Monitoring**

A monitoring will be conducted to evaluate whether environmental and social consideration, the land acquisition process and compensation activities are implemented as planned according to the “Annex 10: Environmental and Social Monitoring Form”.



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**1. Response/Actions to Comments and Guidance from Government Authorities and the Public**

Monitoring Item	Monitoring Results during Report Period
Number and contents of formal comments made by the public	
Number and contents of responses from Government agencies	

**2. Pollution**

1) Air Quality

Item	Unit	Situations of Dust Based on the observation	Monitoring Point	Frequency
Dust	-	1. Good 2. Acceptable level 3. Bad	Construction site	Daily

2) Surface Water Quality

Item	Unit	Measurement Point			Standards for Contract	Referred Standards	Frequency
		Discharge point of the turbid water	Down-stream of Sarakata river	Up-stream of Sarakata river			
Suspended Substance (SS)	mg/l			-	200	Japan's standard	weekly
Oil & grease	Yes/No			-	observed		

3) Waste (Construction waste)

Date: \_\_\_\_\_ Item: Waste Management Mark: "✓" if management is done as required

Location	Kind of waste	Volume of waste (m3)	Final disposal or reuse	Stored at designated place	Waste separation	Remark

4) Mitigation Measures

Date: \_\_\_\_\_ Mark: "✓" if mitigation measure is done

No	item	Monitoring Site	Mitigation measure is done or not Conditions of facilities	Remarks	Frequency
1	Check the conditions of vehicles (dust & noise control)	Project site			Daily
2	Sprinkling (dust control)	Project site			Daily
3	Washing tires (dust control)	Exit of the project site			Daily



No	item	Monitoring Site	Mitigation measure is done or not Conditions of facilities	Remarks	Frequency
4	Condition of temporary cofferdam	Riverbank at the project site			Daily
5	Condition of sedimentation pond/drainage	Discharge point			Daily

### 3. Natural Environment

#### 1) Ecosystems

Item	Monitoring Site	Monitoring Results during Report Period	Measures to be Taken	Frequency
Clearance condition to avoid/limit the loss of habitat (visual inspection)	Project site			Weekly
Identifying Important species such as <i>Pteropus. anetianus</i> (Vanuatu Flying Fox) (visual inspection)	Project site			Weekly

#### 2) Hydrological Situation

Item	Monitoring Site	Monitoring Results during Report Period	Measures to be Taken	Frequency
Impact of construction work on steep slope (visual inspection)				Weekly
Impact of operation of hydropower facilities on river channel (visual inspection)				Twice a year (Dry & Wet season)





**4. Social Environment**

1) Land acquisition  
Pre-Construction phase  
 Resettlement, Land expropriation, and compensation for assets and crops (monthly report)

Item	Planned Total	Unit	Month/Year		Month/Year		Month/Year		Month/Year		Expected completion date	Responsible organization
			Qty	%	Qty	%	Qty	%	Qty	%		
1. Update PAPs list and Final Asset Valuation												DOL
1-1 Identification of final PAHs*	-	HH Business										
1-2 Announcement to Affected people	-	Time										
1-3 Inventory survey and final cost estimation for expropriation	-	Time										
1-4 Consultation meeting times	-	Time										
1-5 Agreement signed by PAHs*	-	HH Business										
2. Progress of resettlement												
2-1 Resettlement of household	-	HH										
3. Progress of land												DOL

EG

Item	Planned Total	Unit	Month/Year		Month/Year		Month/Year		Month/Year		Expected completion date	Responsible organization
			Qty	%	Qty	%	Qty	%	Qty	%		
acquisition												
3-1 Permanent land acquisition Customary land	13,000	m2										
3-2 Permanent land acquisition Leased land	337,000	m2										
3-3 Temporary land use Leased land	70,000	m2										
4. Progress compensation in cash of												DOL
4-1 Agricultural Products	140	num.										
4-2 Trees	73	num.										
4-3 Livestock	100	num.										
5. Complain and Grievance Redress Cases N/A		Case										
5-1 Solved cases		Case										
5-2 Unsolved cases		Case										



EG

Item	Planned Total	Unit	Month/Year		Month/Year		Month/Year		Month/Year		Expected completion date	Responsible organization
			Qty	%	Qty	%	Qty	%	Qty	%		
2												

Record of Complain and Grievance Management

No	Date	Complain and Grievance from PAPs		Solution / Result / Any actions to be taken	

Consultation meetings

No	Date	Sector	Nos of Participants	Key agenda and result of discussion

2) Livelihood Before Construction

Item	Monitoring Results during Report Period	Measures to be Taken	Frequency
Priority in Employment			Monthly
Other employment			Monthly

EG

3) Safety Management (Health and Occupational Safety)  
 Safety management plan  
 Pre-construction phase

Date	Safety management plan is prepared and submitted	Approved by the Consultant	Remarks

Training programs

No	Date	Training	Agenda	Participant
1				
2				

During Construction  
 Safety management

Date:

No	item	Result	Remarks
1	Number of meetings organized since the previous monitoring		
2	Safety gear distribution (%)		
3	Keep records of accidents and injuries properly (Yes/No)		
4	Installation of fences, assignment of guards (Yes/No)		

Record of Accidents

No	Date	Details of accidents	Solution / Result / Any actions to be taken



EG





4) Other checklist

Date:

Mark: "✓" if mitigation measure is done

No	item	Monitoring Site **	Mitigation measure is done or not	Remarks
1	Communities get the information on the construction schedule			
2	Communities know get the information of traffic management			
3	Installation of signboard			
4				

5) Record of Complains

No	Date	Complains	Solution / Result / Any actions to be taken

EG

