## A. BASIC PROJECT INFORMATION

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# Table ES 1: Summary of Projec Component

	Project Component	Description/Specification
1	Dam	
	Dam type	Concrete face rockfill dam
	Maximum dam height	143.1 m
	Length of dam crest (including spillway)	878.5 m
2	Reservoir	
	Area	2,924 ha
	Storage capacity	1169.3 10 <sup>6</sup> m <sup>3</sup>
3	River Diverison and Outlet Facilities	
	Cofferdam Elevation	73 m
	Design Flood	1.5 year return period
	Diversion Tunnel-diameter	10 m
	Number of untis	3
	Length	900 m
4	Spillway	
	Elevation of weir crest	149.0 m
	Gate quantity	3 sets
5	Power Intake and Waterways	
5.1	Intake structures	



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	Project Component	Description/Specification
	Overall width (with middle pier)	55 m
	Height	55 m
6	Powerhouse	
	Туре	ground
	Rated capacity	250 MW
	Dimension (L x W x H)	85.41m*39.28m*51.2m
7	Generating Equipment	
7.1	Model of water turbine	HL()-LJ-340
	Quantity	3 sets
	Rated output	87.18 MW
7.2	Model of generator	SF85-28/7650
	Quantity	3 sets
	Rated capacity	85 MW
8	Switchyard and Transmission Facility	
8.1	Switchyard	
	Туре	GIS
	Area (L x W)	49.57m*11.5m
8.2	Transmission Line	
	Transmission voltage, double circuit	138 kV
	Length of transmission line	20 km
9	Access Road	Length 15.3 km, width 6 m



#### **B.** Process Documentation

### 1. Brief Summary of the Project's EIA Process

The Pulangi Hydopower Corporation (PHPC) commissioned Lichel Technologies Inc. (LTI) to conduct the Environmental Impact Assessment (EIA) for their proposed South Pulangi Hydroelectric Power Plant Project located in the Municipalities of Damulog, Kibawe, Dangcagan and Kitaotao all in the Province of Bukdinon. The conduct of the EIA was guided by relevant issuances of the Department of Environment and Natural Resources (DENR) and the Environmental Management Bureau (EMB) including, but not limited to, DAO 2003-30, MC 2010-14, EMB MC 2014-005 and DENR DAO 2017-15 and its Implementing Rules and Regulations. Proponents of Environmentally Critical Projects (ECPs) must conduct an EIA and submit an Environmental Impact Statement (EIS) or Environmental Performance Report and Management Plan (EPRMP) for review and approval by the DENR through the Environmental Management Bureau (EMB) prior to the issuance of the Environmental Compliance Certificate (ECC).

#### 2. EIA Team

The key members of the multi-disciplinary team who conducted the EIA study and their fields of expertise are shown in **Table ES 2** below:

	NAME	SPECIALIZATION	REGISTRATIO N NO.
1.	Rachel A. Vasquez	Project Director/Peer Reviewer/Air Quality/ Water Quality	IPCO-280
2.	Emmanuel Cleofas	Socioeconomics/People	IPCO-277
3.	For. Jan Paolo Pollisco	Terrestrial Flora and Fauna	IPCO 276
4.	Dr. Roberto Pagulayan	Freshwater Ecology/Fisheries/Aquatic Resources	
5.	Engr. Franklin D. Ramones	Hydrology/Hydrogeology/ Agriculture	
6.	Dr. Perfecto Evangelista	Soils and Land Use	IPCO-179
7.	Ronald Pahunang	Meteorology, Air Quality	IPCO-173
8.	Anacleto Suelto, Jr.	Geology/Geological Hazards/Disaster Risk Reduction/EGGAR	
9.	Rainier D. Reyes	Peer Reviewer/Water Quality	IPCO-104
10.	Allen B. Villanueva	Climate Change	IPCO-279
11.	Lynnette Lyzelle Ferrer	Biology/ Aquatic Resources	IPCO-275

#### Table ES 2: EIA Team

#### 3. EIA Study Schedule

**Table ES 3** below shows the study schedule. Initial IEC Activities were conducted last August 2018. The Public Scoping was conducted last September 4, 2018. The Scoping meeting with the Environmental Management Bureau was conducted last September 25, 2018.

Module	Activity	Date
Pre-Scoping/	Initial IEC	July 26, 2018
Scoping Activities		August 7-8, 2018
	Public Scoping	September 4, 2018
	Technical Scoping with EMB	September 25, 2018
Land	Soil Sampling	August 26-29, 2018
	Geological Survey	September 5-6, 2018

### Table ES 3: EIA Study Schedule



### PULANGI HYDROPOWER CORPORATION

Module	Activity	Date
	Terrestrial Ecology	August 26-29, 2018
Water	Water Quality	September 5-6, 2018
	Hydrology	August 20-21, 2018
	Water Ecology	August 20-21, 2018
Air	Air Quality and Noise Sampling	September 5-6, 2018
People	Household Surveys and Secondary data collection	August 17-24, 2018

#### 4. EIA Study Area

The study area covers the identified direct impact areas such as the location of the proposed damsand the reservoir area. The study covers the Municipalities of Damulog, Kibawe, Dangcagan and Kitaotao, all in the Province of Bukidnon.

#### 5. EIA Methodology

Environmental studies focused on the identified location of each component as the direct impact area. All information and data gathered were compiled and analyzed based on the Guidelines of DAO 03-30. Field investigations and sampling were conducted, together with the secondary data gathered, and the critical parameters for the environmental conditions were established.

The EIA methodology for each study modules are provided in Section 2 and are summarized in **Table ES 4** below.

Modules	Methodologies Used for Assessment		
Geology	Secondary data gathering from different offices and institutions (e.g., Mines and Geosciences Bureau)		
	Site visit;		
Soils	Secondary data gathering from different offices and institutions		
	Sampling conducted by sub-stratum		
	Parameters analyzed include pH, OM, K, P, N, Cd, Pb, Hq, As, CR <sup>6+</sup>		
	Parameter Method		
	pH Electrometric		
	Potassium Flame AAS		
	Phosphorus Colorimetric		
	Organic Matter Walkley-Black		
	Nitrogen kjeldahl		
	Cadmium Flame AAS		
	Lead Flame AAS		
	Mercury Cold Vapor AAS		
	Arsenic GF/AAS		
	Chromium (Cr 6+) Diphenylcarbazide		
Land Use	Secondary data gathering from Comprehensive Land Use Plan, National Commission on Indigenous People and		
	Proponent		
	Site visit		
Terrestrial Flora	Transect survey		
	Secondary data from relevant sources		
Terrestrial Fauna	Transect line survey		
	Interviews		
	Secondary data from the relevant sources s		
Hydrology	Stream flow measurement		
	Secondary data gathering from different offices and institutions		
Secondary data used for flood peak prediction			
Water Quality	In situ measurement of water temperature and DO parameters Orion Oxygen Meter (Model 840)		
	Parameter Methodology		
	I otal Suspended Solids (TSS) Grab sampling		

Table ES 4: Methodology Used for each Module



# PULANGI HYDROPOWER CORPORATION

Modules	Methodologies Used for Assessment		
	Oil and Grease	Grab sampling	
	Biochemical Oxygen Demand (BOD)	Grab sampling	
	Dissolved Oxygen (DO)	Multi-parameter meter	
	Temperature	Multi-parameter meter	
	рН	Multi-parameter meter	
	Total Dissolved Solids (TDS)	Multi-parameter meter	
	Salinity	Multi-parameter meter	
	Conductivity	Multi-parameter meter	
Freshwater Ecology	a. Riparian, Channel, and Environmental Inventory don	e using the metrics of Petersen (1992)	
	b. Plankton sample collection was done using a plankto	n net of 80 μm mesh size.	
	c. Riverside macroinvertebrate sampling was done using an improvised 1 mm mesh sieve		
	d. Fish and macro-biota were done on wadable areas with the help of local fisherfolk using cast nets, e. line, or hand		
	sieves, where applicable.		
	f. Interview with local fisherfolk		
	g. Secondary literature search		
Air Quality	High Volume Sampler for TSP sampling, Gas Bubble S	ampler.	
	Sound level meter for noise/sound level determination		
	Secondary data from PAGASA for climatic conditions		
Socio-economic	Secondary data gathering for demographic analysis		
	Key Informant Interview		
	Household and Perception Interview		
	Land Acquisition and Resettlement Plan-FGDs, Invento	bry of Assets;	
	IPDP-FGDS, Interviews, site visits at sacred sites.		

6.

# 7. Scoping and Public Participation

# i. IEC Activities

**Table ES 5** below shows the summary of IEC and public participation activities conducted. Summary of the issues and concerns raised during the IEC activities is further discussed in Section 2.4.7

Date	Activity	Venue	Participants
July 24, 2018	Project Presentation	Maramag Gymnasium,	Local Government Units (Municipal)
	(LGU-PHPC initiated)	Maramag Bukdinon	Barangay LGUs
			Tribal Leaders/Elders
August 7, 2018	Project Presentation	Function Hall,	Local Government Units (Municipal)
9:00 am	EIA Process Presentation	Municipality of Damulog	Barangay LGUs
			Tribal Leaders/Elders
			Women's Organization
			Senior Citizen's Organization
			Youth Organization
			Community Leaders
			School Heads
August 7, 2018	Project Presentation	Municipal Gymnasium,	Local Government Units (Municipal)
1:00 pm	EIA Process Presentation	Municipality of Kibawe	Barangay LGUs
			Tribal Leaders/Elders
			Women's Organization
			Senior Citizen's Organization
			Youth Organization
			Community Leaders
			School Heads

# Table ES 5: Summary of IEC Activities



Date	Activity	Venue	Participants
August 8, 2018	Project Presentation	Lucky 9 Resort	Local Government Units (Municipal)
9:00 am	EIA Process Presentation	Municipality of Dangcagan	Barangay LGUs
			Tribal Leaders/Elders
			Women's Organization
			Senior Citizen's Organization
			Youth Organization
			Community Leaders
			School Heads
August 8, 2018	Project Presentation	Municipal Tennis Court,	Local Government Units (Municipal)
1:00 pm	EIA Process Presentation	Municipality of Kitaotao	Barangay LGUs
			Tribal Leaders/Elders
			Women's Organization
			Senior Citizen's Organization
			Youth Organization
			Community Leaders
			School Heads

## ii. Public Scoping

The Public Scoping for the proposed South Pulangi Hydroelectric Power Plant Project was held last September 4, 2018 at the East Kibawe Covered Court in the Municipality of Kibawe, Bukidnon. Around 64 attendees were present during the activity. The Public Scoping Repor is attached as **Annex 13.** Present during the scoping are the following representatives:

- Hon. Minerva Casinabe, Mayor, Municipality of Kibawe
- MENRO, Municipality of Dangcagan
- MPDC, Municipality of Dangcagan
- SB Secretary, Municipality of Dangcagan
- Barangay Affairs Office, Municipality of Kitaotao
- MPDC, Municipality of Kitaotao
- Punong Barangay
  - o Dolorosa, Dangcagan
  - o Miaray, Dangcagan
  - San Vicente, Dangcagan
  - o Balintawak, Kibawe
  - o Bukang Liwayway, Kibawe
  - Magsaysay, Kibawe
  - o Mascarinas, Kibawe
  - Natulongan, Kibawe
  - o Pinamula, Kibawe
  - o Sanipon, Kibawe
  - o Talahiron, Kibawe
  - o Tumaras, Kibawe
  - Cagawasan, Kibawe
  - o Kitaihon, Kitaotao
  - Kitobo, Kitaotao
  - Metebagao, Kitaotao
  - o San Lorenzo, Kitaotao
- Senior Citizen's Organization
- Magsaysay Elementary School Kibawe
- Department of Energy

- Tribal Chieftain/IPMR
  - Dolorosa, Dangcagan
  - o Miaray, Dangcagan
  - o San Vicente, Dangcagan
  - o Bukang Liwayway, Kibawe
  - o Bukang Liwayway, Kibawe
  - o Cagawasan, Kibawe
  - o Mascarinas, Kibawe
  - Pinamula, Kibawe
  - o Talahiron, Kibawe
  - o Balocbocan, Kitaotao
  - o Kitobo, Kitaotao
  - Metebagao, Kitaotao
  - o Tandong, Kitaotao
  - o Tangkulan, Damulog



- National Irrigation Administration Bukdinon IMO
- Environmnetal Management Bureau 10

### C. EIA Summary

#### a.) Summary of Alternatives

Table ES 6 shows the summary of alternatives considered for the project in terms of siting and dam type. This is further discussed in **Section 1.3**.

## Table ES 6: Summary of Project Alternatives

Positive Feature	Negative Feature	
Siting		
Municipality of President Roxas, North Cotabato (Pu	ılangi V)	
Higher project production (300MW)	Larger reservoir area;	
	Higher number of affected household;	
	Political uncertainty	
Municipality of Damulog, Province of Bukidnon (Sou	th Pulangi HEPP)-adopted as project	
Smaller reservoir area, hence less affected	d Lower project production (250MW)	
households;		
More favourable political situation		
Dam Type		
Embankme	ent with Core	
Accepts poor quality but low cost fill material from	Impervious material source uncertain	
excavations		
Appropriate for weak foundation	Wide base requires longer diversion and power	
	tunnels	
Least Foundation treatment	Need most protection during construction	
Conventional, conservative, ample precedent		
Conclusions: rejected, based on technical		
<u>C</u>	FRD	
Least affected by rainfall during construction	Needs substantial volume of imported hi-cost rock fill	
Shorter waterways (than embankment with core)	Foundation treatment at plinth grout cap very critical	
	Unprecedented for these weak foundations and	
	materials	
Conclusion: adopted, basic project		
<u>Ha</u>	rd fill	
Accepts poor quality and low cost aggregates	Unprecedented for this size and combination of	
	conditions	
Appropriate for weak foundation	Needs more foundation treatment (than	
	embankment with core)	
Least cost for appurtenant structures	Less suited to higher reservoir FSL (dam heights)	
Non-erodible and less sensitive to foundation	Estimated cost least certain.	
treatment (than CFRD)		
Conclusion: potential alternative at lower FSL		

### b.) Summary of Main Impacts

The summayr of main impact, mitigating and enhancement measures and residual impacts is shown Table ES 7. Project impacts are further discussed in **Section 3**.

Impact	Options for Prevention for Mitigation or Enhancement	Residual Impacts After Mitigation
CONSTRUCTION		
- Vegetation loss	<ul> <li>Avoid unnecessary cutting of vegetation</li> </ul>	Clearing of vegetation
	- Inventory of biota and riparian zone as	unavoidable due to nature of

### Table ES 7: Summary of Main Impacts



PULANGI HYDROPOWER CORPORATION

Impact         Enhancement         Mitigation           - Habitat fragmentation         - Sais for species and volume replacement - Compensate through planting indigenous tree species suitable in the area - Implement watershed Management Plan         project. ensure implementation of watershed management plan.           - Change in topography - Increased adsoil erosion         - Use contour- trenching, furrowing, - Increased soil erosion control watershed management plan.         - Consider innimal soil erosion control were with soil erosion control measures,           - Increased ad soil erosion paratal: life due to works in rivers.         - Sais for species during dry - Adequate positioning of stockpile areas way from river/creek.         - Considering the nature of the project, damage is invertable; rehabilitation after construction should be done.         - Considering the nature of the project, damage is invertable; rehabilitation after construction should be done.         - Doestible minimal spill even with appropriate storage and management           Change in river depth and width beavy equipment and vehicles         - Provision of diversion structures to prevent blockage of river flow         - Due to nature of project, change in river depth and width compensation scheme         - Due to nature of project, change in river depth and width compensation scheme         - Displacement of houses is unavoidable considering the nausoidable considering the nau	Impact	Options for Prevention for Mitigation or	Residual Impacts After
- Habitat fragmentation         basis for species and volume replacement - Compensate through planting indigenous tree species suitable in the area - Implement watershed Management Plan         project; ensure indigenous watershed management plan.           - Change in topography         - Use contour- trenching, furrowing, - Increased soli erosion         Possible minimal soli erosion even with soli erosion control measures,           - Increased soli erosion         - Limit construction activities during dry season         Possible minimal soli erosion even with soli erosion control measures,           Degradation of aquatic habitat, species decline         - Road-bank soli erosion preventroin/minimization (use of biological erabalitation)         Considering the nature of the project, damage is inevitable; rehabilitation after construction should be done.           Oil and grease leaks from heavy equipment and vehicles         Periodic inspection and maintenance of equipment         Possible minimal spill even with appropriate storage and management           Change in river depth and width de dorease water flow         Provision of diversion structures to prevent blockage of river flow         Due to nature of project, change in river depth at the reservoir inevitable.           Temporary to germanent disocation of households and loss/destruction of properties, trees, and crops.         Implementation of an IEC program         Displacement of houses is unavoidable considering the nature of the proposed project.           Temporary to permanent disturbances, Reduced productivity of arrested disturbance, even allowing di direct habitat atteration or effect of siltation and seconstruct	impact	Enhancement	Mitigation
- Compensate through planting indigenous tree species suitable in the area - Implement watershed Management Plan - Change in topography - Increased landslides - Increased landslides - Increased landslides - Increased soil erosion - Limit construction activities during dry pestruction or disturbance of aquatic life due to works in rivers. Degradation of aquatic habitat, species decline Change in river depth and width Change in river flow Increased Siltation and Section of properties, trees, and crops. Temporary to permanent physical alteration of properties, trees, and crops. Temporary to permanent physical alteration of in where discostion of siltation and secondary river to biologing frimplementation of an IEC program Temporary to permanent physical alteration of in where discostion of siltation and secondary river to biologing frimplementation of an IEC program Temporary to permanent physical alteration of in where discostion of siltation and secondary river depth and secondary discostion of siltation and secondary frees, and crops. Temporary to permanent physical alteration or effect of siltation and secondary organisms may be in order. Compensation for lose and proper organisms may be in order. Compensation for lose and proper organisms may be in order. Compensation for lose and siltary procedures proventicontor flooding raterall implementation of an IEC program Temporary to permanent physical alteration or effect of siltation and secondary in the vicinity of construction rate and indirect wastel and reduction of in the vicinity of construction rate and indirect wastel discuparies proventicon of the proposed proje	- Habitat fragmentation	basis for species and volume replacement	project; ensure implementation of
- Implement watershed Management Plan         - Change in topography       - Use contour- trenching, furrowing, terracing, fipraps and vegetative measures       Possible minimal soil erosion even with soil erosion control measures,         - Increased and sides       - Limit construction activities during dry pestruction or disturbance of aquatic life due to works in rivers.       - Adequate positioning of stockpile areas away from river/creek.       Possible minimal soil erosion even with soil erosion control measures,         Degradation of aquatic habitat, species decline prevention/minimization (use of biological change in river depth and width equipment       Periodic inspection and maintenance of equipment       Possible minimal spill even with appropriate storage and management.         Change in river depth and width Change in river flow       Periodic inspection structures to prevent blockage of river flow       Due to nature of project, change in river depth at the reservoir inevitable.         Change in species richness due to decrease water flow       Implementation of mutually acceptable dislocation of households and toss/destruction of properties, trees, and crops.       Minimize disturbance, even allowing a portion of the river to be open for organism transit of organism in the vionity of construction area.       Minimize direct disturbance, even allowing a portion of the river to be open for organism ransit, minimize all forms of direct and indirect waste discharge to the river water.       Physical alteration is inevitable due to impounding of water/reservoir.         Temporary to permanent physical alteration and sectory disturbances; Reduced productivity of construction rarea.       Mi		- Compensate through planting indigenous	watershed management plan.
Charge in topography     Construction activities during dry     Consider internation of activities of controur trenching. furrowing.     Increased soil erosion     Increased soil erosion     Considering the nature of the     project, damage is inevitable;     rehabilitation after construction     advart from river/crease     avay from river/crease     considering the nature of the     project, damage is inevitable;     rehabilitation after construction     should be done.     Considering the nature of the     project, damage is inevitable;     rehabilitation after construction     should be done.     Periodic inspection and maintenance of     equipment     avay from river/crease		tree species suitable in the area	
- Change in tipography     - Use contour tenching, furrowing,     - Increased soil erosion     - Limit construction activities during dry     season     - Limit construction activities during dry     season     - Adequate positioning of stockpile areas     away from river/creek.     Degradation of aquatic     - Road-bank soil erosion     revention/minimization (use of biological     rehabilitat, species decline     Perovision and maintenance of     equipment     - Provision of diversion structures to     peroduct inspection and maintenance of     equipment     - Provision of diversion structures to     prevention/file     Provision of diversion structures to     prevent blockage of river flow     Change in river depth and width     Change in river flow     Provision of diversion structures to     prevent blockage of river flow     Change in species richness due     to decrease water flow     Permanent and temporary     dislocation of households and     loss/destruction of properties,     trees, and crops.     Temporary to permanent     physical alteration of site where     construction work is to be done     dam     Reduced biodiversity because     of direct habitat alteration or site where     condermation     Reduced biodiversity because     of direct habitat alteration or site where     routers to     rorganism mays be in order.     Prevention of flow     Persation of site where     routers     rainfall     Increase in landslides in     revent.     Compensation of developed for haves discharge to the     river water.     Compensation of developed for the river to be open for     routers     rainfall     Implementation of money be in order.     Project area is located in area     wreter.     Compensation form lost and reduction of     productivity of construction     apartor of the river dase discharge to the     river axis of organism     the vicinity of construction     rainfall     Implementation of emergency response     plans and safety procedures     Project area is located in area     wreter     r		- Implement watershed Management Plan	
<ul> <li>Increased landslides</li> <li>Iterracting, ripraps and vegetative measures</li> <li>Increased soli erosion</li> <li>Linit construction activities during dry season</li> <li>Adequate positioning of stockpile areas away from river/creek.</li> <li>Road-bank soli erosion of aquatic file due to works in river depth and width or non-biological structures)</li> <li>Oil and grease leaks from equipment and vehicles</li> <li>Periodic inspection and maintenance of equipment</li> <li>Provision of diversion structures to preventible maintagement</li> <li>Provision of diversion structures to prevent blockage of river flow</li> <li>Increased Sittation and Sedimentation</li> <li>Change in river depth and width edue.</li> <li>Provision of diversion structures to prevent blockage of river flow</li> <li>Increased Sittation and Sedimentation</li> <li>Change in species richness due to decrease water flow</li> <li>Permanent and temporary dislocation of households and loss/destruction of site where construction of asite where construction or scheme</li> <li>Temporary to permanent physical alteration of site where disposal of spoils</li> <li>Minimize disturbances and proper discultate atteration or a portion of the river to be open for organism transit, minimize all forms of direct hait atteration area vater.</li> <li>Minimize direct disturbances, Reduced productivity of construction area productivity of construction area productivity of construction area infandil implementation of drug travested aquatic organism may be in order.</li> <li>Presenticontrol flooding</li> <li>Adequate release of water during heavy rainfall</li> <li>Prevent/control flooding</li> <li>Provibutization of host scheme versori area</li> <li>Provibutization of on of the river to be open for organism transit, minimize all forms of direct hait atteration or a portion of the river to be open for organism transit, minimize all forms of direct hait atteration or ap</li></ul>	- Change in topography	- Use contour- trenching, furrowing,	Possible minimal soil erosion
<ul> <li>Increased soil erosion</li> <li>Limit construction activities during dry season</li> <li>Adequate positioning of stockpile areas away from inver/creek.</li> <li>Reducte bablitation of aquatic</li> <li>Read-bank soil erosion prevention/minimization (use of biological protect, damage is inevitable; reducting the nature of the project, damage is inevitable; or non-biological structures)</li> <li>Oil and grease leaks from</li> <li>Periodic inspection and maintenance of equipment</li> <li>Provision of diversion structures to prevent blockage of river flow</li> <li>Provision of diversion structures to prevent blockage of river flow</li> <li>Increased Siltation and Sections during in species fichness due to decrease water flow</li> <li>Permanent and temporary distorbands and crops.</li> <li>Implementation of an IEC program</li> <li>Temporary to permanent physical alteration of site where construction scheme disposal of spoils</li> <li>Minimize disturbances and proper distation and secondary direct disturbance, even allowing a portion of the proposed project.</li> <li>Temporary to permanent physical alteration of site where construction and secondary direct and indirect waste discharge to the river sube configures.</li> <li>Minimize direct disturbance, even allowing a portion of the river to be open for or ganism transit; minimize all forms of direct and indirect waste discharge to the river water.</li> <li>Compensation from lost and reduction of productivity and upstream-discondary organism may be in order.</li> <li>Presciel and solate in area with application of mitigating measures.</li> <li>Project area is located in area with application of mitigating measures.</li> </ul>	- Increased landslides	terracing, ripraps and vegetative measures	even with soil erosion control
Destruction or disturbance of aquatic life due to works in rivers.Season -Acquate positioning of stockpile areas away from river/creek. - Road-bank soil erosion prevention/minimization (use of biological should be done.Considering the nature of the project, damage is inevitable; rehabilitation after construction should be done.Oil and grease leaks from heavy equipment and vehiclesPeriodic inspection and maintenance of equipment and vehiclesPossible minimal spill even with appropriate storage and managementChange in river depth and width change in river flow- Provision of diversion structures to prevent blockage of river flowDue to nature of project, change in river depth at the reservoir inevitable.Increased Siltation and Sedimentation- Provision of mutually acceptable compensation schemeDisplacement of houses is unavoidable considering the nature of the proposed project.Temporary to permanent of direct habitat alteration of site where construction work is to be done damMinimize discurbances and proper discoal of solution of not the river to be open for organism transit; minimize all forms of direct habitat alteration compensation remotes the rived water.Physical alteration is inevitable due to impounding of water/reservoir.OPERATIONS-Adequate position for demension of model and sadely procedures project area is located in area with high landslides usceptibility. Landslide possible even with application of mitigating measures.Temporary to perture discubances; Reduced productivity of construction area.Minimize direct disturbance, even allowing a portion of the river to be open for organism transit; minimize	- Increased soil erosion	- Limit construction activities during dry	measures,
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		employment	as the project is in operation



PULANGI HYDROPOWER CORPORATION

Impact	Options for Prevention for Mitigation or	Residual Impacts After
	Enhancement	Mitigation
Increased source of livelihood	Assistance to LGUs in formulation and	
for locals	implementation of alternative sources of	
	livelihood	
ABANDONMENT		
Land and water pollution	Allocate certain percentage of the	Contamination of land and soil
	construction cost for clean-up after	during clean up still possible even
	construction	with mitigating and management
		measures.
	- Salvage materials that are usable which	
	can be used by the local workers or	
	residence	
Loss of species richness	-Continual rehabilitation and re-vegetation	Due to nature of project,
	of idle and barren lands using indigenous	restoration to pre-project
	species.	conditions may not be possible.
Riverbanks stabilization through	Community-based regreening and	Due to nature of project,
engineering measures and/or	maintenance could be instituted	restoration to pre-project
regreening technologies		conditions may not be possible.
Allow enough time for	Compensation or provision of alternative	Due to nature of project,
organisms to repopulate the	source of income could be provided.	restoration to pre-project
altered environment		conditions may not be possible.

## c.) Risks and Uncertainties

The Environmental Impact Statement was prepared based on the latest available information and as a result of the different scenario analysis, modeling and comparison with standards. This should serve as guide to local, regional and national decision makers in decisions concerning project-related activities. However, this should not be the sole basis of decision making since it is possible that there are project-related risks that is not within the scope of this assessment and may not have been considered in the related management plans. Hence, this assessment will only help as a guide and as supplement to the wide array of information available to decision makers.

In the determination of risks and uncertainties, natural and man-made hazards were assessed to aid decision makers in reducing risks for the multipurpose project. Natural hazards with high susceptibility include ground motion, Earthquake induced landslides, seiche, mass wastingand fluvial hazards.

